



# Chapter 5: Develop a Local Action Plan

## Best Bets

### Municipal Transportation

**DOCUMENT CONTENTS**

Reduce Municipal Vehicle Fleet Emissions.....	1	Programs to Reduce Driving.....	9
Hybrid.....	2	CASE STUDIES:	
CASE STUDY:		Oakland, CA.....	10
King County, WA.....	2	Pleasanton, CA.....	10
Alternative Fuels.....	3	Modify Transportation Contracts to Incentivize Alternative Fuel Use.....	11
Electricity.....	3	Alternative Fuels for School Buses.....	11
CASE STUDY:		CASE STUDIES:	
Chattanooga, TN.....	3	Saint Johns, MI.....	12
Biodiesel.....	4	Warwick, RI.....	12
CASE STUDY:		Alternative Fuels for Waste Haulers.....	13
San Francisco, CA.....	4	CASE STUDIES:	
Hydrogen.....	5	Los Angeles, CA.....	14
Compressed Natural Gas.....	5	Hybrid Technology for Refuse Vehicles.....	15
Ethanol.....	5	Bio-Methane.....	15
CASE STUDY:		Additional Resources.....	16
Minneapolis, MN.....	6		
Idle Reduction Campaigns.....	6		
CASE STUDIES:			
Mississauga, Canada.....	7		
Lane County, Oregon.....	8		

### Reduce Municipal Vehicle Fleet Emissions

Reducing the amount of emissions produced by municipal vehicle fleets has the potential to make a significant contribution to a city’s greenhouse gas (GHG) reduction targets. It will also save money and create a more beautiful place to live, work and play. Vehicle emissions reductions are a particularly visible area for improvement given the highly publicized nature of rising gasoline prices and the ensuing debate over foreign oil dependency. Vehicle emissions reductions can be applied to city transit, employee cars, police patrol cars, waste removal trucks, school buses, street sweepers or any other vehicle in the municipal fleet.

Although the initial cost of emissions reduction options is often higher than continuing to use conventional vehicles, in the longer-term, fuel-efficient or alternative fuel options will save costs and pay for themselves many times over.

Municipal vehicle fleet emissions reductions can occur through the use of hybrid and other highly efficient vehicles, the introduction of alternative fuels, and campaigning for idle reduction policies. The best strategy is diversification in order to try out pilot projects for what works best and still prepare for advancements in different sectors. The city of Seattle's Clean and Green Fleet Action Plan (being revised and updated) is a good model for how to create a diversified strategy. The 2003

document still available on their website summarizes Seattle's plan to implement cleaner operating vehicles and increase vehicle efficiency and use by breaking down the programs, recommended actions, cost impacts, environmental impacts and departmental lead. The State of Washington is modifying the guide for its own use.<sup>1</sup>

### Hybrid

Hybrid electric vehicles (HEVs)<sup>2</sup> are efficient vehicles that use a small motor and an electric engine to generate the power to operate the vehicle. Today, most people have heard of an HEV and many people have a basic understanding of how they work.

In addition to offering reduced

emissions of GHG, hybrid vehicle technologies are worthy of adoption due to their high fuel economy, which helps reduce dependence on petroleum from foreign sources and saves money.

One practical and highly visible method of implementing hybrid vehicles in any city is to ensure that the Mayor is transported around the city in a hybrid. This provides leadership by example and serves as a visual statement that reducing emissions and air pollution, and contributing to climate protection are important priorities.

Efficiency savings depends on the make and model of HEV, since some use the technology to increase power instead of mileage efficiency.<sup>3</sup>

## Municipal Fleet Emissions Reduction

### CASE STUDY: King County, WA

In 2004, King County, Washington purchased 235 hybrid diesel-electric buses to replace the existing fleet.<sup>4</sup> This purchase is expected to reduce fuel consumption by 750,000 gallons a year, and save \$3.5 million annually in both fuel and maintenance costs. The hybrids cost \$645,000 each—about \$200,000 more than a traditional diesel bus. The up front cost of \$47 million was expected to pay

for itself in about 13 years. As of 2006, given higher fuel costs, it is expected to be a 8 year payback.

In 2006, King County had the National Renewable Energy Laboratory (NREL) perform a fuel economy comparison. The hybrid diesel-electric buses performed 29% better than conventional buses on King County routes and showed a

32% GHG emission reduction. In addition to purchasing the hybrid diesel-electric buses the county is also converting all existing and new buses to biodiesel (B20).<sup>5</sup>

#### CONTACT

Jim Boon  
King County Department of  
Transportation  
(206) 684-1498

<sup>1</sup> Seattle Clean and Green Fleet Action Plan, [www.seattle.gov/environment/Documents/CleanGreenFleetAP.pdf](http://www.seattle.gov/environment/Documents/CleanGreenFleetAP.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationMunicipal/Seattle\\_CleanGreenFleetAP\\_2003.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationMunicipal/Seattle_CleanGreenFleetAP_2003.pdf), 5 December 2006.

<sup>2</sup> For more information about Hybrid electric vehicles, [www.eere.energy.gov/cleancities/hev/what\\_is\\_hev.html](http://www.eere.energy.gov/cleancities/hev/what_is_hev.html), 29 September 2007

<sup>3</sup> To determine what the mileage savings are refer to [www.fueleconomy.gov](http://www.fueleconomy.gov), 30 October 2006.

<sup>4</sup> For more information, [www.metrokc.gov/kc-dot/news/2004/nr040527\\_hybrids.htm](http://www.metrokc.gov/kc-dot/news/2004/nr040527_hybrids.htm), 27 July 2006.

<sup>5</sup> Personal Communication with Jim Boon, 2 October 2006.

## Alternative Fuels

Alternative fuels, as defined by the Energy Policy Act of 1992, include ethanol, natural gas, propane, hydrogen, biodiesel, electricity, methanol and p-series fuels. Using these alternative fuels in vehicles can generally reduce harmful pollutants and exhaust emissions. Also, most of these fuels are produced domestically and derived from renewable sources. It is important to diversify the cities'

alternative fuel programs to both to try different programs and prepare for advancement in different sectors technology.

