

## Partners for Climate Protection

### Greenhouse Gas Reduction Initiative of the Month

#### Ottawa's hybrid diesel-electric transit buses



#### Municipal Profile

Population: 812,129

PCP Member since 1997

In 2002, Ottawa city council adopted a Fleet Emissions Reduction (FER) strategy. The strategy includes an anti-idling policy, converting to ethanol blended gasoline or biodiesel, encouraging alternative methods of transportation, performing regular vehicle maintenance, practicing fuel-efficient driving techniques, and procuring more fuel-efficient vehicles, including transit buses.

#### Background

In 2003, the city and OC Transpo, Ottawa's transit authority, approached the National Research Council (NRC) to evaluate which of the two leading North American hybrid diesel-electric engines would work best for the city's requirements and in the cold Ottawa winters. Both technologies use regenerative braking, a system that captures and reuses the energy that is usually lost during traditional vehicle braking. Testing revealed that both technologies met the city's requirements and would achieve fuel efficiency of between 17 and 26 per cent if deployed on routes with several stops, low-speed routes or high-stop frequency. Testing also revealed that CO<sub>2</sub> emissions would be cut by about 30 per cent.

#### Implementation and Approach

The city chose Orion VII Next Generation transit buses and purchased two of the buses in late 2008 at an approximate cost of \$675,000 each (a conventional diesel powered bus costs about \$500,000).

Jean-Yves Carrier, program manager with OC Transpo's transit vehicle projects, reports that the buses have performed very well despite the cold weather. He notes, however, that because of changes to the duty cycle, the buses have not yet met fuel efficiency expectations.

"By necessity, we have been putting all available buses on the road this spring," explains Carrier. Rather than putting the hybrids on the stop-and-go routes and making the best use of the regenerative braking system, the new buses were assigned to several different routes and so did not meet the expected fuel efficiency. This route assignment has now been corrected and the manufacturer is confident that efficiency targets can be achieved.

No specific training for the new buses is required of transit drivers, but mechanics must learn how to maintain the hybrid technology. Until OC Transpo mechanics are fully trained, one of the manufacturer's technicians comes to Ottawa when the buses are serviced.

## Results

Using the NRC's results on fuel economy, the city estimates the payback period to be about six years, once subsidization is factored in. The hybrids are less noisy than conventional buses and have a lifespan of about 18 years.

Carrier says that transit drivers have noticed a difference. "It's a continuous acceleration with no shift change in the transmission—there is no transmission," he explains. "For deceleration, the moment a driver removes his/her foot the bus starts to coast down and replenishes the battery cells. It's a nice feeling to let the bus coast to a stop."



One of Ottawa's two hybrid diesel-electric buses.  
Photo courtesy of OC Transpo.

## Lessons Learned

Carrier says that the routes on which the hybrids are deployed are critical to using the technology properly.

"Hybrids aren't viable for every type of transit service. You have to have a minimum of three stops per kilometre to enjoy the benefits of the technology," he says. "The key is to use the bus on those routes consistently."

## Future Direction

Ottawa has ordered 175 more hybrid diesel-electric buses, 95 of which are scheduled to arrive by December 2009 and the remainder by the end of 2010.

The city also added one hybrid electric-gasoline vehicle to its fleet for use by city employees, saving approximately \$2,400 annually in fuel costs and cutting GHG emissions by five to six tonnes per year.

## Further Information

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Read the original feasibility study (GMEF 5360 - Hybrid Technology and Feasibility Study) at:  
[www.fcm.ca/gmf](http://www.fcm.ca/gmf).

The Partners for Climate Protection (PCP) program is a network of Canadian municipal governments that have committed to reducing greenhouse gases and acting on climate change. PCP is the Canadian component of ICLEI's Cities for Climate Protection (CCP) network, which involves more than 900 communities worldwide. PCP is a partnership between the Federation of Canadian Municipalities (FCM) and ICLEI – Local Governments for Sustainability. PCP receives financial support from FCM's Green Municipal Fund™ ([www.fcm.ca/gmf](http://www.fcm.ca/gmf)).