Idle Reduction Fleet Applications

Notes

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Introduction

There are many options available for fleet managers who wish to implement idle reduction technologies and strategies. The previous section provided an overview of alternative fuel options and their benefits and drawbacks. This section will provide information specific to the use of idle reduction strategies as a petroleum reduction technology.

The use of idle reduction strategies can be applied to all vehicles and any fleet application. Some obstacles in the use of idle reduction technologies and strategies are the lack of knowledge and understanding of advanced technology vehicles. There are idle reduction strategies that can be implemented by all fleet managers. There are also idle reduction technologies available for fleet managers. Both technologies and strategies should be reviewed in the decision to use idle reduction in their fleet.

The goal of this chapter is to provide the information necessary for fleet managers to determine if implementing idle reduction strategies and technologies are viable alternatives for their fleet.

Objectives

- Explain how to implement green fleets
- Learn about incentives for utilizing idle reduction technologies and strategies
- Learn about the availability and cost of idle reduction technologies and strategies
- Identify the advantages of idle reduction technologies and strategies
- Understand the performance of vehicles with idle reduction technologies

Greening of Fleets

There can be challenges to starting a fuel efficient green fleet, or converting an existing fleet to the use petroleum reduction technologies. According to some industry experts, a successful plan to reduce fuel consumption and carbon emissions requires a long-term vision, incremental change, support from top management, and flexibility to make changes along the way.

There are compelling reasons why fleets should be green and deliberate steps on how to implement alternative fuels. [1]

Why Use Green Fleets?

- **Reduce operating costs** by improving efficiency, reducing lifecycle costs, and reducing vulnerability to volatile fuel prices.

- **Reduce greenhouse gas emissions** by implementing the use of idle reduction technologies and strategies in vehicles, which are the primary source of greenhouse gases and urban air pollution.
- **Improve corporate image** by branding business strategies and appealing to public concerns about energy conservation and ecological sensibilities.

How to Implement Green Fleets

- **Get buy-in** from all management and staff levels, and be sure to communicate information about the benefits, goals, and targets frequently.
- **Create long-term objectives** and tangible goals based on best practices in the industry (such as baselines, benchmarks, and progress reports).
- **Avoid setting reduction goals** in absolute numbers for growing fleets or fleets just starting because absolute goals can impede growth.
- **Anticipate obstacles**, such as driver resistance, lag time between original equipment manufacturers' technology and market availability, and slower return on investment.
- **Move slowly** and implement change over time.
- **Improve vehicle use** with selection analysis and education of drivers.
- **Track and report progress** and share successes with employees, shareholders, and the public

Idle Reduction in Fleets

Idle reduction is a petroleum and emissions reduction strategy that focuses on limiting the time during which vehicles idle. In this context, idle refers to the speed at which internal combustion engines (ICEs) rotate under no throttle or load. Idle speeds typically range from 600 to 1,000 revolutions per minute (rpm) (see **Figure 1**). Most cars have a gauge to display engine speed. This gauge is called a tachometer. This speed is most often set by the manufacturer in order to provide smooth vehicle acceleration from stop and adequate oil pressure to lubricate moving parts of the engine. Engines that operate under their prescribed idle speed are often said to idle rough, and this is due to the low rotating energy of the engine components causing significant vibrations.

Figure 1:*The engine tachometer showing a vehicle's idle speed. Source: NAFTC.*

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There are two types of idling. They are: transportation and convenience. Examples of transportation idling are waiting at traffic lights or in highway congestion. Convenience idling is when vehicles are idled for reasons of operator convenience or comfort. As an umbrella term, idle reduction describes the technologies, policies, and strategies aimed at reducing the amount of time that vehicles idle their engines. This section covers reduction technologies and strategies available to fleet managers that will reduce both transportation and convenience idling.

