

Greening

the

City Fleet



“The City of Windsor is committed to being a leader through its daily actions and services to enhance the environment for present and future generations.”

October 2012

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Section 1: Why Green the Fleet?

The Ministry of Environment has been monitoring air quality in the Windsor area for many years to determine the sources of emissions and levels of air contaminants. A 2003 report stated that “*air monitoring stations in Windsor Downtown and/or Windsor West recorded the highest concentrations of: ozone (O₃), fine particulate matter (PM_{2.5}), nitric oxide (NO), nitrogen dioxide (NO₂), nitrogen oxides (NO_x), carbon monoxide (CO), and sulphur dioxide (SO₂) than any other Ontario city.*” Ten-year trends consistently place Downtown Windsor’s pollutant concentrations as the highest in the Province (1994-2003).

When the residents of Windsor participated in the Environment Attitudes Survey conducted in 2005, they were asked to make a choice on what they felt was the biggest environmental issue facing Windsor; 66% of them answered “air quality”. In 2011, air quality remained the number one environmental issue for the residents of Windsor as per a follow up to this survey.

Statistics from the Ontario Medical Association from 2005 show that Windsor’s air pollution related illnesses were one of the highest in the province. Below are the actual reported statistics with projections to 2026:

Premature Deaths	260 (440 in 2026)
Hospital Admissions	900 (1310 in 2026)
Emergency Visits	2750 (4020 in 2026)
Minor Illness Days	\$1.37M
Health Care Costs	\$23.55M
Lost Productivity Costs	\$17.56M

Environmental and health issues resulting from air quality and atmospheric changes have increased both the urgency and the importance to act on environmental initiatives. For example, carbon dioxide concentrations, the principal greenhouse gas (GHG) contributing to climate change has increased 30% above pre-industrial levels and half of this growth has occurred in the past 30 years. There are various initiatives underway at the international, federal, provincial and municipal level to address these concerns.

The City of Windsor’s fleet accounts for approximately 31 percent of the Corporation’s GHG emissions. Transit Windsor accounts for 66 percent of the total fleet emissions. The service provided by Transit Windsor is paramount in reducing the total emissions of the community inventory.

The City of Windsor’s fleet consists of more than 1200 vehicles, on- and off-road.

City of Windsor Fleet as of 2011	
Corporate Fleet	455
Transit	118
Fire	20
Police	190
Parks	455

Total	1,238
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Greening the fleet involves choosing vehicles, equipment, fuels and practices that consume less fuel and emit less pollution. Reducing fuel consumption lowers the City's fuel costs and reduces emissions of the greenhouse gases that cause climate change and the air pollutants that cause smog and health impacts.

Green Vehicles in Windsor's Fleet as of 2011	
Saturn Aura hybrid	1
Ford Escape hybrid	1
Chevrolet Malibu hybrid	7
Ford Fusion hybrid	1
Bus hybrid	29
Total	39

The guiding principle in a green fleet plan is to improve fuel efficiency which will reduce air emissions and fuel costs. The actions selected for inclusion in the green fleet plan shall guide the City's fleet decisions to ensure the environment is considered in all decisions made.



Section 2: The Environmental Master Plan

The residents' concerns on the subject of air quality in Windsor extend to City Council. The City of Windsor's commitment to improving air quality in addition to other environmental factors is evident in the development of the Environmental Master Plan (EMP). The Environmental Master Plan was unanimously approved by City Council on July 24, 2006 (CR374/2006). The purpose of the EMP is to prepare potential action plans for the improvement of local air quality, water, land and energy issues in the short and the long-term. The EMP provides a framework for the City's environmental decisions.

The Plan's success depends on the involvement of all City's departments, the community, environmental organizations as well as neighbouring municipalities. The Environmental Master Plan shall guide the City's actions with regard to the environment, but it also reflects the expectations of the community.

The Operations – Fleet Division is the defined lead on **Objective Bc** of the Environmental Master Plan.

Objective Bc:	<i>Investigate alternatives to "green" the City's fleet.</i>
Action:	<i>To reduce the air pollution created while operating the City's fleet of vehicles.</i>
Steps:	<ul style="list-style-type: none">• <i>Develop and Implement a Green Fleet Plan</i>• <i>Implement the Fleet Winter Maintenance Policy</i>• <i>Coordinate the Outcome of this Objective with Objective Da – (Environmental Purchasing Policy)</i>

The greening of the City's fleet will help the City in achieving 4 of the 5 goals of the EMP.

Goal A: Improve our Air and Water Quality

Reduction of air emissions from the City's fleet will have a positive effect on improving air quality.

Goal B: Create Healthy Communities

Investigating alternatives to "green" the City's fleet while supporting the City's Transit Master Plan to reduce the dependence on automobiles by increasing transit use and other forms of transportation.

Goal D: Use Resource Efficiently

Improving the fuel efficiency of the City's fleet will reduce overall fuel consumption allowing the City's fleet operations to become more sustainable. Reducing fuel usage will help the City to achieve Greenhouse Gas Emissions reduction targets.

Goal E: Promote Awareness

Lastly, the goal of promoting awareness can be achieved by developing an environmental education strategy to build awareness and understanding of how driver behavior can affect fuel economy and air emissions.

As outlined in the EMP, the Fleet division shall focus on innovation and consider best practices while balancing economic, social and ecological considerations. By forming partnerships and engaging residents, the City of Windsor hopes to lead by example by making achievable and sometimes ambitious environmental policies. By tracking the Plan's progress, an assessment of policies, procedures and initiatives can be reviewed to ensure the desirable objectives are being achieved.



Section 3: Government Initiatives

To encourage municipalities to embrace the “greening” of their cities, the Government of Canada has established several initiatives to provide resources and support these undertakings. These initiatives are present at the federal, provincial and municipal levels.

The Office of Energy Efficiency (OEE), which is part of Natural Resources Canada (NRC), contributed to the development and implementation of the **Federal House in Order (FHIO)** initiative. This initiative formally centralizes the Government of Canada’s efforts to monitor, track and reduce its own GHG emissions.

The **Green Municipal Fund (GMF)** was established in 2000 to support municipal investments in innovative environmental infrastructure projects and practices to achieve cleaner air, water and soil and to reduce GHG emissions. The Federation of Canadian Municipalities (FCM) operates the funds of the GMF.

The **Partners for Climate Protection (PCP)** is a partnership between the Federation of Canadian Municipalities (FCM) and the International Council for Local Environmental Initiatives (ICLEI) - Local Governments for Sustainability. PCP is the Canadian component of ICLEI's Cities for Climate Protection (CCP) network that comprises of more than 800 communities worldwide making the same efforts. More than 176 Canadian municipal governments have committed to reducing greenhouse gases and acting on climate change. PCP receives financial support from the Green Municipal Fund as part of the Capacity Building Program.