## Electricity

Electricity can be used as a transportation fuel to power battery electric and plug-in hybrid vehicles. Pure electric vehicles or EVs, require a large energy storage device, such as a battery. EV batteries have a limited storage capacity and their electricity must be replenished

by plugging the vehicle into an electrical source. The electricity for recharging the batteries can come from the existing power grid, or from distributed renewable sources such as solar or wind energy. Plug-in Hybrid vehicles use smaller batteries changes when a power source is available, or their fuel tank when it is not, hence the name "plug-in." See Fuel Transitioning for more information on plug-in hybrids<sup>6</sup>

## Municipal Fleet Emissions Reductions

### CASE STUDY: Chattanooga, TN

Chattanooga and Hamilton County, Tennessee<sup>7</sup> are reversing a history of environmental neglect by infusing sustainability concepts and practices into all aspects of local planning and public services. A prominent example of local sustainability initiatives, the transit authority for the city of Chattanooga and Hamilton County formed an innovative public-private partnership to develop, build, test and operate electric transit vehicles (ETVs) and ETV systems in downtown Chattanooga. Since 1991, 10 electric buses have gone in service on a downtown shuttle route, a local non-profit has been launched to promote research and provide information and a company has been formed to

manufacture electric buses. Program benefits include reduced congestion on downtown streets, reduced air emissions, and over 30 new manufacturing jobs.

Emission reductions include:

**Particulate emissions avoided - 600 lbs. per year (0.27 metric tons)**

**CO emissions avoided: 2,900 lbs. per year (1.32 metric tons)**

**NOx emissions avoided: 10,800 lbs. per year (4.90 metric tons)**

**CO<sub>2</sub> emissions avoided: 3.5 million lbs. per year (1587.57 metric tons)**

Local Economic activity includes:

**AVS, Chattanooga's electric bus manufacturer has sold 29 buses - more than 60% of electric transit vehicle sales outside California. Local electric bus manufacture supports 35 jobs.**

**Shuttle system related retail development is projected to reach \$12 million generating \$800,000 in city and county tax revenue.**

CONTACT

Communications Director  
Todd Womack  
Chattanooga City Council Transit Authority  
(423) 757-5168

<sup>6</sup> U.S. DOE [www.eere.energy.gov](http://www.eere.energy.gov), 27 September 2006.

<sup>7</sup> Smart Communities Network, [www.smartcommunities.ncat.org/success/chattano.shtml](http://www.smartcommunities.ncat.org/success/chattano.shtml), 27 September 2006.

## Biodiesel<sup>8</sup>

Biodiesel is a domestically produced, renewable fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant greases.

Biodiesel is safe, biodegradable and reduces serious air pollutants such as particulates, carbon monoxide, hydrocarbons and air toxics. Blends of 20% biodiesel with 80% petroleum diesel (B20) can generally be used in unmodified diesel engines; however, users should consult their original equipment manufacturer engine warranty statement. Biodiesel can also be used in its pure form (B100), but

it may require certain engine modifications to avoid maintenance and performance problems and may not be suitable for wintertime use.

According to the U.S. Department of Energy, B100 reduces CO<sub>2</sub> emissions by more than 75% over petroleum diesel. Using a blend of 20% biodiesel reduces carbon dioxide emissions by 15%. Biodiesel also produces less of other air pollutants, including particulate matter, carbon monoxide (CO) and sulfur dioxide (SO<sub>2</sub>) emissions.<sup>9</sup>

Currently, a federal biodiesel tax incentive is helping reduce the cost of biodiesel.<sup>10</sup> The credit equates to a one penny per percent of biodiesel in a fuel blend made from agricultural products like vegetable oils, and one-half penny per percent for recycled oils. This incentive is taken by petroleum distributors and passed on to consumers. A USDA study estimated this incentive will increase the demand for biodiesel to at least 124 million gallons per year. And depending on other factors, including crude oil prices, the industry projects that demand could be much higher.

## Municipal Fleet Emission Reduction

### CASE STUDY: San Francisco, CA<sup>11</sup>

In 2006 the city of San Francisco's Mayor Gavin Newsom signed an Executive Directive to accelerate the pace of biodiesel use in city fleets.<sup>12</sup> The city has been a long-term user of a B20 biodiesel blend (80% petroleum diesel, 20% biodiesel) with the San Francisco Airport, Department of Public Works, MUNI buses, San Francisco Zoo and ferries using the fuel successfully.

The directive calls for fleet managers to identify vehicles that can be quickly transitioned to B20 use and make the necessary

preparations for this transition. All diesel-using departments are required to begin using biodiesel as soon as is feasible with the following targets: 25% use of B20 by March 31, 2007 and 100% use by December 31, 2007. San Francisco uses about 8 million gallons of diesel a year, so the shift to B20 will result in significant petroleum displacement and emissions reduction. In related news, the San Francisco Fire Department has announced a pilot program to test B20 in two fire trucks, six engines and one ambulance. The pilot will be conducted in the

southeastern part of the city, which struggles with poor air quality.

The National Biodiesel Board (NBB) has recently praised the city of San Francisco for its commitment to biodiesel. Joe Jobe, CEO of NBB said, "This makes San Francisco the largest U.S. city ever to institute such broad biodiesel use."

#### CONTACT

Clean Air Program at the Department of the Environment (415) 355-3700

<sup>8</sup> U.S. DOE, [www.eere.energy.gov](http://www.eere.energy.gov), 5 October 2006.

<sup>9</sup> An Overview of Biodiesel and Petroleum Diesel Lifecycles, USDA and DOE joint report, 1998, [www.nrel.gov/docs/legosti/fy98/24772.pdf](http://www.nrel.gov/docs/legosti/fy98/24772.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationMunicipal/USDA\\_DOE1998.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationMunicipal/USDA_DOE1998.pdf), 30 October 2006.

<sup>10</sup> To learn more about the biodiesel tax incentive, go to the National Biodiesel Board's Tax Incentive website: [www.nbb.org/news/taxincentive/](http://www.nbb.org/news/taxincentive/), 30 October 2006.

<sup>11</sup> National Biodiesel Board [www.biodiesel.org/resources/pressreleases/fle/20060522\\_sanfran\\_b20nfinal.pdf#search=%22San%20Francisco%20Biodiesel%20program%22](http://www.biodiesel.org/resources/pressreleases/fle/20060522_sanfran_b20nfinal.pdf#search=%22San%20Francisco%20Biodiesel%20program%22), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationMunicipal/2006\\_sanfran\\_b20nfinal.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationMunicipal/2006_sanfran_b20nfinal.pdf), 27 September 2006.

<sup>12</sup> San Francisco Executive Directive, [www.newrules.org/de/archives/000124.html](http://www.newrules.org/de/archives/000124.html), 5 October 2006.

