The Importance of Idle Reduction:

Awareness and Outreach

Notes

© NAFTC 2012

The Importance of Idle Reduction

Awareness and Outreach

Objectives 2

Why Consider Idle Reduction 2

Benefits of Idle Reduction 4

- Health Benefits 4
- Environmental Benefits 4
- Economic Benefits 5
- Energy Security Benefits 5

Idle Reduction - Today and Tomorrow 6

- The Future of Idle Reduction 6
- Suggested Actions 6

Summary 7

Test Your Knowledge 7

Acknowledgments

This material was developed by the National Alternative Fuels Training Consortium (NAFTC), a program of West Virginia University in Morgantown, West Virginia, under a grant from the U.S. Department of Energy (DOE).

Acknowledgment: This material is based upon work supported by the U.S. Department of Energy Clean Cities Program under Award Number DE-EE0001696.

Many individuals and organizations in academia, government, and industry participated in this process.

The NAFTC thanks and acknowledges:

- The Curriculum and Training Development Committee of the NAFTC for review and input throughout the development process.
- The National Research Center for Coal and Energy for oversight and support of the project.

Project management was provided by the National Alternative Fuels Training Consortium (NAFTC), Al Ebron, NAFTC Executive Director and Judy Moore, NAFTC Assistant Director - Communications and Outreach and Clean Cities Learning Program Project Coordinator, West Virginia University, Morgantown, West Virginia.

National Alternative Fuels Training Consortium
A Program of
West Virginia University

© NAFTC 2012

The Importance of Idle Reduction

This material will discuss the importance of idle reduction technologies and strategies. The advantages and reasons to consider implementing idle reduction technologies will be explored. There will be a discussion of how using idle reduction technologies and strategies will benefit human health, the environment, the economy, and U.S. energy security. Finally, some suggested actions will be provided to see immediate results of idle reduction strategies.

Objectives

- Describe why idle reduction strategies and technologies must be considered
- Describe how idle reduction benefits health and the environment
- Explain the economic benefits of idle reductions
- Describe what energy security is and how idle reduction can affect it
- Explain some suggested actions to utilize idle reduction strategies

Why Consider Idle Reduction?

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.

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

There are two types of idling, 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, safety, or comfort. As an umbrella term, idle reduction describes the technologies, policies, and strategies aimed at reducing the amount of time that engines are idled. This workshop will cover reduction strategies and technologies that will reduce both transportation and convenience idling.

© NAFTC 2012

Manufacturers

Manufacturers are utilizing idle reduction technologies in light-, medium-, and heavy-duty vehicles to improve fuel economy while reducing emissions. Light- and medium-duty vehicles using mild hybrid systems that allow for idle shutoff functions to save on fuel at stoplights or during heavy slow moving traffic situations, are currently available. Other advanced engine technologies also are being examined. Heavy-duty manufacturers are looking at technologies such as mild hybrids, block heaters, direct-fired heaters, and auxiliary power units (APUs) in order to reduce idling time of larger vehicles such as long-haul trucks (tractor trailers). In addition to vehicle manufacturers, federal, state, and local governments are working on projects to reduce overnight idling at truck stops. The main technology for this option is called truck stop electrification. It is estimated that overnight idling for these vehicles consumers nearly one billion gallons of fuel each year.

Consumers

Consumers can use idle reduction technologies by purchasing vehicles equipped with some type of idle shutoff function. However, they also can change driving habits to see immediate savings at the pump. An easy way for consumers to reduce idle time is to avoid congested rush hour traffic. A car that is idling and not moving is getting 0 MPG. Consumers also should read vehicle owner/operator manuals or contact dealerships to review standard operating procedures. Idling vehicles longer than suggested by these sources is a waste of fuel and engine life, and produces unnecessary pollutants.

Advantages of Idle Reduction

The main advantages of idle reduction strategies and technologies are reduced fuel consumption, lowered operating costs, and lowered vehicle emissions. An idling vehicle not in motion achieves 0 MPG. Drivers and fleet managers also can take advantage of the lower operating costs and increases in engine life from idle reduction strategies. Some idle reduction strategies can be implemented at little to no cost to consumers and fleet managers.

Additional Points to Consider

The use of certain technologies by vehicle operators may require significant capital investment. There also may be a compromise of consumer comforts when implementing idle reduction strategies, such as choosing not to precool your vehicle by using the air conditioner at idle. However, vehicle operators should weigh the advantages and drawbacks of limiting vehicle idle time along with being aware of local idling laws.