PCP is based on the CCP Campaign of a five-milestone framework used to guide municipalities to reduce greenhouse gas emissions. The five-milestone process is a performance-based model, which remains flexible; milestones do not need to be completed in sequential order. The five milestones are:

Milestone 1:	Creating a greenhouse gas emissions inventory and forecast;
Milestone 2:	Setting an emissions reductions target;
Milestone 3:	Developing a local action plan;
Milestone 4:	Implementing the local action plan or a set of activities; and
Milestone 5:	Monitoring progress and reporting results.

The City of Windsor reached the first milestone in October 2008 with the completion of the greenhouse gas inventory and is working to achieve the other milestones. See Appendix A for the fleet results.

The **Federal Vehicles Initiative (FVI)** assists Government of Canada departments and agencies in reducing operating costs by increasing



the energy efficiency of their motor vehicle fleets and making greater use of alternative transportation fuels. This initiative provides federal fleet managers with information and tools to improve the operational efficiency of their fleets and increase their use of alternative fuels. In 2004–2005, the Government of Canada acquired 125 “leadership vehicles,” of which 64 were alternative fuel vehicles, in compliance with the Alternative Fuels Act, and 61 were hybrids.

The **Motor Vehicle Fuel Efficiency Initiative** aims at improving fuel efficiency of new light-duty vehicles sold in Canada. The indicator used to measure annual progress is new vehicle fuel consumption, expressed in litres per 100 kilometres (L/100km). Canada has a voluntary system of fuel consumption standards for each manufacturer, known as company average fuel consumption (CAFC). The standards – 8.6L/100km for passenger cars and 11.4L/100km for light trucks – are consistent with the regulatory standards in the United States. While vehicle fuel efficiency remained fairly flat between 1990 and 2003, new vehicles changed significantly due to technological advances. In 2004, passenger cars were, on average, 12 percent below the standards at 7.6 L/100 km, and light trucks were 6 percent below the standard at 10.7 L/100 km.

The **Ethanol Expansion Program (EEP)** is co-managed with Agriculture and Agri-Food Canada, the EEP aims at increasing the production and use of fuel ethanol in Canada by providing financial contributions for the construction or expansion of ethanol plants.

The **Future Fuels Initiative** aims to increase the supply and use of fuel ethanol produced from biomass, such as plant fibre, corn, wheat and other grains. In March 2004, a national ethanol awareness survey was completed; results indicated that 85 percent of Canadians are in favour of increased ethanol-blended gasoline use in Canada.

As part of the Government of Canada's 10-year Federal Agenda on Cleaner Vehicles, Engines and Fuels, a fundamental part of the Government of Canada's Clean Air Strategy, the **Sulphur in Diesel Fuel Regulations** was created. This will limit the level of sulphur in diesel fuel used in on-road vehicles to a maximum of 15 mg/kg (or 15 parts per million). It came into effect on June 1, 2006 for producers and importers and on September 1, 2006 for sellers to allow for turnover of diesel supplies.

The **Biodiesel Initiative**, an \$11.9-million initiative that is led by CANMET Energy Technology Centre (CETC) and supported by the OEE, supports the Government of Canada's proposed target of 500 million litres of biodiesel production per year by 2010. A biofuel's quality registry was established with the Alberta Research Council to set an industry protocol and standard for fuel analysis.

Canadian Transportation Fuel Cell Alliance (CTFCA) is a private-public partnership co-managed by OEE and CETC. The CTFCA encourages advancements in hydrogen and fuel cell technologies through demonstration projects.

Since 1990, through building retrofits, better fleet management, strategic “green power” purchases and the downsizing of operations, the federal operations have already achieved a 26 percent emissions reduction. The Government of Canada is illustrating its achievements in order to promote similar actions at both the provincial and municipal levels.



Section 4: Possible Solutions

Green fleet management issues vary with time but three main issues are always present: 1) managing fuel consumption, 2) promotion of environmentally friendly vehicles and 3) evaluating alternative fuels. A “green fleet” is a fleet that tries to minimize fuel consumption and exhaust emissions by encouraging fuel efficiency and reduced use.

In general, the elements that the City’s Fleet Division can control or influence to achieve a cleaner and greener fleet include the following:

- *Fuel use, type and amount*
- *Fleet size*
- *Vehicle types – fuel efficiency, size and availability of alternatives*
- *Maintenance of vehicles*
- *Use of recycled oil, anti-freeze and tires*
- *Use, storage and disposal of hazardous materials used in vehicle maintenance*
- *Fueling procedures – preventing pollution from incidental fuel spills*
- *Selection of maintenance materials (i.e. alternatives to hydraulic fluids)*

“Greening” the fleet involves introducing more fuel-efficient cars and converting to cleaner fuels but these alternatives must be closely examined to evaluate pros and cons. Factors such as cost, effectiveness and reliability could determine if the advantages outweigh any disadvantages of adopting a particular solution. The City’s current fleet should be used as a benchmark. Actions selected for implementation shall set clear and concise goals and objectives. Implementation of these actions shall be tracked and compared to the benchmarks to measure success or failures.

There are essentially three strategies available to the City to reduce fuel use and emissions:

1. Capital Investment
 - a. Purchase of New Vehicles
 - b. Alternative Fuels
2. Maintenance (Operating) Improvements
3. Driver training

CAPITAL INVESTMENT ALTERNATIVES

Purchase of New Vehicles

Propane Vehicles

Although a variety of alternative fuels have always been suggested – methanol, compressed natural gas, ethanol and “reformulated” gasoline, only one alternative fuel is proven through widespread use - propane. Exhaust emissions from vehicles running on propane are greatly

reduced as compared to gasoline and diesel fuel. Although fuel consumption is slightly higher with propane as compared to gasoline because it contains slightly fewer BTU's of energy, there are significant maintenance reductions with engines running on propane because of its clean burning characteristics. Propane is gaseous at normal temperatures and under moderate pressure; but is stored as a liquid. Propane is 270 times more compact as a liquid than a gas, making it economical to store and transport as a liquid. It's a by-product of natural gas processing and petroleum refining. A litre of propane will go four times further than a comparable volume of compressed natural gas. The City fleet utilized propane vehicles when there were government incentives to install after market fuel tank conversions. The propane vehicles became costly to maintain and repair and government incentives were no longer available, therefore, decision was made to move away from propane vehicles unless manufacturers provide factory built models.

