



Hamilton

Public Works

To:	Transportation Association of Canada, 2007 Environmental Achievement Award	Submitted by:	Scott Stewart, C.E.T. General Manager Public Works sstewart@hamilton.ca
Date:	March 19, 2007	Prepared by:	Chris Hill Manager, Central Fleet Public Works cghill@hamilton.ca

PROJECT NOMINATION: Green Fleet Implementation Plan 2006-2008

BACKGROUND SUMMARY:

The City of Hamilton's Public Works Department developed the Green Fleet Implementation Plan in 2005. The purpose of the Plan is to present an affordable implementation schedule for replacing the City's fleet with vehicles and equipment that are less harmful to the environment, and to reduce greenhouse gas emissions through the use of renewable fuels and reduced engine idling. The City of Hamilton operates a large and diverse fleet of vehicles and off-road equipment and the City itself is located in an area that has persistent air quality problems.

Fleets are responsible for a significant portion of the air pollutants emitted in the course of municipal operations. Vehicle engines produce almost three times the mass of carbon dioxide compared to the fuel consumed. These emissions contribute to poor air quality, which adversely affects human health, and climate change, which may have serious long-term consequences if not addressed.

One objective of the Green Fleet Implementation Plan is to reduce emissions of greenhouse gases (GHG) and air contaminants that have the potential to harm the environment and human health. These emissions are referred to in the plan as carbon dioxide equivalents or eCO₂. Benefits can be measured in terms of social, economic and environmental benefits such as improved energy efficiency, cleaner air and reduced greenhouse gas emissions that contribute to a better quality of life, and making a contribution to reducing health care costs.

**City of Hamilton, Public Works Department
Green Fleet Implementation Plan**

The Green Fleet Implementation Plan is also a strategic investment. First, by selecting and then placing orders for specific quantities of new “greener” products, the City demonstrates that a “green market” exists and encourages manufacturers to produce more of these products. Eventually cleaner vehicles powered by fuel cells may become available, but the process will take less time in response to higher market demand.

Secondly, the City demonstrates to other orders of government that significant progress is being made to achieve air quality targets. The Green Fleet Implementation Plan makes an important contribution to Canada’s commitment to mitigate the causes of climate change. Hamilton has participated in Natural Resources Canada programs on fleet fuel efficiency. The Implementation Plan is consistent with Transport Canada’s Climate Change and Transportation program, the Urban Transportation Showcase program, and the Moving on Sustainable Transportation program. Provincially, the Ministry of Municipal Affairs and Housing has published “Building Strong Communities: Municipal Strategies for Cleaner Air”, which discusses the importance of “fleet greening”.

Last, the City demonstrates its own progress towards sustainability and triple bottom line values. It has a long-term perspective and demonstrates a return on investment over time, through reduced fuel use and improvements to air quality, both of which are principles of Hamilton’s *VISION 2020* sustainability commitment.

Improving air quality is one of Hamilton’s top priorities as part of our overall commitment to environmental protection. To reinforce this commitment, the City of Hamilton became one of the leading municipalities in Canada to transition its fleet to greener alternatives. The key elements of the Green Fleet Plan include:

- Purchasing Hybrid-Electric Vehicles (HEVs)
- Implementing Renewable Fuels
- Anti-idling policy
- Implementing new technologies

In 2006, the Green Fleet Expo was held to showcase Hamilton’s progress with implementation of the Green Fleet Plan. The event was hosted by the City of Toronto, Fleet Services Division and supported by Fleet Challenge Ontario. Hamilton and Toronto are continuing this partnership to present the 2007 Green Fleet Expo.

PURCHASING HYBRID-ELECTRIC VEHICLES (HEVs)

By March 2007, the City of Hamilton had replaced 60 older sedans and pickups with HEVs since 2002. HEVs have reduced fuel consumption by 15 per cent to 35 per cent versus comparable conventional models, and emissions of key air pollutants are reduced by over 50 per cent. When fuel consumption is reduced, all exhaust emissions are also reduced, including eCO₂ and the toxic compounds which create smog. HEVs are by far the biggest development in automotive efficiency in the last several years.