Idle Reduction Strategies

Fleet managers using light-duty vehicles usually idle less than medium- and heavy-duty commercial vehicles, but even small reductions in idle time can save fuel and reduce emissions. Most idle time of light- and medium-duty vehicles occurs during in-city driving. Idle time can be reduced by avoiding congested areas and rush hour traffic. Fleet managers also can follow guidelines presented in this workshop to help limit idle time for convenience. Reductions in idle time can lead to immediate and direct savings.

Idle Reduction Technologies

Manufacturers of light- and medium-duty vehicles are implementing idle reduction technologies in a number of ways. These technologies improve fuel economy and reduce emissions by reducing idle time. Though these vehicles do not consume the same amount of fuel or idle as long as heavy-duty vehicles, the volume of these vehicles in use offers significant room for fuel savings. In this workshop, these specific technologies will be called idle shutoff functions. Some of these technologies include mild hybrids that utilize motor/generators (MGs), engine restart due to combustion without electric assist, and advanced starters similar to conventional engine starters.

Manufacturers of heavy-duty vehicles also are developing and implementing idle reduction technologies. For example, manufacturers of long-haul trucks are providing the option of installed auxiliary power units (APUs). These units typically use a smaller diesel engine that is attached to an electric generator. Because of the size of the APU, it operates more efficiently than the larger displacement main engine. APUs can provide electrical power for accessories, A/C, cab heating, and even engine heating. Tax incentives and weight limit exemptions have been implemented to support the use of APUs.

Truck stop electrification (TSE) is also a technology being developed and implemented by truck stop owners, manufacturers, and state governments. These truck stops allow long-haul drivers to purchase grid electricity for heating, cooling, and accessories. Some of these trucks are equipped with sleeper cabs. At these locations the vehicle auxiliary systems can run off independently powered systems allowing for engine shutdown instead of idling for eight or more hours.

Incentives for Implementing Idle Reduction Technologies

Incentives propagate the growth and purchasing power within organizations that are needed for strong commercial markets. Incentives include partnership initiatives and pooled resources, financial subsidies, and informational tools. Below we discuss incentives available that augment fleet managers' efforts to implement idle reduction technologies and strategies use in their fleets.

Recent industry surveys have confirmed that fleet operations are voluntarily purchasing alternative fuel vehicles to meet specific EPAct regulations and mandates by the federal government. Unfortunately, alternative fuel and advanced technology vehicles cost more that their gasoline-powered counterparts, and determining how to pay for these more expensive vehicles has become a growing concern for fleet managers across the country. Fortunately, there is financial help available.

Despite the fluctuating economy and budget woes, there are a record number of grants and incentives for funding alternative fuel vehicles available. For example, in 2009 the U.S. Department of Energy (DOE) made nearly $300 million of American Reinvestment and Recovery Act (ARRA) funding available through the Clean Cities program. This single grant funding opportunity is responsible for putting more than 9,000 alternative-fuel and energy-efficient vehicles on the road.

Tax Incentives

In the past decade, there have been many federal and state tax incentives for alternative fuels and advanced technology vehicles. For example, tax exemptions have been made available for idle reduction technologies through the SmartWay program. These technology tax exemptions are available to fleet managers who implement qualifying idle reduction equipment. To see what equipment qualifies use the link below. Funding and partnership opportunities for idle reduction technology use are also available through the Clean Cities and National Clean Diesel Campaign programs.

For a list of qualifying tax exempt idle reduction equipment use the following link:
http://www.epa.gov/smartway/technology/excise-tax.htm

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Federal Grant Funding

When it comes to grant opportunities, the federal government is by far the largest and most consistent source of funding. Many federal agencies offer funding opportunities, but the majority of funding for alternative fuel vehicles and transportation-related projects comes from a handful of federal agencies, such as the U.S. Department of Energy (DOE), Department of Transportation (DOT), Environmental Protection Agency (EPA), and U.S. Department of Agriculture (USDA). These agencies have information on their funding opportunities available on their respective websites.