© NAFTC 2012

With the 2010 emissions regulations for compression-ignition engines many aftertreatment technologies have been installed onboard to reduce harmful emissions. These systems may require certain idle periods before or after operation to ensure proper system operation. Idle timer systems are starting to be offered in some heavier pickup trucks. These trucks have built-in functions that idle the vehicle for a predetermined length of time before shutdown. Even though some idling may be required, there is significant room for reducing the time most vehicles spend idling.

Benefits of Idle Reduction

Beyond the mentioned advantages, there are also benefits to idle reduction strategies and technologies. Idle reduction can have direct benefits to human health, the environment, the economy, and energy security.

Health Benefits

The combustion of fuels in ICEs can have negative effects on overall health. Some of the negative emissions include particulate matter (PM) (soot), carbon monoxide (CO), oxides of nitrogen (NO_x), and volatile organic compounds (VOCs). Inhalation of PM leads to respiratory and cardiovascular problems, particularly affecting young children and the elderly. CO enters the bloodstream through the lungs and forms carboxyhemoglobin, a compound that inhibits the blood's capacity to carry oxygen to organs and tissues. NO_x, when mixed with VOCs and sunlight, produces ground level ozone (O_3) and can negatively affect those with respiratory problems. Reductions in idle time can also positively affect the health of drivers operating these vehicles. It is clear that idle reduction would lead to a reduction in harmful emissions and to healthier air quality.

Environmental Benefits

Motor vehicle emissions also negatively affect the environment. Ground level ozone (O_3) and carbon dioxide (CO_2) are a direct result of the combustion of fuels. Carbon dioxide is considered a "greenhouse gas" and may be a major determinant of global climate change. Greenhouse gases trap the heat from the sun within the Earth's atmosphere, potentially contributing to global warming. NO_x, and SO_x emissions all can lead to the formation of acid rain. The acidification negatively affects plant and aquatic life. Any reduction in burning petroleum-based fuels promises a positive benefit to the environment. Idle reduction is a simple method to reduce unnecessary emissions.

© NAFTC 2012

Economic Benefits

Excessive idling can lead to considerable financial loss for the commercial freight industry, fleet vehicle companies, and for individual families. 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.

Argonne National Laboratory estimates there are more than 650,000 trucks that are likely to idle overnight. A reduction in idling represents a potential of $4.6 billion in savings to the collective industry. These two numbers represent an opportunity for rapid growth in idle reduction technology in the freight and fleet vehicle sectors. The future's demand for idle reduction technologies in the service industry appears promising.

Idle reduction presents economic benefits for the nonprofessional driver as well. For example, many believe that it is better and more efficient to leave an engine running if parking for a short period. According to the California Consumer Energy Center, most fuel-injected vehicles should be turned off if it is to be idle for more than is 10 seconds. This figure is supported by Argonne National Lab and the EPA. Restarting an engine uses less fuel than idling. Idle reduction strategies may provide for immediate savings at the pump.

Energy Security Benefits

Reducing total petroleum consumption can help lead to energy security. Each move toward self-sufficiency decreases the nation's vulnerability to oil shortages and price shocks. Nearly half of all petroleum used in the U.S. is imported from foreign countries.

Almost 70% of oil use in the U.S. is within the transportation sector, with 16% going to freight vehicles and 61% to passenger vehicles. It is estimated that six billion gallons of fuel are consumed annually through idling. Simple changes in policies, practices, and technology adoption toward idle reduction can make a positive contribution to overall energy security.

© NAFTC 2012

Idle Reduction – Today and Tomorrow

The EPA sets standards for fuel economy and emissions. As these limits become more stringent and technology becomes more sophisticated idle reduction technologies become valuable as an immediate part of the solution. There are a few new options for consumers looking to purchase vehicles equipped with idle shutoff functions. The products needed for heavy-duty idle reductions from APUs and other onboard improvements are available for purchase and most states already allow for weight exemptions to include idle reduction equipment. Perhaps the easiest and cheapest way to see the benefits of idle reduction today is to simply be aware of idling time and work on improving driving habits to reduce vehicle idle time.