## Hydrogen

Hydrogen (H<sub>2</sub>) could play an important role in developing sustainable transportation in the U.S., because in the future it may be produced in virtually unlimited quantities using renewable resources. While hydrogen technology is still evolving, the fuel has been used effectively in a number of internal combustion engine vehicles mixed with natural gas. Hydrogen has the potential to be a major fuel source in the longer term, but the technology will not be market-ready in the short term. (See Renewable Energy Planning for more information on Hydrogen as an alternative energy source)

## Compressed Natural Gas (CNG)

Natural gas is domestically produced and readily available to end-users through the utility infrastructure. It is also cleaner burning and produces significantly fewer harmful emissions than reformulated gasoline or diesel when used in [natural gas vehicles](#).<sup>13</sup> A study conducted by NREL in 2000 compared CNG, bi-fuel CNG and gasoline vans on pre-existing routes in Colorado. The study found CO<sub>2</sub> emissions were 22% to 25% less for the CNG vans than their gasoline counterparts.<sup>14</sup> In addition, commercially available medium- and heavy-duty natural gas engines have demonstrated over 90% reductions of CO and

particulate matter and more than 50% reduction in NO<sub>x</sub> relative to commercial diesel engines. Natural gas can either be stored onboard a vehicle as compressed natural gas (CNG) at 3,000 or 3,600 psi or as liquefied natural gas (LNG) typically at 20-150 psi.

## Ethanol

Ethanol is an alcohol-based alternative fuel produced by fermenting and distilling starch crops that have been converted into simple sugars. Feedstocks for this fuel include corn, sugar, barley and wheat. Ethanol can also be produced from "cellulosic biomass" such as trees and grasses. The technology for this "cellulosic ethanol" still needs further development for the fuel to be cost effective. However, this fuel source has great potential. 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. E85 and blends with even higher concentrations of ethanol, E95, for example, qualify as alternative fuels under the [Energy Policy Act of 1992](#) (EPAct)<sup>15</sup>. Vehicles that run on E85 are called flexible fuel vehicles (FFVs) and are offered by several car manufacturers. There are already more than 6 million E85 compatible vehicles on American roads.<sup>16</sup> Enabling

these owners to have access to E85 stations, due to the limited suppliers in many states, is now the challenge.<sup>17</sup>

Benefits of using Ethanol (E 85) include:

**Ethanol reduces demand for imported oil.**

**Ethanol is a renewable fuel source. In MN ethanol is made from starch found in corn and cheese-making byproducts.**

**It is safe and approved. E85 is made from 85% ethyl alcohol (ethanol) and just 15% petroleum, and is approved by all flexible fuel vehicle manufacturers.**

**E85 reduces ozone-forming pollution by 20% and GHGs by nearly 30%.**

**Ethanol is less toxic and therefore reduces the release of the compounds like benzene, toluene and xylene, which are required in gasoline.**

**Ethanol boosts engine horsepower. E85 has a 105 octane rating and burns cooler than gasoline, keeping engines clean.**

**Cost. E85 is typically costs less than gasoline.**

**Cleanup. Ethanol degrades quickly in water, which reduces gasoline spills and leaks.**

<sup>13</sup> U.S. DOE Alternative Fuels, [www.eere.energy.gov/afdc/afv/gas\\_vehicles.html](http://www.eere.energy.gov/afdc/afv/gas_vehicles.html), 30 October 2006.

<sup>14</sup> NREL SuperShuttle CNG Fleet Evaluation Report, 2000, [www.eere.energy.gov/afdc/pdfs/supershuttle\\_final.pdf](http://www.eere.energy.gov/afdc/pdfs/supershuttle_final.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationMunicipal/NREL\\_supershuttle.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationMunicipal/NREL_supershuttle.pdf), 30 October 2006.

<sup>15</sup> Freedom Car and Vehicle Technologies Program [www1.eere.energy.gov/vehiclesandfuels/epact/](http://www1.eere.energy.gov/vehiclesandfuels/epact/), 30 October 2006.

<sup>16</sup> National Ethanol Vehicle Coalition, [www.e85fuel.com/index.php](http://www.e85fuel.com/index.php), 5 December 2006.

<sup>17</sup> National Ethanol Vehicle Coalition, Refueling station locator, [www.e85refueling.com/](http://www.e85refueling.com/), 5 December 2006.



## CASE STUDY: Minneapolis, MN

The city of Minneapolis<sup>18</sup> fleets included 53 E85 vehicles, 5 hybrids and 3 maintenance shop tricycles as of March 2006. In 2005, their vehicles and equipment used 1,100,000 gallons of ultra low sulfur unleaded gasoline<sup>19</sup> and 760,000 gallons of B5 fuel (5% biodiesel). In 2004, the city contracted with a local gas station to provide E85 fuel to its vehicles but the station was not conveniently located. The city's 2006 plan includes lessons learned in 2004 & 2005, and is developing an

E85 fueling station at its most heavily used maintenance facility.

Costs of using Ethanol in Minnesota:

**Vehicle cost: Flexible Fuel Vehicles (FFV) cost about the same as regular vehicles.**

**Fuel cost: E85 is \$1.99/gallon at area gas stations compared to over \$2.65/gallon for regular unleaded gas.**

**Fuel location: The city of Minneapolis and Hennepin County are jointly funding the new E85 Fueling Station. Hennepin plans to purchase E85 vehicles.**

### CONTACT

Environmental Manager  
Gayle Prest  
Department: Minneapolis  
Environmental Services  
(612) 673-2931  
[Gayle.Prest@ci.minneapolis.mn.us](mailto:Gayle.Prest@ci.minneapolis.mn.us)

### Idle Reduction Campaigns

"Idle reduction" is typically used to describe technologies and practices that reduce the amount of time heavy-duty trucks and cars idle their engines. Reducing idle time saves fuel, engine wear and money. In addition, it reduces emissions and noise.

Ten Tips to Conduct an Anti-Idling Campaign<sup>20,21</sup> from Mississauga, Canada

1. Attack the myths about engine idling  
Three major idling myths need to be challenged:

- Your engine should be warmed up for long periods before driving;
- Idling is good for your engine; and
- Shutting off and restarting your vehicle is hard on the engine.

You need to put these front and center in your campaign along with the facts. The myths and facts are important information that should be in the information materials, Web site, etc.

2. Get your own house in order  
For municipalities, your message goes a long way with the public if you first get your own house in order. The

must take the lead on issues like idling, so launch a workplace initiative to reduce idling across municipal operations.