State Grant Funding

Many states have developed aggressive grant funding programs during the past few years. While each state has different grant funding sources, the designated State Energy Office (SEO) is typically the largest alternative fuel vehicle grant funding source in each state. To make it easy to identify each state's SEO, the National Association of State Energy Officials (NASEO) publishes a directory of State Energy Offices online. The DOE's Alternative Fuels Data Center (AFDC) also publishes an interactive web-based map that allows users to click on any state in the country to get information on alternative fuel vehicle incentives and funding sources.[2] There is a multitude of state-level funding programs for clean air vehicle and transportation projects, but visiting these two websites will provide the starting points for any fleet manager interested in state-level funding programs.

Idle Reduction Laws

Many states and cities have implemented laws or regulations that limit the time a vehicle may idle. There are also established no idle zones which is common for school systems to implement in pickup and drop-off zones. Some examples of these state and city laws are:

- In the state of West Virginia the regulation states: A commercial motor vehicle with a gross vehicle weight rating of 10,000 pounds or more may not idle for more than 15 minutes in any 60-minute period.
- In Pennsylvania, vehicles of 10,001 pounds or more may not idle for more than five minutes per hour.
- Philadelphia restricts idling to two minutes.
- Denver restricts idling of any vehicle to five minutes anywhere within the city.

To search local idle restrictions use the following link:
http://www.afdc.energy.gov/afdc/vehicles/idle_reduction_laws.html

Idle Reduction Availability and Cost

Light and Medium-Duty

There are many technologies available to the light- and medium-duty fleets to help with idle reductions. This section will quickly address block heaters, mild hybrids, and other idle shutoff technologies.

Block Heaters

Block heaters are a method of using grid power to maintain engine temperatures to avoid problems associated with cold starting. This technology has been used for decades by heavy-duty diesel vehicles. These systems typically operate on 120VAC from a standard outlet connection. They are often thermostatically controlled so that they do not consume more energy than necessary to facilitate easy cold weather starting. They are often suggested for engines in vehicles where the low temperature falls below 0 °F (-17.8 °C). These devices can reduce the amount of time idling that is common for consumer acceptability of entering a cold vehicle. With these units vehicles are started easily and driving can begin almost instantly, providing for quicker warm-up compared to idling a cold vehicle.

Mild Hybrids

The most common technology for idle reduction of some new light- and medium-duty vehicles comes in the form of mild hybrids. These vehicles come equipped with an idle shutoff function. When the vehicle is idled for a given period of time such as at a stop light, the ICE shuts down. This reduces fuel consumption and local emissions. The vehicle utilizes a small battery pack and motor/generator (MG) to assist in vehicle propulsion while the ICE is restarted. Onboard sensors determine, from brake pedal release and throttle position, how to accelerate the vehicle under electric power while also restarting the ICE. Unlike full hybrid vehicles, the time for electric vehicle propulsion is usually only on the order of seconds instead of minutes or miles. This type of technology offers idle reduction functions of full hybrid vehicles while saving on cost by allowing for smaller onboard energy storage. These types of systems can be applied to ICEs powered by conventional gasoline or diesel fuels as well as other alternative fuels. An example of mild hybrid technologies can be found in vehicles such as those sold from GM brands labeled with eAssist, which stands for electric assist.

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New Idle Shutoff Technologies

The purchase price of even mild hybrid electric vehicles is typically still more than conventional vehicles. Research continues on other methods to start and stop conventional ICEs in order to save on fuel economy and lower idle emissions. One of these technologies is iStop from Mazda. The technology has been demonstrated in gasoline and diesel ICEs. When the idle shutoff function is enabled sensors control the exact stopping position of the pistons. This is done such that a startup procedure can occur without the need to rotate the engine through standard or hybrid starting procedures. Such a system can inject fuel and/or cause a spark such that combustion occurs sequentially, causing the rotation of the ICE. This technology typically begins as soon as the brake pedal is released and starts the engine on the order of less than half a second.

Toyota also has developed alternative starting methods to utilize idle shutoff functions without the need for even mild hybrid systems. Conventional starters utilize multiple solenoids, usually one to engage with the flywheel and the second to spin the flywheel. Toyota's method is used on some Yaris models. They utilize a starter with a one-way clutch that allows for its continuous engagement with the flywheel. Its design is more robust, allowing for more starts than conventional starters.