Compressed Natural Gas Vehicles

Compressed natural gas (CNG) vehicles run considerably cleaner than gasoline cars: they have lower carbon monoxide, particulate matter and carbon dioxide emissions, produce significantly lower evaporative emissions during fueling and operating and emit relatively few toxic contaminants. The disadvantage of this is that it is not widely available and it has a lower fuel economy.

Natural Gas Vehicles

Virtually no Canadian municipalities are planning to use Natural Gas Vehicles (NGVs) in their fleet operations. The exception is the City of Toronto, which has 134 NGVs in their fleet. However, the City of Toronto has 15 public natural gas stations within its boundaries and therefore no requirement to build any municipally owned refueling stations. The City of Toronto also benefits from a unique funding arrangement with the local natural gas distributor that is not available in Windsor.

Hybrid vehicles

The use of hybrid technology not only results in a reduction in fuel usage, which translates into fuel cost savings but also creates a reduction in both smog related and greenhouse gas emissions.

Though there are several hybrid technologies emerging on the market today, the general concept revolves around the use of an electric motor in

conjunction with a conventional internal combustion

engine to help reduce fuel consumption and emissions. The conventional engine shuts down allowing the electric motor to take over at lower speeds. This form of technology is evidently favourable, especially in stop and go inner city traffic. The City of Windsor has taken this into account and has purchased a hybrid Saturn Aura for use in the corporate fleet as well as Ford Escapes, Fusions and Chevrolet Malibu's in the Police Department.



Hybrid Transit Bus



City of Windsor's Hybrid Saturn Aura – Parking Enforcement

Another prime example of hybrid technology emerging in the City of Windsor can be found at Transit Windsor where 18 Hybrid transit buses have been ordered from a Canadian Company by the name of New Flyer. The buses (as shown above) have numerous advantages of the traditional diesel buses such as emissions reductions of up to 90% and improved fuel economy from 20% to 40%.

Hybrid technology is really only beginning to emerge but is doing so rapidly. This technology is prominently used in light duty vehicles, but is beginning to be seen in light trucks as well. Pilot projects are being conducted to investigate the possibility of using hybrid technology in large heavy-duty machinery such as forestry trucks, which idle a significant amount of the time.

The use of hybrid electric vehicles is one of the greatest opportunities to increase the fleet's average fuel economy. Hybrids combine a highly efficient gas engine with an advanced electric motor resulting in an increased fuel efficiency of about 60 percent seems high. They are more expensive to purchase than standard vehicles.

Smart Cars

Smart cars are not electric cars, nor are they hybrids. They run on diesel fuel and use just 4.2 litres per 100 km (combined city and highway value). Biodiesel fuel should not be used in Smart cars. It is a small vehicle so height of driver, space for equipment and other considerations must be made.



Hydrogen fuel cell cars

Fuel cell cars are powered by hydrogen, which is the most abundant element in the universe. It is pollution and noise free. The hydrogen fuel-cell vehicle has low emissions and energy use on the road, but converting natural gas or gasoline into hydrogen requires substantial energy use and emits greenhouse gases.

Electric Vehicles

Electric vehicles have zero emissions while operating, although there are emissions from the electricity generating process. However, with the future closure of coal-fired plants, the air emission will further be reduced. The benefit is that the vehicles can be recharged overnight after the demand for hydro has been reduced. These vehicles are slowly coming onto the market but can still be considered in the development stage. The development of this sector will be monitored to consider the feasibility and benefits for the City's fleet.

Alternative Fuels

Alternative fuels are alternatives to the standard gasoline and diesel. A summary of pros and cons of various alternative fuels is included in Appendix B.

Ethanol-Blended Fuels

Ethanol is an alcohol-based alternative fuel produced by fermenting and distilling starch crops - corn, barley, and wheat - that have been converted into simple sugars. Ethanol can also be produced from "cellulosic biomass" such as trees and grasses and is called bioethanol. Ethanol is most commonly used to increase octane and improve the emissions quality of gasoline. Ethanol can be blended with gasoline to create E85, a blend of 85% ethanol and 15% gasoline.

The Canadian government estimates that, "If 35 percent of gasoline in Canada contained ten percent ethanol, GHG emissions would be reduced by 1.8 megatonnes per year (1.8 million tonnes), which is the equivalent of removing more than 400,000 vehicles from the road." Although most North American gasoline powered vehicles will tolerate up to 10% Ethanol, E-85 compatible engines must be designed and built to accept this fuel. The use of ethanol based fuels greater than the Canadian standard can be considered.

On October 7, 2005, the Ontario government passed regulation Ontario Regulation 535/05 – Ethanol in Gasoline. The regulation calls for an annual average of five percent ethanol in gasoline, beginning in January 2007. Ontario's 2007 target for ethanol will reduce annual greenhouse gas emissions by about 800,000 tonnes, equivalent to removing 200,000 cars from the roads.

Bio-diesel

Another alternative fuel is bio-diesel. It is a clean-burning fuel produced from a variety of renewable agricultural resources such as: soybeans, canola, animal fat or recycled cooking oils. Blended with diesel fuel, the fuel significantly lowers emissions of carbon monoxide, hydrocarbons, particulate matter and toxic contaminants compared to petroleum diesel fuel – particularly important in those diesel vehicles for which there are presently no emission control devices available, e.g., light duty diesel trucks and off-road equipment. Life-cycle reductions in CO₂ are also significant, and, because it is biodegradable and non-toxic, bio-diesel poses minimal concerns related to soil and water contamination. Bio-diesel has the added advantage of not requiring any vehicle equipment changes; it can be used in any standard unmodified diesel engine.

There are some incentives available: In the March 2003 budget, the Government of Canada provided a full exemption of the 4¢ per litre federal excise tax on diesel, for bio-diesel.

Some disadvantages are that bio-diesel can have a cleaning effect on the fuel system of a vehicle when being used for the first time. Special attention needs to be paid to fuel filters for the first few weeks. It also has a higher cloud point than diesel therefore precautions need to be taken during storage. Once bio-diesel is blended (B20), generally cold weather issues are avoided down to negative 20°C, at which point vehicles should be stored inside. Furthermore, bio-diesel tends to cost more than petroleum diesel, however, with more price stability than diesel.

MAINTENANCE (OPERATING) IMPROVEMENTS

Maintenance

To ensure the cleanest possible emissions and optimal fuel economy, proper vehicle maintenance is essential. Emissions from well-maintained vehicles are 20 to 50 percent less than those from engines that are not properly maintained. Fuel economy is equally affected by maintenance. The City of Windsor has planned maintenance programs in place, at regular intervals, based on the industry standard for each vehicle. Maintenance is tracked in a fleet management system and records are kept for each vehicle. This regular maintenance assures optimal fuel economy and minimal emissions for each vehicle within the City of Windsor Fleet.