3. Partnerships are key to success  
To effectively implement your campaign, you need to develop local community partners, for example, local school boards and universities.
4. Finding and managing project staff  
Use a community-based social marketing approach. This involves personal "interventions" or, personal

<sup>18</sup> U.S. Conference of Mayors Energy & Environment Best Practices Survey Report, [mayors.org/uscm/best\\_practices/EnergySummitBP06.pdf#search=%22ethanol%20E85%20best%20practices%20city%22](http://mayors.org/uscm/best_practices/EnergySummitBP06.pdf#search=%22ethanol%20E85%20best%20practices%20city%22), also archived at, [www.natcapsolutoins.org/ClimateManual/Cities/Chapter5/BestBets/TransportationMunicipal/EnergySummitBP06.pdf](http://www.natcapsolutoins.org/ClimateManual/Cities/Chapter5/BestBets/TransportationMunicipal/EnergySummitBP06.pdf), 26 October 2006.

<sup>19</sup> Ultra low sulfur diesel can reduce GHG and other air pollutants. EPA National Clean Diesel Campaign, [www.epa.gov/cleandiesel/](http://www.epa.gov/cleandiesel/), 19 October 2006.

<sup>20</sup> Mississauga, Canada [www.mississauga.ca/portal/residents/idlefree?paf\\_gear\\_id=10200022&itemId=42200036&returnUrl=%2Fportal%2Fresidents%2Fidlefree](http://www.mississauga.ca/portal/residents/idlefree?paf_gear_id=10200022&itemId=42200036&returnUrl=%2Fportal%2Fresidents%2Fidlefree), 27 September 2006.

<sup>21</sup> Canada Natural Resource Idling Information Page, [oee.rncan.gc.ca/communities-government/idling.cfm?attr=12](http://oee.rncan.gc.ca/communities-government/idling.cfm?attr=12), 27 September 2006.

interactions by project staff to encourage drivers in reducing idling at community locations. You need people power to do the interventions and it can be tricky to find and manage the staff. Determine if there are environmental internship programs at the local university for resource help.

5. Council and senior management support is critical  
For municipalities, foster strong support from your council and senior management. Your mayor could help launch the campaign and formal council endorsement should be sought. In Greater Sudbury, the anti-idling campaign was adopted by Earthcare Sudbury, a partnership of the city and 40 community groups; this helped to cultivate broad-based community support and awareness.
6. Utilize pre-existing campaign materials  
Draw extensively on the images, information and

graphic materials available on NRCan's Idle-Free Zone Web tool kit. Create your own new tools using the web site images, including t-shirts, radio spots, letterhead, a dedicated anti-idling web site, etc. The tool kit is a great starting point, and you can tailor it for local use. You need to know your community and what the local hooks are.

7. Schedule field work during consistently moderate temperatures  
Schedule the implementation of initiatives when temperatures are expected to be consistently moderate, such as spring and early fall, for all aspects of field work (re: pre-intervention data collection, interventions, and post-intervention data collection).
8. Focus on your target audience  
Some audiences are more receptive to the anti-idling message than others. In the city of Mississauga's experience, the most successful component was drivers (i.e., parents and

caregivers) at elementary schools who are concerned about the health of their children. Information kits distributed to schools educated children about idling and the kids then took the message home.

9. Build a campaign web site  
A web site is a great low-cost way to make anti-idling information readily accessible and allows regular updates as the campaign progresses. A contact e-mail address allows visitors to make inquiries, comments or suggestions easily, and response time and printing costs can be minimized by referring to the Web site.
10. The message should be visible and memorable / communications input  
Use strong messaging and images (i.e., vehicle tailpipe that looks like a smoking gun), and colors to promote the campaign. Your campaign will also go smoother if you have communications expertise on your project team.

## Municipal Fleet Emission Reductions

### CASE STUDY: Mississauga, Canada<sup>22</sup>

In 2002, the city of Mississauga partnered with Natural Resources Canada to conduct a "Towards an Idle-Free Zone in the city of Mississauga" campaign. The city utilized many of the communications tools

Natural Resources Canada provided and aimed the campaign at public awareness, schools, residential, workplace, private sector, transit education and municipal hotspots. A few of the results are listed next.

Results of the Workplace Initiative:

**96% of city employees were aware of the anti-idling campaign;**

<sup>22</sup>Mississauga Idle Free Campaign, [www.mississauga.ca/portal/residents/idlefree](http://www.mississauga.ca/portal/residents/idlefree), 27 September 2006.

**31% reported that the campaign had changed their idling behavior;**

**Meetings with transit management have resulted in a new policy reducing the maximum idling time for city buses from 15 minutes to 5 minutes<sup>23</sup>**

Results of School Initiative

**Before the interventions were conducted, 54% of drivers were observed idling their vehicles while waiting for children.**

**Almost 500 drivers were approached at 20 elementary schools visited by campaign staff**

**The frequency of idling decreased from 54% to 29%**

**The duration of idling decreased from 8 minutes to 3.5 minutes.**

CONTACT

Environmental Coordinator  
Brenda Sakauye  
Transportation and Works  
Department  
(905) 615-3217  
[brenda.sakauye@mississauga.ca](mailto:brenda.sakauye@mississauga.ca)

## Municipal Fleet Emission Reductions

### CASE STUDY: Lane County, OR

The Lane Regional Air Protection Agency (LRAPA) created the Everybody Wins Program as a project to reduce diesel emissions from idling heavy-duty trucks.<sup>24</sup> LRAPA developed an innovative lease-to-own program to help truckers reduce their idling time through the use of auxiliary power units (APUs). APUs were installed on 100 trucks in Phase 1 of the program, which helped to develop the installation and service infrastructure to support APU technology on the I-5 corridor in Oregon. Phase I of the project is expected to conserve around 1 million gallons of diesel fuel over the life of the 100 APUs and

reduce idling emissions in the trucks with APUs by 75%-90%.

Phase 2 of the program is now underway, with the goal of installing another 250 APUs by 2007. LRAPA received a \$500,000 grant from the Environmental Protection Agency (EPA) SmartWay Transport Partnership for the second phase. In Phase 2, LRAPA will place passive GPS data loggers on board 100 of the 250 trucks to track the usage of APUs. After a year of data on the APUs has been collected, LRAPA will submit a case study report to the EPA, which will then be used to demonstrate the effectiveness of

the idle reduction technology to the trucking industry.<sup>25</sup> As a result of the program, the non-profit Cascade Sierra Solutions was created in March 2006 with the mission of continuing and expanding the Everybody Wins Program throughout Oregon, Washington and California.<sup>26</sup>

CONTACT

Angelique Dodaro  
Cascade Sierra Solutions  
Phone: (541) 302-0900

Gordon Griffin  
LRAPA, Diesel Projects  
Phone: (541) 736-1056

<sup>23</sup> [www.oregon.gov/DEQ/air\\_quality/cleanair/cppi-final-report.cfm?attr=28](http://www.oregon.gov/DEQ/air_quality/cleanair/cppi-final-report.cfm?attr=28), 27 September 2006.