Other companies such as BMW are blurring the lines between mild hybrids and conventional starting systems. Some of these systems are referred to as micro-hybrids. In order to accommodate a small energy storage system and unconventional charge cycles, absorptive glass mats are used to store energy. Unlike mild hybrids, this energy storage and starting system does not propel the vehicle for any distance but does allow for idle shutoff functions. Thus, there are many options for light- and medium-duty vehicles that can be purchased today that already have the built-in advantages of idle reduction technology and more on the horizon.

Heavy-Duty

Heavy-duty vehicles represent the long-haul commercial freight carriers, among others. These long-haul trucks are commonly known as "tractor-trailers." It is estimated that there are approximately 650,000 of these vehicles that idle overnight and nearly 2,000,000 total. Due to their large numbers, large fuel consumption rates, and operation practices, this group is critical when considering vehicle idling behavior.

In order to prevent driver fatigue and ensure highway safety, the Federal Motor Carrier Safety Regulations were developed within the U.S. Department of Transportation. To meet the hours of service (HOS) requirements, commercial drivers must have periods of rest that break periods of driving. For drivers whose trucks contain sleeping berths, mandatory rest periods often occur in highway rest areas and commercial truck stops.

An average long-haul truck with a sleeper cabin idles more than 1,900 hours annually to supply heating, cooling, and electricity during driver rest periods. Nationwide, overnight long-haul truck idling consumes more than one billion gallons of fuel annually. Argonne National Laboratory estimates that this practice, along with workday idling, uses more than three billion gallons of diesel fuel a year. Commercial truck stops and manufacturers have developed technologies and strategies to reduce the need for idling while addressing the needs of commercial drivers. Understanding of these technologies, and their economic and environmental impacts will be of great significance to freight companies and independent drivers. Understanding the technical aspects of these technologies and their increased use will be of great significance to technicians of this emerging niche.

Truck Stop Electrification (TSE)

Truck stop electrification is a multi-party initiative put forth to address the problem of commercial truck stop idling. Multiple companies and agencies are working in conjunction to build an infrastructure of electrified parking spaces at commercial truck stops. With a potential of up to 5,000 electrified truck stops, long-haul drivers will have required and necessary rest without the need for truck idling. It is estimated that this strategy represents a potential for reduction in maintenance costs, millions of gallons of fuel, and will eliminate millions of tons of pollutants each year. As of September 2011, there were 64 electrified truck stops registered and listed with the DOE.

To find an electrified truck stop in your region, the DOE hosts a site locator searchable by zip code. It can be found at this address:
http://www.afdc.energy.gov/afdc/locator/tse/

There are two variations of TSE. They are: single-system and dual-system. Single-system electrification consists of stand-alone units that drivers can connect to their trucks. These units have all the necessary off-board equipment and utilities. A typical system consists of one unit per parking space, and offers drivers heating, ventilation, and air conditioning (HVAC), electricity, internet, and cable. In cold climates, drivers can install block heaters and these can be powered by the system as well. **Figure 2** shows an example of a single-system electrification unit. A unit is placed in the passenger's window. This unit provides for multimedia usage with a screen and connections for keyboards. It also provides vents necessary to heat and cool the cabin while the driver sleeps.

Figure 2: *Long-haul truck utilizing single system electrification. Source IdleAir.*

Dual-system electrification also known as "shore power" requires an initial investment in onboard equipment, such as a power inverter, electrical cabin equipment, block heaters, and electrical HVAC equipment. After this equipment is installed, drivers simply plug the vehicle into an electrical outlet.

Onboard Equipment

There are many onboard equipment options that can easily be integrated into a heavy-duty truck that can help reduce idle time at truck stops, roadsides, ports, terminals, and delivery sites. Such equipment may be powered by external electricity or is integrated into a truck's existing fuel system. Because they are task specific, these technologies are much more efficient than allowing the main engine to idle.