Hybrids use regenerative braking to recover the energy normally lost as heat when the brakes are applied. This energy is converted to electricity and stored in the on-board high voltage battery. Hybrid vehicles do not need to be plugged-in to an electrical outlet to recharge the battery as a result.

Hybrids don't need special fuel or additional fuel tanks and any changes the operators need to make to use hybrids are very minor. Compared to business-as-usual fleet vehicles, there is an additional cost for hybrid vehicles. The Province of Ontario refunds up to \$2,000 of the provincial sales tax paid on each HEV. There are currently no federal incentives for HEVs.

As the selection and availability of factory-built and warranted HEVs is increasing and there is no impact on operations caused by their use, the Implementation Plan proposes to order HEVs for the majority of replacements for passenger cars and light-duty trucks. This will add 90 HEVs to our fleet between 2006 and 2008, and reduce eCO₂ emissions by 260 tonnes over the same period.

The estimated capital cost for new vehicles already scheduled to replace existing vehicles in the same period would increase by \$310,000. This assumes that no grants or subsidies become available from sources such as any Government of Canada climate change programs. Offsetting this cost would be the fuel savings to the operating budget. HEVs use less gasoline than conventional vehicles. Fuel savings continue to accumulate over the life of the vehicles, normally eight years.

IMPLEMENTING RENEWABLE FUELS

Biodiesel is the term used for a co-product of either soybeans used to produce glycerine or animal fat left over from food processing. These are the most common sources of biodiesel, but the product can also be refined from tallow, yellow grease from restaurants, canola oil, industrial mustard seeds, or palm oil. Following a properly-documented process, this co-product can be used as a fuel in diesel engines, either undiluted or more commonly blended with ordinary diesel fuel.

Hamilton has ordered a diesel blend containing 5% biodiesel (B5) for delivery to the Wentworth Street Operations centre, the City's largest fuel facility, starting in April 2007.

Table 1 – Greenhouse Gas Emissions Reduction from Biodiesel

Year	Fuel Blend /Duration	Regular Diesel (kg eCO₂ emissions)	Animal Fats (kg eCO₂ emission reductions)	Soybeans (kg eCO₂ emission reductions)
2007	B5 for 6 months	21,880,000	-245,000	-160,000 (0.9%)
2008	B2 for 6 months, B5 for 6 months	21,880,000	-353,000	-231,000
Total		43,680,000	-598,000 (-1.4%)	-391,000 (-0.9%)

Note: Animal Fats and Soybeans represent the high and low ranges of eCO₂ reductions available from different feed stocks used for biodiesel. Source: Table 6, Appendix to Report

It is important to note that the eCO₂ reductions presented above are based on a life-cycle analysis and not emissions from the tailpipe. The key concept is that burning fossil fuel releases carbon dioxide that was removed from the atmosphere millions of years ago, in effect, increasing the present volume in the air. In contrast, biodiesel as a renewable resource is the result of contemporary sequestering of carbon dioxide in plants either processed directly into fuel, such as soybeans or canola, or through consumption of fodder by livestock to be processed later. To this end, the reductions presented in Table 1 (above) are estimates and actual emissions reductions will depend on variables such as the quantity of fuel consumed and the feedstock used for the biodiesel.

ANTI-IDLING POLICY

The simplest fuel-saving tactic is to eliminate idling. It is also one of the most difficult to implement, as it means changing the habits of many of the drivers of fleet vehicles.

Idling is defined as leaving a vehicle’s engine running while the vehicle is parked, either in a yard or at the side of a roadway. In 2005, the City of Hamilton’s Central Fleet participated in an inter-city program that measured the amount of time fleet vehicles spent idling, using automated technology. The outcome is that on average, City of Hamilton fleet vehicles are running at idle 25 per cent of the total operating time.