<sup>24</sup> Lane Regional Air Protection Agency, [www.lrapa.org/projects/everybody\\_wins/](http://www.lrapa.org/projects/everybody_wins/), 5 December 2006.

<sup>25</sup> West Coast Diesel, [www.westcoastdiesel.org/programs.htm](http://www.westcoastdiesel.org/programs.htm), 5 December 2006.

<sup>26</sup> Cascade Sierra Solutions, [www.cascadesierrasolutions.org](http://www.cascadesierrasolutions.org), 5 December 2006.



## Programs to Reduce Driving

Many commuters are offered subsidized parking but get no comparable benefit if they use such alternative modes as walking, biking, telecommuting or public transit. When commuters are offered subsidized parking or its cash equivalent, automobile commuting trips typically decline 15-25%.<sup>27</sup> The result would not only include

significant reduction in emissions, but also a diminution in traffic accidents, congestion and fossil fuel consumption.

Parking cash out<sup>28</sup> means that commuters who are offered a subsidized parking space can instead choose the equivalent cash value or other benefits. For example, employees might be able to choose between a free parking space, a monthly transit pass, vanpool subsidies or \$50 cash per month. This typically reduces automobile commuting

by 10-30%, and is fairer, since it gives non-drivers benefits comparable to those offered motorists. More strategies to reduce driving for residents are discussed in the Chapter 5, Residential Transportation Section.

A study of 1,110 Los Angeles area employee commute trip reduction programs found that financial incentives were the most effective of all the strategies evaluated.<sup>29</sup> The table below summarizes the findings.

Type of Benefit	Change in Drive Alone Mode Share
Bicycle Subsidy	-2.7
Vanpool Seat Subsidy	-5.4
Transit Subsidy	-3.1
Other Employee Benefits	-4.1

Table: Effect of Various Financial Incentives on Commute Trips

Transit voucher programs typically shift 20-percentage points of recipients' commute travel from auto to transit.<sup>30 31</sup> Another study found that total vehicle trips declined by 17% after Parking Cash Out was

introduced at various urban and suburban worksites, as illustrated in the next figure.<sup>32</sup> These automobile trips reductions tend to increase over time: one employer found that solo

commuting continued to decline each year after Parking Cash Out was introduced, as more employees found opportunities to reduce their driving and take advantage of the benefit.

<sup>27</sup> Victoria Transportation Policy Institute [www.vtpi.org/wwclimate.pdf](http://www.vtpi.org/wwclimate.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationMunicipal/wwclimate.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationMunicipal/wwclimate.pdf), 27 September 2006

<sup>28</sup> Ibid.

<sup>29</sup> Cambridge Systematics, *The Effects of Land Use and Travel Demand Management Strategies on Commuting Behavior*, Travel Model Improvement Program, USDOT ([www.bts.gov/tmip](http://www.bts.gov/tmip)), 1994.

<sup>30</sup> Oram Associates, *Impact of the Bay Area Commuter Check Program: Results of 1994 Employee Survey*, Metropolitan Transportation Commission (Oakland; [www.commutercheck.com](http://www.commutercheck.com)), 1995.

<sup>31</sup> Judith Schwenk, *TransitChek in the New York City and Philadelphia Areas*, Volpe Transportation Systems Centre, USDOT ([www.volpe.dot.gov](http://www.volpe.dot.gov)), October 1995.

<sup>32</sup> Donald Shoup, "Evaluating the Effects of California's Parking Cash-out Law: Eight Case Studies," *Transport Policy*, Vol. 4, No. 4, 1997, pp. 201-216.

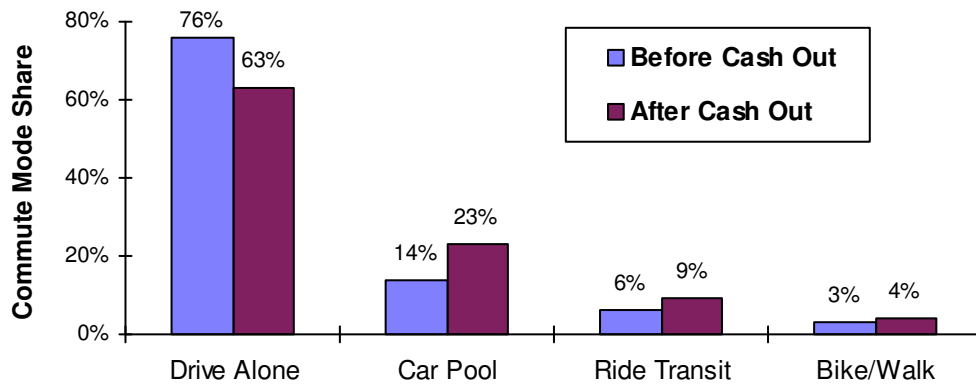


Figure: Cashing Out Impacts on Commute Mode<sup>33</sup>

Parking Cash Out results in reduced automobile commuting and increases in carpooling, transit and non-motorized travel.

#### Municipal Fleet Emission Reduction

### CASE STUDY: Oakland, CA

The city of Oakland established a Commuter Check Program<sup>34</sup> for employees. The program encourages the use of mass transit, by allowing employees to set aside pre-taxed dollars that are specifically designated for utilizing mass transit. The program encourages rider-ship

on buses, trains and ferries while lowering taxable earnings.

A monthly payroll deduction of \$100 plus an administrative fee is used to offset commuter expenses. Vouchers equaling the same set aside amount are

mailed to the employee and can then be used at various locations that dispense tickets and passes.

#### CONTACT

City of Oakland's Benefits Office  
(510) 238-6560

#### Municipal Fleet Emission Reductions

### CASE STUDY: Pleasanton, CA

The suburban city of Pleasanton, California offers \$1.50 per day to employees who use a commute alternative instead of driving to work alone. All city employees

are eligible to participate with no minimum days required. The program has resulted in an annual savings of 20,625 trips, which translates into 12,375 gallons of fuel and 123 tons of

CO<sub>2</sub>. In 1993, the year before the program was implemented, only 28 employees were commuting to work using alternative modes. Average participation in 1994 was 55

<sup>33</sup> Ibid.