Tire Inspection

Well-maintained engines and properly inflated tires can significantly increase fuel efficiency for cars and trucks. Annual maintenance checks are not enough to ensure all tires are properly inflated. Studies show that one tire under-inflated by two pounds per square inch (psi) will

increase fuel consumption by one percent and that low rolling resistance tires could improve the fuel economy of passenger vehicles by approximately three percent and even more for diesel trucks with heavy loads. This three percent increase in efficiency would cut fleet fuel by a significant amount.

Right vehicle/right job

An effective fuel saving strategy would be to match duty requirements of staff to the smallest possible vehicle for the task. The purchase of pick-up trucks should only be considered when the purpose of the vehicle will include the hauling of large equipment.

Diesel truck retrofits

Retrofitting diesel vehicles with emission control devices such as oxidation catalysts or particle filters in addition to using ultra low sulphur diesel fuel will reduce carbon monoxide, hydrocarbon and particulate emissions by 50 to 90 percent, depending on the device used.

- Particulate traps achieve the greatest emissions reduction but work only on engines that get heavy use and reach high temperatures.
- Oxidation catalysts reduce emissions by about 50 percent and are used on equipment that gets less intense use. The only negative aspect is that they have high particulate emissions unless fitted with a particulate trap.

Retrofit devices also significantly reduce smoke and odour from diesel engines.

Tracking Fuel Efficiency

The City of Windsor's fuel management system currently has fuel economy tracking capabilities. In order for a vehicle to be refueled, the vehicle's odometer reading must be entered into a system. This provides the capability to track fuel consumption on a per-vehicle basis. This could also be used to pinpoint fuel consumption issues with individual vehicles, or even driving habits (ex. excessive idling).

Anti-Idling Technologies

There are anti-idling technologies available that will automatically shut down a vehicle if it has been idling for too long. For example, Attica Equipment Ltd. has designed, developed and is manufacturing an unattended shut-down system for use in all engine powered equipment. The "GT3A" shut-down systems are designed to limit engine idling to a maximum of 10 minutes (user adjustable 0-10 minutes). The device utilizes a signal from the vehicle's park brake system as an input to start/stop the timer. This device will save fuel, reduce engine wear, reduce emissions, and much more. The key switch in the picture is for warm up by-pass. All units are keyed alike so there is no confusion if the mechanics lose a key or two. There is also a red reset button next to the key switch. Simply press this reset button to restore normal operation if the unit times out.



(Available in 12 and 24 Volt)

It is important to note that some City vehicles have equipment that requires the engine to be running, such as emergency lights on public safety vehicles. When appropriate, vehicle lighting can be converted to LED technology which will allow for the vehicle to be turned off without affecting battery life. Some heavy duty specialty equipment such as sweepers, aerial trucks and dump trucks come standard with anti-idling devices. The shift to mobile offices (laptops mounted in city vehicles) improves work efficiency when information can be retrieved and/or inputted while the vehicle is idling and power to essential equipment is not lost.

DRIVER TRAINING

Driver Training

Drivers of fleet vehicles must also be aware of all “Green Driving Practices.” Simple habits such as ensuring proper tire pressure on a regular basis, driving in a gradual manner avoiding abrupt accelerations, and avoiding vehicle idling are all very important, yet simple practices that affect a fleet’s impact on the environment. The full fuel training program includes some green driving practices; however, this type of driver training could be included with yearly training on proper refueling procedures. The collective impact of each driver’s habits could be significant.

Reduction of Vehicle Idling

Vehicle idling wastes fuel and pollutes the environment, getting zero miles per gallon. Idling causes double the wear on internal parts compared to driving at regular speeds. People think that to heat up the car, you must leave it running for a long time but 10 seconds is sufficient. Idling for more than 10 seconds burns more fuel than it takes to restart the engine. A substantial amount of money could be saved by reducing vehicle idling in addition to reduced emissions. Drivers of all City vehicles shall be aware of the City of Windsor’s Anti-Idling By-Law 233-2001 (Appendix „C”) and educated on the consequences of idling vehicles.



Section 5: Transition Strategy

5.1 Reduce the Size of Fleet

Fewer vehicles result in reduced fuel use and lower greenhouse gas emissions.

As part of the annual budget review of fleet requirements, departments rationalize their fleet vehicles for possible consolidation or elimination based upon operational needs.

Actions:

- Rationalize fleet vehicles for possible elimination.

Implementation:	2010 - 2014
Lead:	Fleet Manager Executive Director of Operations Executive Director of Parks & Facilities Senior Manager, Pollution Control Chief Building Official Fire Chief Police Chief General Manager, Transit Windsor

5.2 Right Size Vehicles

Right sizing the fleet refers to ensuring that the right size vehicle is assigned for a specific job function. For example, the purchase of pick-up trucks should only be considered when the purpose of the vehicle will include the routine hauling of large equipment.

Natural Resources Canada (NRCan) publishes an annual Fuel Consumption Guide for light duty vehicles available in Canada, including passenger cars, pick-up trucks, minivans, large vans, special purpose vehicles and alternative fuel vehicles. It is a useful resource to compare fuel efficiency and carbon dioxide emissions for individual vehicle models. NRCan also recognizes the most fuel-efficient new light-duty vehicles in their class sold in Canada each model year.

Recent examples of corporate right sizing include the introduction of small pickups in the Corporate fleet, hatchback cars in the Fire Department and Dodge Journeys in Building Department (e.g. By-Law Enforcement)..

Actions:

- To assist in right sizing, a needs assessment (Appendix D) must be completed by departments for each new light duty vehicle to confirm job function and demands on the vehicle. As required, ergonomic assessments may also be performed to determine the appropriate type of vehicle.

- Departments should target light duty vehicles (that are typically used by single occupants and not used for transporting goods and materials as determined in the needs assessment) with carbon dioxide emissions rated below 3,600 kg/year and fuel efficiency for city driving below 8.5 litres/100 km.

Implementation:	2010 - 2014
Lead:	Fleet Manager Executive Director of Operations Executive Director of Parks & Facilities Senior Manager, Pollution Control Chief Building Official Fire Chief Police Chief General Manager, Transit Windsor

5.3 Maintenance of Vehicles

Vehicle maintenance is an important part of a green fleet strategy to ensure emissions continue to be minimized and fuel efficiency is maximized.

FACT:
Operating a vehicle with one tire under-inflated by 8 psi can reduce the life of the tire by 15,000 km and increase fuel consumption by 4 %.

Operations – Fleet Division is responsible for maintaining the majority of the City’s fleet of light duty vehicles. Systems are in place to ensure the fleet is regularly maintained, according to the manufacturers’ recommended maintenance schedule.