If the Central Public Works fleet (excluding Transit) saved 1% of its fuel budget for 2006-2008 through a reduction in idling, the saving would amount to \$107,000. This would reduce eCO₂ emissions by approximately 290 tonnes in this period.

Using engine cab heaters to keep vehicle interiors warm and auxiliary batteries to operate traffic direction signals are effective ways to reduce idling. Driver education remains the largest opportunity. Since 2005, the City has frequently communicated messages about the harmful effects of idling to staff, including the purchase of 500 “No Idling” windshield stickers placed on the windshields of City vehicles.

IMPLEMENTING NEW TECHNOLOGIES

While the Green Fleet Implementation Plan recommends several specific tactics to achieve its goals, there are other new technologies entering the market that are being considered. While some of these are produced from the massive research and development programs of major auto manufacturers, others are the products of small and medium enterprises with limited means to provide credible testing to prove their performance claims.

Environment Canada has created an environmental testing validation program for products that claim to reduce environmental impacts. ETV Canada is the agency that administers a testing and certification program using a network of 26 laboratories and research facilities across Canada. For a fee, a product can be tested to validate its performance claims and receive the "Canada Verified" symbol to use as a marketing tool, similar to the CSA standard for electrical products.

Fleet operators receive numerous solicitations to try fuel additives and fuel-saving devices that are either poorly supported by test data proving performance claims, or presented with a cleverly-worded marketing pitch that is difficult to refute without a high level of technical expertise. By obtaining certification from ETV Canada, both fleet operators and vendors can discuss these products with assurance that performance claims have been presented factually. Our approved policy is to consider no product that does not have ETV Canada certification, and that the certification must be applicable to the vehicles in our fleet.

GREEN FLEET EXPO

In May 2006, the Cities of Hamilton and Toronto – both leaders in greening their fleets - jointly hosted the first Green Fleet Expo to showcase the progress made by municipalities in implementing green fleet plans. The event was held at Exhibition Place in Toronto and was supported by Fleet Challenge Ontario, part of a national program to reduce greenhouse gas emissions from fleets.

Participants were able to test-drive vehicles, view information displays and listen to speakers on topics including creating green fleet plans in Hamilton and Toronto. The event was attended by 100 registered participants from across Ontario. It was covered by print and television media.

On May 24, 2007 Hamilton's Public Works Department, in cooperation with Toronto's Fleet Services Division, will host the second Green Fleet Expo in Hamilton. Ontario's Minister of the Environment has confirmed attendance at this event.

CONTRIBUTION TO ENVIRONMENTAL PROTECTION

Environmental protection was the driving goal behind the development and implementation of this plan. Several environmental protection benefits will be realized as a result of the Plan, including:

1. Emission reductions

- Reduced carbon dioxide output by up to 1,100 tonnes over three years
- Key air pollutants reduced by over 50 per cent
- When fuel consumption is reduced, all exhaust emissions are also reduced, including eCO₂ and the toxic compounds which create smog

2. Fuel savings

- Hybrids overall average 25 per cent lower fuel consumption
- Hybrid cars and utility vehicles are 50 per cent more fuel efficient
- Hybrid pickup trucks are about 10 per cent more fuel efficient

COST IMPLICATIONS

The long range capital forecast for the vehicle replacement reserve was increased by 2% overall in 2004 to pay for automotive technology improvements such as hybrids, beginning with the 2005 budget. For deliveries planned in the period 2006-2008, \$339,500 was included in the forecast. The Green Fleet Implementation Plan estimated the additional cost of hybrids would amount to \$309,470 during this period, about 91% of the amount included in the capital forecast. The approved 2005 Vehicle Replacement Plan capital budget included \$126,280 for hybrid vehicles. Table 2 summarizes the capital cost impact of this plan