<sup>34</sup> Oakland Commuter Check Program, [www.oaklandnet.com/government/fwewebsite/personnel/personnel\\_benefitsp3.htm](http://www.oaklandnet.com/government/fwewebsite/personnel/personnel_benefitsp3.htm), 27 September 2006.

employees per month and grew to 66 participants in 1995.<sup>35</sup> By 2004 average participation was 57 employees per month representing a steady interest in the first ten years of operation. At the close of the 2006 fiscal year, average monthly

participation was up to 62 employees per month. The program has increased its incentive rate to \$2.00 per day.<sup>36</sup>

The city of Pleasanton is also listed on the Best Workplaces for Commuters web site because of

their innovative programs to promote alternative commute programs.<sup>37</sup>

#### CONTACT

Lisa Adomalis  
City Economic Development  
(925) 931-5039

## Modify Transportation Contracts to Incentivize Alternative Fuel Use

### Alternative Fuels for School Buses

There are many niche markets for biodiesel, but school buses, in particular, can be considered 'low hanging fruit'. The fact that there are about 460,000 school buses in the U.S.—nearly six times as many as all the nation's public transit buses combined—is reason enough. But the fact that children—especially young children—tend to be more susceptible than adults to the toxic and potentially cancer-causing emissions from petrodiesel has been an even

more compelling reason for school boards and parents across the nation to insist on switching school buses to biodiesel. A program designed to help school districts clean up their bus fleets. The fact that the EPA received more than 120 applications requesting almost \$60 million is a clear indication of how popular the program has become. Numerous school districts have integrated biodiesel into their fleets<sup>38</sup>:

**In 1997 the Medford, New Jersey, school district was the only one in the nation to run its fleet on biodiesel<sup>39</sup>.**

**The Clark County, Nevada, school district now powers more than twelve hundred of its buses with biodiesel, making it the largest school bus fleet in the nation (and possibly the**

**world) to use biodiesel. The district school buses use 3.5 million gallons of biodiesel each year<sup>40</sup>**

**In Kentucky nine school systems are now running six hundred buses on biodiesel.<sup>41</sup>**

Although the details are still a little confusing, there is increasing evidence that other school bus fleets are also saving money by using biodiesel, even though the fuel costs more than petrodiesel. How is this possible? Biodiesel use results in reduced maintenance costs and increased mileage per gallon.

The federal government has been helpful in this process. Congress included \$5 million in the Environmental Protection Agency's (EPA) budget for Clean School Bus USA,<sup>42</sup> a cost-shared grant

<sup>35</sup> Victoria Transportation Policy Institute, [www.vtpi.org/tdm/tdm8.htm](http://www.vtpi.org/tdm/tdm8.htm), 24 October 2006.

<sup>36</sup> Personal Communication with Lisa Adomalis, 27 October 2006.

<sup>37</sup> Best Workplace for Commuters, [www.bwc.gov/empkit/case-studies.htm#city](http://www.bwc.gov/empkit/case-studies.htm#city), 27 October 2006.

<sup>38</sup> "Biodiesel, Growing a New Energy Economy" by Greg Pahl, Chelsea Green Publishing Company, 2005.

<sup>39</sup> National Biodiesel Board, [www.biodiesel.org/resources/users/stories/medfordnj.shtm](http://www.biodiesel.org/resources/users/stories/medfordnj.shtm), 27 September 2006.

<sup>40</sup> Clark County School District Insider, [www.ccsd.net/news/publications/insider/05-06/Insider\\_Fall.pdf#search=%22biodiesel%22](http://www.ccsd.net/news/publications/insider/05-06/Insider_Fall.pdf#search=%22biodiesel%22), 30 October 2006.

<sup>41</sup> For information on the six districts participating in Clean Cities pilot program: [www.eere.energy.gov/afdc/apps/toolkit/pdfs/kentucky\\_success.pdf#search=%22school%20districts%20and%20biodiesel%22](http://www.eere.energy.gov/afdc/apps/toolkit/pdfs/kentucky_success.pdf#search=%22school%20districts%20and%20biodiesel%22), 30 October 2006.

<sup>42</sup> EPA Clean School Bus [www.epa.gov/cleanschoolbus/](http://www.epa.gov/cleanschoolbus/) 27 September 2006.

## CASE STUDY: Saint Johns, MI<sup>43</sup>

The Saint Johns Public Schools in Michigan was the first Michigan school district to switch its entire fleet of buses (totaling thirty-one) to B20 when it began utilizing biodiesel in 2002.

The school has kept careful maintenance records from both before and after biodiesel was adopted in April 2002. The main cost savings have been due to extended intervals between oil changes, according to Wayne Hettler, garage foreman and head mechanic for Saint Johns. "I'm convinced," he says, "that we are able to extend the oil changes because the B20 burns

cleaner and isn't dirtying the oil as quickly. We're using oil analysis to determine oil change times. We solely credit biodiesel for cleaning up the oil, thus saving the district the costs of oil, filters, labor and the like. I challenge other fleets to 'read' their fleet records and make these cost saving changes after switching to B20."

Longer fuel-pump life due to biodiesel's higher lubricity and increased miles-per-gallon rating are also cited by Hettler as adding even more savings. "Pre-April 2002, our fleet's mileage averaged 8.1 miles per gallon.

Now we average 8.8. That's a huge difference in miles per gallon for buses," said Hettler. A combined savings of \$3,500, even after the extra cost of the biodiesel is deducted, is predicted by the district for the two year period. If savings can be realized by this school bus fleet, it seems reasonable to assume that other fleets can do the same.

### CONTACT

Garage Foreman, Head Mechanic  
Wayne Hettler  
(989) 227-5333.

## CASE STUDY: Warwick, RI

On the East Coast, the Warwick, Rhode Island, school district not only uses B20 biodiesel in its entire seventy-bus fleet but has been successfully heating three of its school buildings with B20 since 2001.<sup>44</sup>

Utilizing the change as an 'experiential education' opportunity the district has also begun integrating biodiesel education into its classroom curriculum. This program is modeled after the high school curriculum on alternative fuels

developed by the Northeast Sustainable Energy Association called "Cars of Tomorrow and the American Community."