Onboard Heating

These units burn fuel from the truck's existing fuel supply and function in one of two ways. Some units burn fuel to heat external air that is blown into the cab. Other types heat the engine block coolant.

Direct-fired heaters are small furnaces that function to heat the cab of a truck. Compared to idling the truck's engine for heat alone, cab heaters are extremely fuel efficient. A direct-fired heater consumes about a tenth of the amount of fuel as an idling truck.

Coolant heaters take advantage of the truck's internal heat-transfer system. The unit is typically mounted in the engine compartment and burns fuel from the main tank to heat the vehicle's coolant. This dual-purpose unit can maintain a warm engine block in cold weather, and heat the cab through the trucks pre-existing cab heater. Coolant heaters reduce the negative impact of cold starts on fuel consumption and emissions by keeping the engine fluids warm.

Onboard Cooling

Another main reason to idle long-haul truck engines is to keep the cab cool while the driver sleeps in warm climates. There are multiple options for onboard cooling that eliminate main engine idling. Thermal storage and battery-electric air conditioners are two technologies aimed at cab cooling and idle reduction. In the thermal storage system, thermal energy is stored during normal operation. This thermal energy can be used to cool the cab at a later time when the engine is off. Battery-electric air conditioners are powered with an onboard battery bank. These batteries are charged during normal driving or from "shore power" at truck stops. Both idle reduction systems are extremely efficient and produce fewer emissions.

Auxiliary Power Units

Auxiliary power units (APUs) are small vehicle-mounted systems designed to eliminate the need for convenience idling. These systems consist of an electrical generator powered by a small internal combustion engine, which generally uses fuel from the main fuel system of the truck. Because these engines and generators are task specific they are more efficient when compared to using the main engine and alternator system. APU technology could help eliminate 11 million tons of carbon dioxide emissions from truck idling in the U.S. each year. For some APUs in cold climates, a heat recovery system sends captured heat from the APU engine to the cabin. In hot climates, APUs are used to power electrically powered air conditioners within the cabin.

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Strategies

Fleet managers can implement strategies that may provide for immediate fuel savings at the pump. These fuel savings may also provide for emissions reductions. The California Consumer Energy Center gives some tips to consumers to help alleviate old myths about the necessity of idling. It is suggested that even on cold days, a modern engine only needs to idle for 30 seconds before the car is driven. New vehicles have warm-up functions programmed into the main control units to ensure the engine, transmission, and exhaust aftertreatment systems quickly reach operating temperatures. Another rule of thumb is that a car should be turned off in situations where idling will last more than 10 seconds. Idling a vehicle for one hour consumes almost one gallon of fuel. Idling engines may cause faster wear than when engines are operated at higher speeds (rpm). Engines are designed to operate efficiently at higher engine speeds. It is also noted that frequent engine cranking associated with starting and stopping costs an estimated $10 a year due to component wear, but this is easily offset by savings at the pump.

Cost

Fleet managers have many options to purchase new equipment to help reduce idle time and fuel consumption. The capital cost of such equipment may not prove economical for all fleets but implementing idle reduction strategies can provide lost cost benefits. There have been tax incentives for hybrid vehicles in the past. These vehicles offer idle reduction benefits for both light-duty and heavy-duty fleets. The purchase and installation price of qualifying heavy-duty idle reduction equipment may be subsidized by incentives and tax exemptions. The EPA estimates that the average truck is left to idle overnight for 6.5 hours, 300 nights a year and a typical long-haul, heavy-duty truck consumes nearly one gallon of diesel fuel for each hour it idles. Considering that diesel fuel is close to $4 per gallon, idling overnight costs over $6,000 per year of operation.

Idle Reduction Advantages

There are advantages and things to consider when choosing to implement idle reduction strategies as a petroleum reduction technology. Below is a list of factors that affect decisions to use idle reduction in fleets.