The Future of Idle Reduction

The Obama administration has raised the CAFE standard to 35.5 MPG for 2016 and 54.5 MPG by 2015 for light-duty vehicles. Along with this, the EPA is also looking at implementing regulations for fuel economy and CO_2 emissions from heavy-duty engines. These new mandates will most likely lead to more vehicles produced with idle reduction technologies as a standard feature. Many automobile manufacturers have mild hybrids or other advanced idle reduction technologies in production. Research continues in the field of APUs for the heavy-duty market and improvements in batteries and fuel cells will cause further evolution. An option for heavy-duty idle reduction is the increased use of TSEs. There are 64 electrified struck stops across the U.S. with the future potential of up to 5,000 electrified truck stops. The electricity used at these TSEs is domestically produced and offers the benefits of lower local emissions and noise. This alone has the potential to reduce petroleum consumption on the order of one billion gallons per year. While these technologies become readily available there are simple actions that consumers and fleet operators can utilize to see immediate benefits of idle reduction.

Suggested Actions

Unlike some alternative fuel and advanced technology vehicles, some idle reduction strategies may be immediately implemented by consumers and fleet managers. Fleet managers should actively review local incentives and laws for idle reduction regulations. Following are some of the easiest actions to implement by using idle reduction to save on fuel consumption and lower emissions.

- Read and practice the recommended operating procedures suggested by the vehicle manufacturer for warm-up and cool-down procedures. Extended operation at idle can cause added engine wear and decrease the life of engine oil.

- Preplan trips in order to avoid sitting in traffic. An idling car sitting in traffic gets 0 MPG.

© NAFTC 2012

- Some idling is used for A/C or heating functions. If this is not necessary and a vehicle is in a position to idle for more than 10-30 seconds, shut down the engine.
- Heavy-duty fleet managers should investigate the purchase APUs, block heaters, direct-fired heaters, and electric power A/C units to save on fuel.
- Fleet managers can preplan by utilizing TSE on their routes. To find TSEs: http://www.afdc.energy.gov/afdc/locator/tse/

Summary

It has been the convention for decades that engine idling was a required and necessary function of vehicles powered by ICEs. However, new technologies and strategies are significantly reducing the necessary idle time of these engines. Fuel economy standards are increasing while emissions limits are decreasing. A great niche to meet both requirements is through the reduction in idle time. Vehicle manufacturers continue to develop and research new advanced methods in idle reduction. In the meantime, consumers and fleet managers can utilize idle reduction strategies to see immediate benefits. Idle reduction is not the final solution to the petroleum consumption problem but it is a valuable part of the solution that has the benefits of improved health, cleaner environment, economic benefits, and assisting in U.S. energy security.

Upon completing this material, can you

- Describe why idle reduction strategies and technologies must be considered?
- Describe how idle reduction benefits health and the environment?
- Explain the economic benefits of idle reductions?
- Describe what energy security is and how idle reduction can affect it?
- Explain some suggested actions to utilize idle reduction practices?

Test Your Knowledge

1) **True or False:** The fuel economy of a conventional vehicle idling while it sits in traffic is 0 MPG.

2) Nearly _____% of the petroleum consumed in the U.S. is used for transportation.

3) The Consumer Energy Center recommends turning off an engine if the vehicle is to idle more than 10 (seconds, minutes).

4) **True or False:** Idling vehicles produces no emissions.

Answers: 1) True.; 2) 70; 3) Seconds; 4) False — an engine that is operating on a hydrocarbon fuel produces emissions regardless of speed.

© NAFTC 2012

Conclusion

Idle reduction technologies and strategies can be used by both consumers and manufacturers. Government mandates to lower emissions while increasing fuel economy are leading to new advanced technologies and vehicles equipped with various types of idle shutoff functions. Beyond these mandates, consumer awareness of health and environment also leads to the search for methods to reduce petroleum consumption. Consumers can modify their driving habits to reduce idle time, which will yield immediate savings at the pump. There are no main changes needed to the current fuel distribution system to implement either the technologies or strategies associated with idle reduction. This reduces the time to see idle reduction benefits. Idle reduction technologies may also be used in conjunction with alternative fuels and advanced technology vehicles. Though idle reduction is not a final solution to the nonrenewable fuel consumption problem, it is a viable petroleum reduction option.

The only main disadvantages of idle reduction technologies are that some do require the purchase of new items and that it will not reduce all fuel consumption needs. However, the future of vehicles will utilize the benefits of idle reduction as a niche solution to lowering emissions and improving fuel economy.