In addition to switching fuels, Warwick Public Schools has undertaken a number of energy-saving initiatives. The district utilizes teaching tools that include a 5kWh solar array, a solar car and a fuel cell. According to Robert Cerio, who educates about and manages the energy program, these efforts combined with district-wide improvements

such as lighting retrofits and an energy management system—have resulted in annual energy savings of \$500,000 during the past four years, according to Cerio.<sup>45</sup>

### CONTACT

Energy Educator/ Manager  
Robert Cerio  
Warwick Public Schools  
(401) 734-3219  
[cerior@wpsadmin.org](mailto:cerior@wpsadmin.org)

<sup>43</sup>Michigan Soybean Committee <http://www.michigansoybean.org/>, 30 October 2006.

<sup>44</sup>Rebuild America [www.rebuild.gov](http://www.rebuild.gov), 27 September 2006.

<sup>45</sup>Rebuild Warwick, [www.rebuild.org/attachments/successstories/RhodeIslandBiodiesel.pdf#search=%22warwick%20public%20schools%2C%20energy%20management%20program%22](http://www.rebuild.org/attachments/successstories/RhodeIslandBiodiesel.pdf#search=%22warwick%20public%20schools%2C%20energy%20management%20program%22), 30 October 2006.

## Alternative Fuels for Waste Haulers<sup>46</sup>

Waste haulers are one of the most inefficient vehicles on U.S. roads. They burn approximately a gallon of fuel for every 2.8 miles, travel approximately 25,000 miles annually and consume 8,900 gallons of diesel per year. The 136,000 refuse trucks operating on U.S. roadways may burn nearly 1.2 billion gallons of diesel fuel per year—equivalent to almost 30 million barrels of oil.

Alternative fuel sources are becoming more apparent and economically viable.

*Greening Garbage Trucks*, authored by James S. Cannon, documents changes since 2002:

**Use of alternative fuel refuse trucks—nearly all powered by natural gas—has doubled from 692 to almost 1,500. The number of cities in which these trucks operate has also doubled, from 26 to 57.**

**Refuse trucks have become the most rapidly growing natural gas vehicle sector in the U.S. Their use has expanded more rapidly as a percentage than any other vehicle sector. Its 89% increase was four times the overall 20% increase**

**(between 2002 and 2004) in natural gas vehicle use nationwide.**

**New natural gas fleets have come into operation in Paris, Madrid and Mecheln, Belgium.**

**Although natural gas truck use has risen dramatically, the number now on U.S. roadways constitutes less than 1% of the total refuse truck population of 136,000. Even so, this sector is the second most promising market for natural gas vehicle use after the transit bus sector, which has a market penetration of 12%.**

\* The nation's five largest natural gas refuse truck fleets are operating in California.

City	Fleet Owner	Size of Fleet
Los Angeles, CA	City of Los Angeles	252 LNG
El Cajon (San Diego), CA	Waste Management-San Diego	126 LNG
Sacramento, CA	County of Sacramento	105 LNG (55 LNG/diesel, 50 LNG)
San Diego, CA	Environmental Services Dept.	77 dual-fuel LNG
Fresno, CA	City of Fresno	69 LNG

Table: Location of California Natural Gas Fleet Owners, Including Size of Fleet<sup>47</sup>

U.S. fleet operators identified seven factors that encouraged their shift from diesel to natural gas fuel trucks and three major obstacles to change.

The seven positive factors were:

1. State government programs that provide incentives for purchasers of alternative fuel
2. Concern about rising gasoline and diesel prices, which have sparked fleet interest in alternatives to petroleum-based fuels
3. Looming new environmental standards for heavy-duty engines, which natural gas engine manufacturers are already prepared to meet
4. Growing concerns about national security and US dependence on foreign oil
5. Strong natural gas vehicle industry presence in the refuse truck market
6. Concern among urban leaders and health officials about the health effects of diesel exhaust, which contains carcinogens
7. Recognized benefits of less noise

<sup>46</sup> Greening Garbage Trucks, Trends in Alternative Fuel Use 2002-2005, James S. Canon. [informinc.org/ggt\\_project1.php](http://informinc.org/ggt_project1.php), also archived at [www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationResidential/GGT\\_2005.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationResidential/GGT_2005.pdf), 27 September 2006.

<sup>47</sup> Ibid.



The three primary obstacles to change were:

1. The higher costs of natural gas vehicles and their refueling infrastructure and the higher costs of biodiesel fuel
2. Performance issues that still affect natural gas trucks
3. Reduced federal funding for key DOE programs and a legal setback for the most ambitious

## Transportation Contracts

### CASE STUDY: Los Angeles, CA<sup>48</sup>

The largest growth has occurred in the city of Los Angeles fleet, which grew from 10 natural gas trucks in 2002 to 252 in 2005. This increase occurred despite a serious setback in 2004, when the entire fleet of roughly 160 natural gas trucks was temporarily removed from service to repair the source of leaks in the liquefied natural gas (LNG) fueling system and to counter problems with overheating of the

engines. (The trucks soon returned to service and have performed well since then.) Leonard Walker, former Equipment Superintendent with the city of Los Angeles told INFORM that the city “bought natural gas trucks to improve the air quality. The City Council took a proactive position and voted to improve the air quality by supporting the SCAQMD [South Coast Air

Quality Management District] ruling<sup>49</sup> to purchase alternative fuel trucks before it was mandated by law.” He noted that the fleet is “performing okay considering it is a new technology” and that “public support for the dual-fuel trucks is positive.”

#### CONTACT

LA Air Quality Division  
[heloise.froelich@lacity.org](mailto:heloise.froelich@lacity.org).

Other clean fuels and advanced technologies are emerging in refuse vehicles: use of biodiesel (San Jose, California), hydraulic hybrid technology (in Los

Angeles) and use of bio-methane fuel, a win-win strategy capturing a powerful GHG that was escaping from landfills for use as a clean renewable refuse truck

fuel (with projects in Burlington, New Jersey; Los Angeles & San Diego, California and Gothenburg, Sweden.)

<sup>48</sup> Ibid.

<sup>49</sup> Rule 1193. Clean On-Road Residential and Commercial Refuse Collection Vehicles [www.aqmd.gov/tao/FleetRules/1193Refuse/index.htm](http://www.aqmd.gov/tao/FleetRules/1193Refuse/index.htm), 27 September 2006.