Advantages

- Reduces petroleum use leading to direct savings
- Reduces idle emissions
- Some strategies require little to no cost to implement
- Technologies available for all fleets

Things to Consider

- New technologies may require capital investment
- Driver buy-in and continued practice of idle reduction strategies
- Check local and state laws that limit idle time from commercial vehicles

Idle Reduction Performance

A major consideration in the successful application of a petroleum reduction technology is performance. Using petroleum reduction technologies and strategies in fleets should not sacrifice operating performance. One of the main benefits specific to the performance of vehicles equipped with idle reduction technologies is extended engine life. Studies have shown that extended periods of idle can add unnecessary wear to engine components. Vehicles that utilize these technologies may outperform conventional vehicles based on vehicle life. Most light-duty vehicles that utilize idle reduction technologies offer similar performance when compared to conventional counterparts. Assistance from electric motors can offer similar vehicle acceleration with overall reduction in fuel consumption. Commercial vehicles may benefit more from idle reductions based on the performance measure of increase engine life. The fuel savings of installing or using idle reduction technologies can easily offset capital cost. Added weight from technologies such as APUs is often exempted from state laws on maximum vehicle weights. The added weight usually has a negligible effect on heavy-duty vehicle performance since they are typically transporting payload that is much heavier than the APU itself. Not only will these technologies offer similar vehicle performance to drivers but fleets will be able to brand their fleet as green due to reduction of idle emissions.

Performance Summary

- *Better fuel economy, an idling vehicle not in motion gets 0 mpg*
- *Reduced emissions*
- *Similar performance to conventional vehicles*
- *May lead to extended engine life*

Summary

This lesson develops an understanding of idle reduction technologies and strategies as options for fleet managers and explains how to green fleets by purchasing idle reduction technologies and implementing idle reduction strategies. Vehicles equipped with idle reduction technologies offer similar performance with reduced fuel consumption compared to conventional counterparts. There are many options for light-, medium-, and heavy-duty idle reduction technologies. There are also low-cost idle reduction strategies that can be implemented by fleet managers to see fuel economy improvements on existing fleets. Idle reduction technologies and strategies offer reductions in operating costs and reduce the carbon footprint of environmentally conscious fleets.

Test Your Knowledge

1) **True or False:** There are idle reduction strategies available for fleet managers that require little to no cost to implement.

2) An average long haul truck spends _____ hours idling per year.

3) There are two types of idling. They are: _____ and _____ .

4) **True or False:** States and cities are not allowed to implement laws limiting the idling time or location of idling vehicles.

Answers: 1) True; 2) 1,900; 3) Convenience and transportation; 4) False — many states and cities have already implemented time limitations on idling and established areas where idling is prohibited.

Resources

STEP

The U.S. Department of Energy has recently supported a truck stop electrification project funded by the American Recovery and Reinvestment Act (ARRA). STEP stands for Shorepower Truck Electrification Project (STEP). In this project, Cascade Sierra Solutions partnered with Shorepower Technologies to locate and build electrified stuck stops along America's busiest highways. This project also covered $10 million in idle reduction equipment beyond truck stop electrification.

Shorepower Technologies has been installing its dual-system pedestals which house the necessary connections for both electricity and multimedia through coax cables. These pedestals will be available for simply cord connections for voltages from 120 VAC to 240 VAC. Wireless internet access may also be available at certain locations. The goal of the project is to install these units at 50 locations nationwide. This type of truck stop electrification will reduce the required idle time at busy truck stops while allowing commercial drivers their required created comforts. To learn more about STEP and available rebates check out the link below.

To find out more about current "shore power" projects, visit http://www.the-step-project.org