Some key benefits:

- Reduction in idle time is directly proportional to fuel economy improvements and emissions reductions.
- Simple idle reduction strategies are easy, cost effective, and immediately available to implement.
- The benefits of idle reduction strategies can be utilized on conventional vehicles as well as advanced technology and alternative fueled vehicles.

© NAFTC 2012

Notes

© NAFTC 2012

Notes

© NAFTC 2012

Disclaimer

National Alternative Fuels Training Consortium/West Virginia University/West Virginia University Research Corporation Disclaimer

All published versions of this Petroleum Reduction Technologies, including both printed and electronic formats thereof and all associated videos, supplementing documents, and related electronic links, are provided as a public service by the National Alternative Fuels Training Consortium (NAFTC), a program of West Virginia University, under a grant from the U.S. Department of Energy Clean Cities Program under Award Number DE-EE0001696.

The information contained in this manual was obtained from sources believed to be reliable and is based on technical information and experience currently available at the time of writing.

All users of the information contained herein do so at their own risk.

The National Alternative Fuels Training Consortium (NAFTC)—a program of West Virginia University—and its members make no warranty or guarantee regarding the results of the use of this information and assume no liability or responsibility in connection with the information or suggestions herein contained. The NAFTC does not endorse any specific commercial product, original equipment manufacturer, or professional service. Any reference or mention of specific products, manufacturers, or service providers by trade name, trademark, or visual identity does not constitute or imply endorsement or recommendation from the NAFTC.

Moreover, it should not be assumed that every acceptable or necessary commodity grade, test, safety procedure, method, precaution, equipment, or device is contained within, nor that abnormal or unusual conditions or circumstances may not warrant or suggest further requirements or additional procedures.

This document is subject to periodic review and/or revision. Users are strongly cautioned to obtain the latest version.

Comments and suggestions are invited from all users for consideration by the NAFTC in connection with such review. Please send all comments to the NAFTC, to the attention of the Executive Director.

The guidance and information in this guide are not meant to take the place of vehicle or equipment manufacturer guidelines and are not intended to supersede other information, requirements, or regulations provided by manufacturers, the insurance industry, safety officials, or other applicable standards and recommended practices.

This document does not take the place of and should not be confused with federal, state, provincial, or municipal specifications or regulations, insurance requirements, or safety codes.

U.S. Department of Energy (DOE) Disclaimer

This material was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

© NAFTC 2012

Copyright Notice

This material is Copyright © 2012 by West Virginia University Research Corporation and the National Alternative Fuels Training Consortium, Morgantown, WV. All rights are reserved in all countries. This work is a product of the National Alternative Fuels Training Consortium, a program of West Virginia University. This material has been funded by a grant from the U.S. Department of Energy (DOE) Clean Cities Program under Award Number DE-EE0001696.

Any reproduction, duplication, distribution, or display, by physical, electronic, or other means, without written permission from the National Alternative Fuels Training Consortium, is expressly prohibited.

This work may be quoted briefly, provided that attribution is given to the National Alternative Fuels Training Consortium.

All images, graphs, and photographs are provided by National Alternative Fuels Training Consortium unless otherwise noted in context.

For questions or further information, please contact:
National Alternative Fuels Training Consortium
Attention: Executive Director
1100 Frederick Lane
Ridgeview Business Park
Morgantown, WV 26508
Telephone: 304-293-7882
Fax: 304-293-6944
http://www.naftc.wvu.edu

PRINTED IN THE UNITED STATES OF AMERICA
First printing 2012.

Acknowledgment: This material is based upon work supported by the U.S. Department of Energy Clean Cities Program under Award Number DE-EE0001696.

Clean Cities
U.S. Department of Energy

The U.S. DOE Clean Cities Program is a government-industry partnership designed to reduce petroleum consumption in the transportation sector by advancing the use of alternative fuels and vehicles, idle reduction technologies, hybrid electric vehicles, fuel blends, and fuel economy measures.

www.naftc.wvu.edu/cleancitieslearningprogram
www.cleancities.energy.gov

The National Alternative Fuels Training Consortium is the only nationwide alternative fuel vehicles and advanced technology vehicle training organization in the U.S.

National Alternative Fuels Training Consortium

Ridgeview Business Park
1100 Frederick Lane
Morgantown, WV 26508

A Program of
WestVirginiaUniversity