FACT:
A poorly maintained vehicle can increase fuel consumption by up to 50% and can increase air pollutant emissions by more than 50%.

Actions:

- Continue with vehicle maintenance best practices, including staff training for new technologies.

Implementation:	2010 - 2014
Lead:	Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief General Manager, Transit Windsor

- Check tire pressure monthly and more often in cold weather because cold temperatures decrease tire pressure.

Implementation:	2010 - 2014
Lead:	Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief General Manager, Transit Windsor

5.4 Anti-Idling

Vehicles idling unnecessarily get zero kilometres to a litre of fuel, waste fuel, cause increased wear on an engine and contribute to air pollution. The City of Windsor has had an idling control by-law in place since 2001 (By-Law 233-2001), which applies to staff and the public.

FACT:

Idling your engine for more than 10 seconds uses more fuel than it takes to restart the engine. Excessive idling can damage engine components. Every 10 minutes of idling wastes ¼ to ½ litre of fuel, emits 600 to 1200 g of CO₂, and a variety of air pollutants. Turn off your engine if stopped for more than a minute, except in traffic.

Actions:

- Include importance of anti-idling in the fuel training sessions delivered by Corporate Health & Safety.

Implementation:	2013
Lead:	Fleet Manager Executive Director of Human Resources

- Investigate anti-idling devices for use in the city fleet.

Implementation:	2012
Lead:	Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief

5.5 LED lighting

Conventional lighting on some vehicles (i.e. rotating safety lights, etc) draw significant power from the vehicles battery. If the lights were required for a time and the vehicle was shut off, the driver may have issues with restarting the vehicle. LED technology requires a lot less energy and allows the driver to shut down the vehicle without the issue of reducing the battery life.

Actions:

- To replace all conventional lighting with LED technology where appropriate.

Implementation:	2010 - 2014
Lead:	Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief General Manager, Transit Windsor

5.6 Diesel Retrofit

Diesel engine emissions include particulate matter under 10 microns (PM₁₀), which is listed as a toxic substance under the *Canadian Environmental Protection Act, 1999*, and is a suspected carcinogen. Diesel PM is linked to increased emergency room visits, hospital admission rates, and cases of asthma.

New standards for diesel engines, combined with regulations for Ultra-Low Sulphur Diesel (ULSD), which came into effect in 2006, will significantly reduce emissions from heavy-duty diesel on-road vehicles. Despite the new regulations, pollution from diesel engines will continue

to be a major environmental concern for years to come. Many older, higher-polluting diesel engines will be on the road for the next 10 to 25 years.

The City of Windsor, in partnership with Environment Canada, would like to reduce emissions of carbon monoxide (CO), hydrocarbon (HC) and particulate matter (PM) by retrofitting older engines with diesel oxidation catalysts (DOCs) or flow through filters (FTFs). The City of Windsor has 6 trucks eligible to receive funding.

Actions:

- To work with Environment Canada to retrofit 6 older engines with diesel oxidation catalysts (DOCs) or flow through filters (FTFs).

Implementation:	2010
Lead:	Fleet Manager

- To investigate the benefit of retrofitting additional units with diesel oxidation catalysts (DOCs), flow through filters (FTFs) or other technology as available.

Implementation:	2010
Lead:	Fleet Manager

5.7 Driver Training

Vehicle operators can reduce emissions and conserve fuel by adopting proper driving habits, such as driving less, smarter, reducing unnecessary idling and minimizing cargo loads where possible. Vehicle operators are provided driver training upon hiring with an emphasis on safety and re-training is provided as necessary. Additional training of smart driver techniques should be considered to improve fuel efficiency.

FACT:
Aggressive driving, including speeding, quick starts and hard stops can burn up to 39 % more fuel. Increasing highway driving speed from 100 km/hr to 120 km/hr burns 20% more fuel. Accelerate and decelerate smoothly and use cruise control (if available) to maintain speeds for highway driving.

FACT:
Remove the junk from your trunk and clean off snow and ice. Every extra 100 pounds of cargo reduces fuel efficiency by 2%.

FACT:
Air conditioning can increase fuel consumption by over 20%. For city driving, it is more fuel efficient to open a window than to operate the air conditioner. At highway speeds, use air conditioning sparingly, alternating with fresh air vents.

Actions:

- To develop a fuel efficient driver handbook and workshop. City staff would receive the handbook and workshop at all fuel retraining sessions. The handbook and workshop could also be used as a resource to promote smart driving to the community.

Implementation:	2012 - 2014
Lead:	Fleet Manager Environmental Coordinator Executive Director of Human Resources

5.8 Monitoring

Energy and fuel consumption has a significant impact on the environment and this should be the starting point for annual environmental reporting. To ensure that the Corporation is strategic in its energy management efforts, options will be evaluated to implement a system to measure fuel consumption.

In order to confirm the efficiencies of the fleet vehicles, information such as vehicle type, fuel consumption and kilometres travelled is required. Most of this data is currently tracked through the City's computerized fleet management system but additional analysis of data may be required.

Actions:

- Establish benchmark for fuel efficiency for each vehicle class and develop a report for monitoring purposes.
- All vehicles should be monitored to track fuel consumption, fuel costs, mileage and maintenance costs to ensure the corporate objective to improve fuel efficiency is met.

Implementation:	2013 - 2014
Lead:	Fleet Manager Environmental Coordinator

5.9 Third Party Review

FCO is a not-for-profit program of the Canadian Energy Efficiency Alliance that helps fleet operators reduce their fuel consumption, operating costs and tailpipe emissions through sharing of modern fleet management techniques and proven best management practices.

In Ontario, Fleet Challenge Ontario represents the E3 (Energy, Environment, Excellence) Fleet Program. E3 Fleet Review applies comprehensive data analysis tools in order to produce custom reports and recommendations for reducing emissions, fuel, operating and capital costs for each fleet. The City of Windsor was selected as 1 of 12 municipalities to participate in a pilot project with Fleet Challenge Ontario (FCO) in 2008.

E3 Fleet also operates a fleet rating system similar to that of LEED ratings for buildings. As fleet greening initiatives are undertaken, the City can apply for a Fleet Rating (e.g. Silver, Gold or Platinum).

A third party review would provide a credible review of the City's fleet and help assess the success of this green fleet plan.

Actions:

- Complete a follow up E3 Fleet Review of the City of Windsor's fleet to assess the success of this green fleet plan.

Implementation:	2011
Lead:	Fleet Manager

- Have the City of Windsor's fleet rated under the E3 fleet rating system (or similar) to identify opportunities to reduce fuel use and pollutant emissions and measure the City of Windsor's fleet against available environmental benchmarks.