***Table 2 – Green Fleet Implementation Plan
Capital Costs and Offsets***

- Additional Cost for Hybrids – 2006 deliveries	\$136,870
- Additional Cost for Hybrids – 2007 deliveries	\$64,200
- Additional Cost for Hybrids – 2008 deliveries	\$108,400
- Transfer approved capital from NGV to hybrids	(\$51,680)
- 2005 approved capital for hybrids (not yet committed)	(\$126,280)
Capital Budget Impact 2006-2008	\$131,510

Table 3 below summarizes the cost and offset savings to operating budgets for each of the major tactics recommended in the Green Fleet Implementation Plan. We have

provided a worst case situation that includes ineffective results from the anti-idling policy. We have also provided a best-case situation that includes an anti-idling policy that reduces fuel consumption by one per cent over the next three years. We have assumed in both cases that biodiesel use begins in April 2007 and continues through 2008.

**Table 3 – Green Fleet Implementation Plan
Operating Costs and Offsets**

	Best case	Worst case
- Cost impact of biodiesel	\$12,800	\$12,800
- Fuel saved by hybrids 2006-2008	(\$53,850)	(\$53,850)
- Fuel budget (for Central fleet) reduced 0% to 1% by lower idling (2006 to 2008)	(\$107,670)	\$0
Operating Budget Impact	(\$148,720)	(\$41,050)

The Green Fleet Implementation Plan is a way to implement affordable and sustainable vehicle technology that clearly demonstrates the City's leadership role toward reducing its environmental impact.

Central Fleet estimates the additional cost to implement the Plan will be less than 1% of the forecast \$16,800,000 already planned for vehicle deliveries planned for the period 2006 to 2008. Approximately one-third of this cost has already been approved as part of the 2005 capital budget. The change to operating costs is expected to be slightly lower, based on adjustments to fuel.

DEMONSTRATING LEADERSHIP

The City of Hamilton is one of the leading municipalities in Canada to transition their fleet to greener alternatives. Hamilton's Green Fleet Implementation Plan was created to reinforce the City's commitment to improving air quality, preventing climate change and implementing one of the country's leading low-emissions fleets.

One of the key goals in implementing this plan is to deliver a strong message to vehicles producers that a "green market" does exist and that Hamilton and other municipalities want more environmentally-friendly vehicles in their fleets.

Through the Green Fleet Expo, Hamilton also hopes to encourage other municipalities to start greening their fleets by showcasing the benefits and successes associated with Hamilton's Green Fleet Implementation Plan. The City also hopes to promote community participation in implementing simple environmentally friendly initiatives, such as reducing unnecessary idling, by demonstrating the City's own leadership in environmental protection initiatives.

TAC's Environmental Achievement Award Application Form

NOMINATION BY

TAC Member Organization: City of Hamilton, Public Works Department
Key employee representative: Scott Stewart, General Manager

NOMINATION FOR

Title: Green Fleet Implementation Plan 2006-2008
 Program Project Process or Other

Please provide a summary paragraph about the initiative being nominated:

The City of Hamilton's Public Works Department developed the Green Fleet Implementation Plan to present an affordable implementation schedule for replacing the City's fleet with vehicles and equipment that are less harmful to the environment. The City of Hamilton operates a large and diverse fleet of vehicles and equipment. The Green Fleet Plan reduces emissions of carbon dioxide and key air pollutants by reducing fuel use and using renewable fuels.

TAC Member Organization: City of Hamilton, Public Works Department
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ATTACHED

- six paper copies of nomination submission (no longer than 10 pages - 8.5" x 11")
- one PDF electronic file of submission on CD
- supporting documents (diagrams, photos, etc.) if needed

Deadline: Friday, March 30, 2007

Send to: 2323 St. Laurent Boulevard, Ottawa, Ontario K1G 4J8
Please note that information on the evaluation criteria and process
are described at

www.tac-atc.ca

If you have any questions or need clarification, please call (613) 736-1350,
ext. 227 or email kcvetkovic@tac-atc.ca.