## CASE STUDY: Hybrid Technology<sup>50</sup> for Refuse Vehicles

In late 2004, a developer of hydraulic-hybrid technology—Permo-Drive, Inc., based in Ballina, Australia—began a program to test its hydraulic-hybrid system in refuse collection vehicles operating in Los Angeles, California. For this test, Permo-Drive is collaborating with Waste Management, a major manufacturer of

truck chassis, a tier-one driveline systems integrator, and a refuse truck body builder. This team will build and test a hybrid-hydraulic refuse collection vehicle. In 2005, the Hybrid Truck Users Forum, a coalition of heavy-duty hybrid-electric truck developers, established a working group to promote the use of hybrid-electric

technology in refuse trucks. In 2006, the working group hopes to begin testing hybrid-electric refuse trucks.

### CONTACT

Group Program Manager  
Phil Condon  
[phil@permo-drive.com](mailto:phil@permo-drive.com)

## CASE STUDY: Bio-Methane<sup>51</sup>

A demonstration landfill gas recovery project, conducted in Burlington County, New Jersey, in 2004 and 2005, successfully produced excellent quality gas and used it to fuel two refuse trucks. In this project, landfill gas was purified using a proprietary CO<sub>2</sub> Wash system, developed by Acricion Technologies, Inc., which produced a contaminant-free stream of methane (75%) and carbon dioxide (CO<sub>2</sub>) (25%). This methane-carbon dioxide stream was further separated

into high-purity methane (less than 100 parts per million CO<sub>2</sub>) using membranes manufactured by Air Liquide. Additional processing liquefied the methane into high purity LNG truck fuel. The trucks were refueled with LNG at a Chart Industries fueling station located at the EcoComplex facility adjacent to the Burlington County landfill. The fuel powered two Mack trucks, with E7G engines, owned by Waste Management. Mack is now

focusing on selling this process commercially and is conducting free assessments for landfills to determine the economic feasibility of building landfill gas recovery facilities.

### CONTACT

Mack Trucks  
Government and Community  
Relations  
[Govt.comm.relations@macktrucks.com](mailto:Govt.comm.relations@macktrucks.com)

<sup>50</sup> Greening Garbage Trucks, Trends in Alternative Fuel Use 2002-2005, James S. Canon. [informinc.org/ggt\\_project1.php](http://informinc.org/ggt_project1.php), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationResidential/GGT\\_2005.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter5/BestBets/TransportationResidential/GGT_2005.pdf), 27 September 2006.

<sup>51</sup> Ibid.

## Additional Resources

### Hybrid Resources

- Hybrid Center provides information on consumer and technology  
[www.hybridcenter.org/](http://www.hybridcenter.org/)
- Calculate the potential mileage savings for hybrid vehicles  
[www.fueleconomy.gov](http://www.fueleconomy.gov)
- Clean Cities' HEV Cost Calculator allows fleets to compare the costs, benefits, and emissions of HEV with those of conventional vehicles  
[www.eere.energy.gov/cleancities/hev/cost\\_calc.html](http://www.eere.energy.gov/cleancities/hev/cost_calc.html)

**Natural Resources Canada** has developed ready-to-use graphic materials, articles, tools and templates that can help you organize a public education campaign at your workplace or develop a larger-scale awareness and outreach campaign in your community.  
[oee.rncan.gc.ca/communities-government/idling.cfm?attr=12](http://oee.rncan.gc.ca/communities-government/idling.cfm?attr=12)

### U.S. DOE Energy Efficiency and Renewable Energy Resources Clean Cities

Clean Cities develops comprehensive toolkits that help coalitions and stakeholders reach their petroleum displacement goals. With technical information, step-by-step instructions, answers to frequently asked questions,

related links, and more, Clean Cities' toolkits point users in the right direction. Choose the following toolkits to learn how to build niche markets, install alternative fuel infrastructure, and calculate the cost savings of hybrid electric vehicles.

[www.eere.energy.gov/cleancities/](http://www.eere.energy.gov/cleancities/)  
**Alternative Fuels Data Center**  
[www.eere.energy.gov/afdc/](http://www.eere.energy.gov/afdc/)

### Toolkits Available for Alternative Fuels

- [www.eere.energy.gov/cleancities/toolkits.html](http://www.eere.energy.gov/cleancities/toolkits.html)
- Airport Shuttle Outreach Toolkit  
[www.eere.energy.gov/afdc/apps/toolkit/airport\\_shuttle\\_toolkit.html](http://www.eere.energy.gov/afdc/apps/toolkit/airport_shuttle_toolkit.html)
- E85 Fleet Toolkit  
[www.eere.energy.gov/afdc/e85toolkit/](http://www.eere.energy.gov/afdc/e85toolkit/)
- School Bus Toolkit  
[www.eere.energy.gov/afdc/apps/toolkit/school\\_bus\\_toolkit.html](http://www.eere.energy.gov/afdc/apps/toolkit/school_bus_toolkit.html)
- Transit Bus Niche Market Toolkit  
[www.eere.energy.gov/afdc/apps/toolkit/transit\\_bus\\_toolkit.html](http://www.eere.energy.gov/afdc/apps/toolkit/transit_bus_toolkit.html)
- HEV Cost Calculator  
[www.eere.energy.gov/cleancities/hev/cost\\_calc.html](http://www.eere.energy.gov/cleancities/hev/cost_calc.html)

**National Biodiesel Board** is the national trade association representing the biodiesel industry as the coordinating body for research and development in the United States  
[www.biodiesel.org](http://www.biodiesel.org)

### Chicago Locomotive Idle Reduction Project.

Environmental Protection Agency, March 2004.  
[www.epa.gov/smartway/documents/420r04003.pdf](http://www.epa.gov/smartway/documents/420r04003.pdf)

### Wisconsin Diesel Truck Idling Grant Program

[www.legis.state.wi.us/lc/2\\_PUBLICATIONS/Other%20Publications/Reports%20By%20Subject/Environment%20and%20Natural%20Resources/IM05\\_02.pdf](http://www.legis.state.wi.us/lc/2_PUBLICATIONS/Other%20Publications/Reports%20By%20Subject/Environment%20and%20Natural%20Resources/IM05_02.pdf)

**Chicago districts' alternative fueled fleet success stories,**  
[www.chicagocleancities.org/stories.shtml](http://www.chicagocleancities.org/stories.shtml)



**NATURAL  
CAPITALISM  
SOLUTIONS**

**NATURAL CAPITALISM SOLUTIONS IS A 501(C)3 NON-PROFIT ORGANIZATION  
WWW.NATCAPSOLUTIONS.ORG • P.O. BOX 398 • ELDORADO SPRINGS, CO 80025  
INFO@NATCAPSOLUTIONS.ORG • TEL: 303-554-0723 • FAX: 303-554-6548**