Implementation:	2014
Lead:	Fleet Manager

5.10 Grant Opportunities

Federal and provincial governments are continuously providing grant opportunities to municipalities to aid in building a more sustainable energy future. An example of a funding opportunity is the Federation of Canadian Municipalities Green Municipal Fund. The City of Windsor should take advantage of any grant opportunities available.

Actions:

- Seek funding opportunities to enable the City to accelerate greening of its fleet.

Implementation:	2010 - 2014
Lead:	Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief General Manager, Transit Windsor Environmental Coordinator

5.11 Purchase Green Vehicles

“Green vehicles” refers to a vehicle that reduces fuel consumption and/or reduces emissions of greenhouse gases and air pollutants, relative to a conventional vehicle. Examples include hybrid and electric vehicles as well as vehicles with an engine that uses a cleaner alternative fuel.

Actions:

- Consider purchase of green vehicles including hybrid, electric or alternative fuel vehicles where one is available in the appropriate class of vehicles and is operationally and economically feasible.

Implementation:	2010 - 2014
Lead:	Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief General Manager, Transit Windsor

5.12 Review of Green Fleet Plan

This Green Fleet Plan tries to highlight available technology today. However, government incentives and tougher air emissions regulations are continuing to push manufacturers to research, develop and build more sustainable vehicles. This plan should be reviewed and updated at least once during each term of Council to ensure that the City of Windsor continues to be a leader and complies with the Environmental Master Plan.

Actions:

- The Green Fleet Plan should be reviewed annually.

Implementation:	2012
Lead:	Chief Administrative Officer Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief General Manager, Transit Windsor Environmental Coordinator



Section 6: Success Stories

There are many Canadian cities that have implemented successful green fleets. The City of Windsor should use these various experiences to learn from when planning and researching the greening process. Here are some PCP participants that have achieved their green fleet goals:

City of Toronto

The City's Fleet Services division is responsible for more than 4,000 licensed vehicles and equipment units. The City's Green Fleet Transition Plan, adopted in 2004, is a three-year strategy to reduce emissions from the City's fleet of vehicles. The plan calls for the replacement of old vehicles with bio-diesel, hybrid electric and natural gas powered cars and trucks - a process that has begun at the City of Toronto. The Green Fleet Transition Plan was developed to reduce the equivalent carbon dioxide (eCO₂) output of the City's inventory by 10 – 15 million kilograms, and significantly reduce other forms of pollutants over the four-years of the Plan and future years. In 2002, the Canadian Federal Government through its Climate Change Action Fund began purchasing emission reduction credits from municipalities to count towards its Kyoto commitment of reducing greenhouse gases by 6% between 2008 and 2012.

If the City of Toronto were in a position to sell emission reduction credits to the Federal Government as part of its Kyoto commitment the revenue could be used to fund the Green Fleet Transition Plan. As of December 31, 2007, the green fleet was composed of 283 vehicles, and the number is growing each year:

Vehicle	Quantity	Vehicle	Quantity
Smart Car	25	Chevy Silverado Hybrid Pickup	27
Honda Insight Hybrid	1	Natural Gas Vehicle	141
Honda Civic Hybrid	24	Cube Van with Idle Free Space Heater	29
Toyota Prius Plug-In Hybrid	1	Hydrogen Gator at Exhibition Place	4
Toyota Prius Hybrid	3	Regenerative Air Dustless Street Sweeper	16
Ford Escape Hybrid	2	100% Biodiesel Garbage Truck	1
Saturn Vue Hybrid	9	Total	283

City of Hamilton

The City has a fleet of 975 vehicles for the Public Works Department. Since the fleet is responsible for a significant portion of the air pollutants emitted in the course of municipal operations, the City created the Green Fleet Implementation Plan. Its purpose is to present a sustainable implementation schedule for replacing the City's fleet with vehicles and equipment that are less harmful to the environment. The Green Fleet Implementation Plan recommends the use of hybrid-electric vehicles to reduce emissions from the City's gasoline powered fleet, and bio-diesel to reduce emissions from the City's diesel powered fleet. Hamilton has purchased 15 hybrid-electric vehicles (HEVs) since 2002, reducing fuel consumption by 15% to

35% versus comparable conventional models, and emissions of key air pollutants are reduced by over 50%. When fuel consumption is reduced, all exhaust emissions are also reduced, including carbon dioxide equivalents (CO₂e) and the toxic compounds, which create smog. The fleet wanted to use natural gas vehicles (NGVs) but because of the inaccessibility the option was disregarded. Most Canadian municipalities are not planning to use NGVs in their fleet operations. The exception is the City of Toronto, which has 134 NGVs in its fleet. This is possible because the City has 15 public natural gas stations within its boundaries and therefore no requirement to build any refueling stations of its own. It also benefits from a unique funding arrangement with the local natural gas distributor that is not available to Hamilton.

City of Burlington

The City of Burlington has committed to reduce corporate greenhouse gas emissions by 20 percent on a per capita basis from 1994 levels by 2012. To aid in accomplishing this goal, the City of Burlington has developed a greening the corporate fleet transition strategy (May 2008). The objectives of this strategy are simple: to continue greening the corporate fleet by improving efficiency and reducing emissions.

Clean Air Sudbury and Mirarco Mining Innovation

The Greater Sudbury Fuel Efficient Driving Handbook was prepared by Clean Air Sudbury, a non-profit community group focused on community air quality issues in Greater Sudbury, and the Mining Innovation Rehabilitation and Applied Research Corporation (MIRARCO), a non-profit applied research firm, specialized in mining and the environment.

This handbook provides Greater Sudbury drivers with information on how to drive and maintain their personal vehicles to maximize fuel efficiency and presents tips for purchasing fuel efficient vehicles. This handbook is distributed to residents of the Greater Sudbury region and promoted through free workshops around the community.



Section 7: Recommendations & Conclusion

This Green Fleet report highlights some options available to move the City's fleet towards operations that would have the least negative impacts on the environment, at the same time having some monetary advantages. Appendix D summarizes these transitional action items.

The City of Windsor is wholly dedicated to improving the environment in order to ensure that the health and social enjoyment of its residents remains a priority. By lowering emissions from City vehicles, Windsor would be doing its part in improving the air quality and the environment as a whole.

Greening the City fleet would not only demonstrate environmental responsibility to the public, but also to the government and automobile manufacturers. This would signal the increasing demand for alternative fuels and environmentally friendly vehicles.

This plan is intended to be a living document. The City of Windsor will continue to thoroughly research all the possible alternatives and update this plan at least once during each term of Council.