Notes

Resources

- **Alternative Fuels Data Center – Idle Reduction** (http://www.afdc.energy.gov/afdc/vehicles/idle_reduction.html) – Offers publications about the benefits of idle reduction, idle reduction implementation strategies, and additional resources.
- **Alternative Fuels Data Center – Truck Stop Electrification** (http://www.afdc.energy.gov/afdc/locator/tse/) – Allows users to search for truck stops with electrification technologies.
- **American Transportation Research Institute** (http://atri-online.org/) – Part of the American Trucking Associations Federation. Focuses on research, studies, and tests within the trucking industry.
- **Argonne National Laboratory – Idle Reduction Research** (http://www.transportation.anl.gov/engines/idling_research.html) – Presents idle reduction facts, figures, and findings.
- **Blue Skyways Collaborative** (http://www.blueskyways.org/our-work/on-road/idle-reduction.html) – A collaborative of three states and multiple cities working to promote idle reduction technologies.
- **Clean Cities 2012 Vehicle Buyer's Guide** (http://www.afdc.energy.gov/afdc/pdfs/51785.pdf) – Offers model-specific information about vehicles that utilize alternative fuels.
- **Consumer Energy Center - Idling** (http://www.consumerenergycenter.org/myths/idling.html) – Contains the truth behind myths and misconceptions related to idling vehicles and idle reduction.
- **Department of Energy Efficiency & Renewable Energy – Vehicle Technologies Program** (http://www1.eere.energy.gov/vehiclesandfuels/resources/fcvt_national_idling.html) – Provides a monthly newsletter pertaining to the participants in a national idling reduction network.
- **Fuel Economy** (http://fueleconomy.gov) – Official U.S. government source for information pertaining to the fuel economy ratings and fuel efficiency.
- **SmartWay** (http://www.epa.gov/smartway/index.htm) – Offers information about the SmartWay program that strives to improve air quality.
- **U.S. Department of Energy (DOE) – Clean Cities Program** (http://www1.eere.energy.gov/cleancities/) – Addresses the nation's energy security by supporting local actions and groups to reduce overall petroleum consumption in transportation.
- **U.S. Department of Energy (DOE)** (http://energy.gov/) – Agency that helps ensure America's security and prosperity by addressing energy related problems with emerging technologies.
- **U.S. DOE Vehicle Technologies Program** (http://www1.eere.energy.gov/vehiclesandfuels/) – Develops more efficient transportation technologies that help reduce domestic dependence on foreign petroleum.

Footnotes

1 Environmental Defense Fund, "Greening Fleets, A Roadmap to Lower Costs and Cleaner Corporate Fleets," http://business.edf.org/sites/business.edf.org/files/greening-fleets.pdf

2 U.S. Department of Energy, Alternative Fuels Data Center, *State Incentives and Laws*, http://www.afdc.energy.gov/afdc/laws/state

Notes

CASE STUDY

Location: Walled Lake, MI

Company: Walled Lake Consolidated School District (WLCSD)

Study: Idle Reduction

Walled Lake Consolidated School District (WLCSD) is settled in the southeast corner of Michigan and is the state's 9th largest school district. For a district of this size, school bus fuel accounts for a large part of the transportation budget. As with many districts across the state, budgets are getting tight. "There is a push towards saving money where ever you can. Certainly one of the ways, one of the biggest ways you can save is by fuel usage reduction," said District Transportation Supervisor Jill Segal. "It became very important to set idling policies, which actually most districts have done, including us, for the better part of the 21st century."

School buses in the bus garage yard at Walled Lake Consolidated School District's transportation facility. Photo Courtesy of Jill Segal.

Decision Points

Idle reduction is an easy way for any fleet to reduce petroleum consumption, but requires cooperation from drivers. "Even though we can have the policies in place, enforcing them is nearly impossible," Segal said. "A few years ago we came up with an incentive – for the drivers." To get drivers interested and complying with idle reducing practices, the district came up with a competition. Beginning in fall of 2007, the two drivers with the greatest increase in miles per gallon (MPG) through reduction in avoidable idling would be rewarded with a parking space in the bus garage. This was a great incentive, because it meant that the winners would not have to warm up their buses, clean off snow in the winter, or walk the long distance from the facility to the parking area. To be fair, the winning drivers would be from two groups: the general education buses and the special education buses. Special education bus drivers typically idle longer due to special needs and driver responsibilities, such as loading wheelchairs.