Appendix A

Fuel Usage and Cost Comparison

2005 Vehicle Fleet – Baseline GHG Inventory		
	Total Litres	Total eCo2 (t)
Corporate Fleet	1,355,715	2,971
Parks Off-Road Equipment	69,314	184
Fire	170,968	449
Transit	3,294,880	8,984
TOTAL	4,890,877	12,588

2010 Vehicle Fleet Inventory			
	Total Litres	Total eCo2 (t)	Change
Corporate Fleet	1,080,489	2,700	-10%
Parks Off-Road Equipment	26,537	70	-163%
Fire	143,460	377	-19%
Transit	3,247,086	8,703	-3%
TOTAL	4,497,572	11,850	-6%

Police Vehicle Fleet Inventory		
<i>NOTE: Police baseline data for 2005 did not include fuel purchased outside City facilities. A breakdown of the 2010 litres by fuel type was not available to calculate the GHG emissions.</i>		
	Total Litres	Total eCo2 (t)
2005	368,091	872
2010	583,202	--

Appendix B

Alternative Fuels Pros and Cons

Fuel Type	Pros	Cons
Unleaded Petrol	Widely available, familiar and proven technology - therefore inexpensive; extensive refuelling infrastructure	High CO ₂ emissions and poor fuel economy; high evaporative emissions
Low Sulphur Diesel	Widely available, familiar and proven technology - therefore inexpensive; extensive refuelling infrastructure; better fuel economy and CO ₂ emissions than petrol	High particulate emissions (unless fitted with a particulate trap); high NO _x emissions; car can be more expensive to purchase than petrol version
Liquid Petroleum Gas (LPG)	Low CO ₂ emissions, similar to diesel; generally low levels of other pollutants; tax advantages (GradVED and BIK); very cheap subsidised fuel compared with petrol/diesel	Currently limited refuelling infrastructure; lower fuel economy; often loss of some boot/load space; more expensive to purchase than petrol/diesel cars - new or conversions
Natural Gas (CNG/LNG)	Low CO ₂ emissions, similar to diesel; generally low levels of other pollutants; tax advantages (GradVED and BIK); very cheap subsidised fuel compared with petrol/diesel	Currently almost no refuelling infrastructure therefore requires dedicated refuelling equipment; lower fuel economy; CNG often has a loss of some boot/load space (more so than LPG); significantly more expensive to purchase than petrol/diesel cars - new or conversions; utilised more for commercial vehicles
Battery Electric	Zero emissions at point of use; extremely cheap fuel; tax advantages (GradVED and BIK) silent operation	Requires special "plug in" point; often requires many hours to recharge; batteries can be expensive; pollution created at power station not exhaust pipe; limited range between charges
Hybrids (Petrol - Electric)	Low CO ₂ and other pollutants; very fuel efficient; driving experience very similar to petrol vehicle; tax advantages (GradVED and BIK); only fuel required is petrol therefore plentiful - no need to recharge batteries as a separate exercise	New technology, so at present some cars are quite expensive; also currently limited vehicle choice - Honda Civic IMA or Toyota Prius, although other models are promised as other manufacturers are following suit

Appendix C

By-law 233-2001, By-law to Prohibit Excessive Idling of Vehicles and Boats

B I L L
No.242
2 0 0 1

B Y - L A W N U M B E R 233-2001

A B Y - L A W T O P R O H I B I T E X C E S S I V E
I D L I N G O F V E H I C L E S A N D B O A T S

Passed the 18th day of June, 2001.

WHEREAS Section 102 of the Municipal Act authorizes the council of a municipality to pass by-laws and make regulations for the health, safety, morality and welfare of the inhabitants of the municipality in matters not specifically provided for by the Municipal Act:

AND WHEREAS under section 320 of the Municipal Act, by-laws may be passed by council for providing that any person who contravenes any by-law of Council passed under the authority of the Municipal Act is guilty of an offence:

AND WHEREAS motor vehicles are a major source of nitrogen oxides, carbon monoxide, sulphur dioxides and volatile organic compounds (air pollutants) into the outdoor air in the City of Windsor;

AND WHEREAS the levels of air pollutants from vehicle emissions in the City of Windsor are associated with various adverse health effects, including acute and chronic effects on respiratory health, especially among the very young, the elderly and those with respiratory ailments;

THEREFORE the Council of the Corporation of the City of Windsor enacts as follows:

1. As used in this by-law, the following terms shall have the meanings indicated:
 - (1) **BOAT** – A ship or any other description of vessel not propelled by oars and includes a boat used exclusively for towing purposes, a water taxi and a boat used on water for living purposes.
 - (2) **IDLE** – The operation of the engine of a boat or vehicle while the vehicle or boat is not in motion and not being used to operate auxiliary equipment that is essential to the basic function of the vehicle or boat, and “idling” has a corresponding meaning.
 - (3) **LAYOVER** – A stopping point along a transit route for a maximum of fifteen (15) minutes used by transit vehicles to allow transit vehicles to adjust to service schedules.
 - (4) **MOBILE WORKSHOP:**
 - (a) A vehicle containing equipment that must be operated inside or in association with the vehicle; or
 - (b) A vehicle serving as a facility for taking measurements or making observations operated by or on behalf of a municipality, public utility or police, fire or ambulance service.
 - (5) **OFFICIAL** – A police officer, police cadet, municipal law enforcement officer or any person authorized to enforce this chapter.
 - (6) **STOPOVER** – A scheduled delay of a maximum of fifteen (15) minutes at a transit vehicle terminal to allow transit vehicles to adjust to service schedule.
 - (7) **TRANSIT VEHICLE** – Public transit vehicles, tour buses and motor coaches.
 - (8) **VEHICLE** – A motor vehicle, trailer, traction engine, farm tractor or road building machine as defined in the Highway Traffic Act and any vehicle drawn, propelled or driven by any kind of non-muscular power, but does

not include cars of electric or diesel electric railways running only upon rails.

2. (1) No person shall cause or permit a vehicle or boat to idle for more than five (5) minutes in a sixty minute period.

(2) Subsection 2 (1) does not apply to:

- (a) Police, fire or ambulance vehicles or boats while engaged in operational activities, including training activities, except where idling is substantially for the convenience of the operator of the vehicle or boat.
- (b) Vehicles and boats assisting in an emergency activity.
- (c) Boats not at anchor or tied to a dock.
- (d) Mobile workshops while they are in the course of being used for their basic function.
- (e) Vehicles or boats where idling is required to repair the vehicle or boat or to prepare a vehicle or boat for service.
- (f) Armoured vehicles where a person remains inside the vehicle while guarding the contents of the vehicle or while the vehicle is being loaded or unloaded.
- (g) Vehicles or boats required to remain motionless because of an emergency, traffic, weather conditions or mechanical difficulties over which the driver has no control.
- (h) Vehicles or boats engaged in a parade or race or any other event authorized by Council.
- (i) Transit vehicles while passengers are embarking or disembarking enroute or in terminals.
- (j) Transit vehicles while at a layover or stopover location except where idling is substantially for the convenience of the operator of the vehicle.
- (k) Vehicles transporting a person where a medical doctor certifies in writing that for medical reasons a person in a vehicle requires that temperature or humidity be maintained within a certain range.
- (l) Vehicles or boats when the ambient temperature inside a vehicle or boat is:
 - (i) More than twenty-seven degrees Celsius (27°C.); or
 - (ii) Less than five degrees Celsius (5°C.).

3. Any person who contravenes any provision of this by-law is guilty of an offence.

4. This by-law shall come into force and take effect on the day of the final passing thereof.

MICHAEL HURST, MAYOR

JOHN SKOROBOHACZ, CITY CLERK

First Reading - June 18, 2001
Second Reading - June 18, 2001
Third Reading - June 18, 2001

Appendix D Greening the City Fleet – Action List

Strategic Item	Actions	Lead	Timeline	Accomplishments
Reduce the Size of the Fleet	<ul style="list-style-type: none"> Rationalize fleet for possible elimination of vehicles. 	Fleet Manager Executive Director of Operations Executive Director of Parks & Facilities Senior Manager, Pollution Control Chief Building Official Fire Chief Police Chief General Manager, Transit Windsor	2010 - 2014	<ul style="list-style-type: none"> Reduced corporate fleet by 8%
Right Size Vehicles	<ul style="list-style-type: none"> To assist in right sizing, a needs assessment (Appendix D) must be completed by departments for each new light duty vehicle to confirm job function and demands on the vehicle. As required, ergonomic assessments may also be performed to determine the appropriate type of vehicle. Departments should target light duty vehicles (that are typically used by single occupants and not used for transporting goods and materials as determined in the needs assessment) with lower carbon dioxide emissions ratings. 	Fleet Manager Executive Director of Operations Executive Director of Parks & Facilities Senior Manager, Pollution Control Chief Building Official Fire Chief Police Chief General Manager, Transit Windsor	2010 – 2014	<ul style="list-style-type: none"> Downsized 15% of the corporate pickup fleet Downsized 25% of the Fire small fleet Introduced mobile offices in Compliance and By-law Enforcement vehicles in the spring of 2012
Maintenance of Vehicles	<ul style="list-style-type: none"> Continue with vehicle maintenance best practices, including staff training for new technologies. Check tire pressure regularly and more often in cold weather because cold temperatures decrease tire pressure. 	Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief General Manager, Transit Windsor Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief General Manager, Transit Windsor	2010 – 2014	<ul style="list-style-type: none"> Revised preventative maintenance program for the corporate fleet

Strategic Item	Actions	Lead	Timeline	Accomplishments
Anti-Idling	<ul style="list-style-type: none"> • Include importance of anti-idling in the fuel training sessions delivered by Corporate Health & Safety. • Pilot anti-idling devices for use in the city fleet. 	Fleet Manager Executive Director of Human Resources Fleet Manager Executive Director of Parks & Facilities	2013 2012	<ul style="list-style-type: none"> • Corporate fuel training updated to reflect the Anti-Idling By-Law. • Introduced 2 anti-idling police vehicles
LED Lighting	<ul style="list-style-type: none"> • To replace all conventional lighting with LED technology where appropriate. 	Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief General Manager, Transit Windsor	2010 - 2014	<ul style="list-style-type: none"> • 75% of the Corporate fleet, 80% of the Fire fleet and 100% of the Police fleet are outfitted with LED lights
Diesel Retrofit	<ul style="list-style-type: none"> • To work with Environment Canada to retrofit 6 older engines with diesel oxidation catalysts (DOCs) or flow through filters (FTFs). • To investigate the benefit of retrofitting additional units with diesel oxidation catalysts (DOCs), flow through filters (FTFs) or other technology as available. 	Fleet Manager Fleet Manager	2010 2012	<ul style="list-style-type: none"> • Collaborated with Environment Canada to retrofit 6 garbage packers
Driver Training	<ul style="list-style-type: none"> • To develop a fuel efficient driver handbook and workshop. City staff would receive the handbook and workshop at all fuel retraining sessions. The handbook and workshop could also be used as a resource to promote smart driving to the community. 	Fleet Manager Environmental Coordinator Executive Director of Human Resources General Manager, Transit Windsor	2012 - 2014	<ul style="list-style-type: none"> • Corporate fuel training updated to reflect smart driving habits • Smart Driver training program used at Transit Windsor
Monitoring	<ul style="list-style-type: none"> • Establish benchmark for fuel efficiency for each vehicle class and develop a report for monitoring purposes. • All vehicles should be monitored to track fuel consumption, fuel costs, mileage and maintenance costs to ensure the corporate objective to improve fuel efficiency is met. 	Fleet Manager Environmental Coordinator	2010 - 2014	<ul style="list-style-type: none"> • Participated in OMBI and the E3 Fleet Review. Fuel efficiency improved by approximately 5%

Strategic Item	Actions	Lead	Timeline	Accomplishments
Third Party Review	<ul style="list-style-type: none"> Complete a follow up E3 Fleet Review of the City of Windsor's fleet to assess the success of this green fleet plan. Have the City of Windsor's fleet rated under the E3 fleet rating system (or similar) to identify opportunities to reduce fuel use and pollutant emissions and measure the City of Windsor's fleet against available environmental benchmarks. 	Fleet Manager	2011 2014	<ul style="list-style-type: none"> E3 Fleet Review completed
Grant Opportunities	<ul style="list-style-type: none"> Seek funding opportunities to enable the City to accelerate greening of its fleet. 	Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief General Manager, Transit Windsor Environmental Coordinator	2010 - 2014	<ul style="list-style-type: none"> Worked with Environment Canada to retrofit garbage packers with diesel oxidation catalysts (DOCs) at no cost to the City of Windsor
Green Vehicles	Consider purchase of green vehicles including hybrid, electric or alternative fuel vehicles where one is available in the appropriate class of vehicles and is operationally and economically feasible.	Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief General Manager, Transit Windsor	2010 - 2014	<ul style="list-style-type: none"> Vehicle procurement specifications modified to include green alternatives 28% of Transit fleet and 5% of Police fleet consists of hybrid vehicles
Review of Green Fleet Plan	<ul style="list-style-type: none"> The Green Fleet Plan should be reviewed at least once during each term of Council. 	Chief Administrative Officer Fleet Manager Executive Director of Parks & Facilities Fire Chief Police Chief General Manager, Transit Windsor Environmental Coordinator	2012	<ul style="list-style-type: none"> Developed Green Fleet Plan