Fleet Facts

WLCSD operates 119 buses covering 107 different routes. Daily, they transport 12,000 school children to and from school. These buses use diesel fuel and vary in size, age, make, and model. The average bus has a life expectancy of 15 years. The use of idle reduction practices and monitoring of average miles per gallon will help these older buses stay in service longer. The fleet has been awarded with safety and inspection awards from the State of Michigan and prides itself on a commitment to safely and efficiently transporting the district's diverse population of students.

Aerial view of fleet facilities. Photo Courtesy of Jill Segal.

Fuel Supply and Infrastructure

The main motivation for the WLCSD's competition was to increase fuel economy through idle reduction practices. With more than 100 buses running on diesel, it was imperative to lower the overall fueling costs. In order to accurately monitor the fuel economy and idling practices of the fleet, the transportation team installed a management and maintenance software program on each bus. This program allows maintenance workers to monitor information and aids in the preventative measures needed for a fleet of this size. Every time the buses fuel up, the software calculates the mileage and fuel usage. This information is then used in reports by the mechanics and maintenance director as a way to keep track of fuel economy, idle reduction practices, and as the first step in preventive maintenance measures.

QUICK FACTS

Alternative Fuel Practice: Idle Reduction

Number of Vehicles: 119

Miles Driven Annually: 1,486,351

Estimated Fuel Consumption: 207,803 gallons per year

Life Cycle of Buses: 15 years

Costs

Tim Stage, the transportation department's head mechanic, compared engine running times and actual miles driven to derive idling time and miles per gallon baselines for each driver and corresponding bus. After a two-month monitoring period, the baseline idling rate averaged 20 percent, and fuel consumption rate was 7 miles per gallon. After two years of this "competition", Segal notes that idling rates are now below 10 percent and MPG has increased to an average of 7.5. Change in driving habits changed significantly and made a big difference in reducing emissions, reducing petroleum use, and reducing costs. Officials estimate the project saving the district $28,000.

Another measure to reduce avoidable idling is to have auxiliary heaters installed. Stage said that more than half of the fleet is using this technology. WLCSD uses auxiliary heaters it had installed by bus dealerships as an aftermarket device. In the price range of $2,400 to $2,500, these devices eliminate cold starts and reduce pre-route, warm-up idling time. These auxiliary heaters are programmed to begin heating engine coolant to approximately 150°F, one hour prior to the drivers' arrival. To do this, they burn a small amount of the diesel fuel from the bus's main fuel system.

Before auxiliary heaters, drivers would need to sit with their buses idling for fifteen minutes or more, warming the engine. This proved to be wasteful and ineffective. Segal added, "Most of our fleet is diesel, and diesel engines really don't put out a lot of heat until they're moving, so the idea of starting a bus 15 minutes ahead of time is just ridiculous."

Maintenance and Satisfaction

One added benefit of keeping track of bus idling times and trends is the ability to monitor the overall miles per gallon achieved by the bus. If a bus shows a drastic change in efficiency, this signals to the maintenance department that something is wrong. The maintenance team would then perform tests to determine if the fuel efficiency problem is connected to increase idle time or a mechanical fault.

The monitoring of both idle reduction times and miles per gallon allow bus drivers to have more control over their buses and equipment, and often times empower them to become inspectors of their own buses.

A maintenance worker checks diagnostics and inspects one of the 119 buses at WLCSD's transportation facility. Photo courtesy of Jill Segal.

The department has found the idle reduction incentive program to be a success and will continue the competition for years to come. Just a simple change in driving habits has resulted in huge savings for the school district, a reduction in petroleum consumption, and an increase in driver morale. Having a goal and a competitive approach has helped drivers become more conscious of their driving habits while having fun.

Summary

These idle reduction measures adopted by the district were done so voluntarily, and not the result of any government mandates or incentives. Segal identified a growing trend among schools districts to save money by reducing petroleum consumption, as well as reducing emissions. These practices have popular support, presented opportunity for good press, and are recommended best practices. Regarding WLCSD's idling reductions policies, it appears to be a win-win scenario. Segal concludes, "We're very proud of what we've done around here."

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