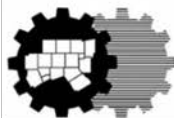


SMARTE

Saving Money and Reducing Truck Emissions



North Central Texas
Council of Governments





Table of Contents

SMARTe PROGRAM OVERVIEW

Vendor Directory
Upgrade Profile Form
SMARTe Program Vendor Directory Sign-Up
Truck Technology Diagram

IDLE REDUCTION OVERVIEW

NCTCOG INFORMATION OVERVIEW

Air Quality Fact Sheet
Freight Fact Sheet

SMARTWAY INFORMATION

Overview of Carrier Strategies
Idle Reduction Overview
Improved Aerodynamics
Low Rolling Resistance Tires
Reducing Highway Speed
Driver Training

BROCHURES

SMARTe
North Texas Idling Restrictions



SMARTe Program Overview

SMARTER || OVERVIEW



Saving Money and Reducing Truck Emissions

The North Central Texas Council of Governments (NCTCOG) has launched a new program called ***Saving Money and Reducing Truck Emissions (SMARTER)***, designed to improve industry awareness of freight traffic effects on air quality and encourage industry-specific best practices, all while helping drivers save money!

Through the SMARTER program, NCTCOG staff will provide outreach and information about regional initiatives and resources available in the Dallas-Fort Worth (DFW) region.

In the last 10 years, many of the country's largest fleets have benefited from new and innovative technologies supported by the Environmental Protection Agency's (EPA's) SmartWay® program. These technologies are helping slash heavy-duty truck emissions while also lowering operational costs and maximizing uptime for drivers. One of SMARTER's goals in DFW is to serve as a bridge to help owner-operators and small businesses take advantage of these same benefits.

SMARTER places heavy emphasis on promoting EPA SmartWay-verified technologies to small and medium-sized fleets and individual owner-operators by providing outreach on regional trucking rules to help drivers stay informed and in compliance.

How do I get started?

- Complete upgrade profile
- Visit www.nctcog.org/SMARTER to learn more.
- Sign up for SMARTER emails for the latest information on grant funding opportunities, technologies, and more!

SERVICES AVAILABLE

As part of this role, SMARTER will:

- **Provide** information on technological and operational solutions for freight efficiency.
- **Determine** combination of technologies best suited to fit driver's needs and provide return on investment.
- **Provide** application assistance for federal, State, local, and non-profit funding programs that provide financial assistance.
- **Educate** drivers and fleets about conditions that affect regional air quality.
- **Inform** users on local regulations that impact the freight industry.

To learn more or to sign up for email alerts about new funding opportunities, visit: www.nctcog.org/aqfunding.

SAVINGS EXAMPLES

The following examples demonstrate potential money saved using a sample of EPA SmartWay-verified technologies.

Auxiliary Power Units (APU) Potential Savings

Idling Costs

Truck Idling		Auxiliary Power Unit	
Per Vehicle	Idling	Idling	APU Use
Hours/Day	10	2	8
Days/Month	25	25	25
Hours/Month	250	50	200
Gallons/Hour	1	1	0.2
Gallons/Month	250	50	40
Fuel Cost/Gallon	\$ 3.00	\$ 3.00	\$ 3.00
Cost/Month	\$ 750.00	\$ 150.00	\$ 120.00
Total Cost	\$ 750.00	\$270.00	

Equipment Financing Options

Equipment + Installation Cost	\$9,500
Loan Amount	- \$8,550
Net Upfront Cost	\$ 950

Length of Loan (months)	12	24	36	48
Monthly Loan Payment	\$ (751.72)	\$ (394.50)	\$ (263.88)	\$ (216.83)
Monthly Savings	\$ 480.00	\$ 480.00	\$ 480.00	\$ 480.00
Monthly Net	\$ (271.72)	\$ 85.50	\$ 216.12	\$ 263.17

MONEY IN YOUR POCKET

Lifetime Net (48 months)	\$ 14,019.36	\$ 13,572.00	\$ 13,540.32	\$ 12,632.16
---------------------------------	---------------------	---------------------	---------------------	---------------------

Electrified Parking Spaces (EPS) Potential Savings

Idling Costs

Truck Idling		Electrified Parking Space	
Per Vehicle	Idling	Idling	EPS Use
Hours/Day	10	0	10
Days/Month	25	25	25
Hours/Month	250	0	250
Gallons/Hour	1	1	0
Gallons/Month	250	0	0
Fuel Cost/Gallon	\$ 3.00	\$ 3.00	\$ 2.00*
Cost/Month	\$ 750.00	\$ 0.00	\$ 500.00
Total Cost	\$ 750.00	\$ 500.00	

*Typical Basic Connection Fee

MONEY IN YOUR POCKET

Total Savings	\$1/Hour	\$10/Day	\$250/Month	\$3,000/Year
----------------------	-----------------	-----------------	--------------------	---------------------

Tractor Tires Potential Savings

Operating Costs

Standard Tires		Tractor Tire Improvement
Per Vehicle		
Miles/Gallon	6	6.19*
Hwy Miles/ Mo.	7,500	7,500
Gallons/ Mo.	1,250	1,211
Fuel Cost/Gallon	\$ 3.00	\$ 3.00
Cost/Month	\$ 3,750.00	\$ 3,633.00

*Low resistance tires are estimated to reduce fuel use by 3% or more

MONEY IN YOUR POCKET

Estimated Annual Savings	\$ 1,404.00
---------------------------------	--------------------

Aerodynamic Improvements Potential Savings

Operating Costs

Standard Vehicle		Aerodynamic Improvements
Per Vehicle		
Hwy Miles/Year	90,000	90,000
Miles/Gallon	6	6.5
Gallons/Year	15,000	13,800
Fuel Cost/Gallon	\$ 3.00	\$ 3.00
Cost/Month	\$ 3,750	\$ 3,450

Equipment Financing Options

Equipment + Installation Cost*	\$3,500
Loan Amount	- \$3,150
Net Upfront Cost	\$350

*10% down + 10% interest

Length of Loan (months)	12	24	36	48
Monthly Loan Payment	\$ (291.66)	\$ (145.83)	\$ (97.22)	\$ (72.91)
Monthly Savings	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Monthly Net	\$ 8.34	\$ 154.17	\$ 202.78	\$ 227.09

MONEY IN YOUR POCKET

Lifetime Net (48 months all scenarios)	\$ 10,900.08
---	---------------------













SMARTE || **VENDOR DIRECTORY**

+

Saving Money and Reducing Truck Emissions

The following vendors have signed up to participate in the SMARTE program. This means they support program goals and sell EPA SmartWay-verified technologies. Inclusion in this listing does not imply endorsement by the North Central Texas Council of Governments.

Please bring a SMARTE Program brochure or directory when you purchase technologies from any of the following vendors. At their own discretion, each vendor *may* offer a promotion to you when you mention the SMARTE Program at the time of purchase.

Vendors	SmartWay Certified Tractors & Trailers	Trailer Strategies	Aerodynamic Devices	Idling Reduction Equipment	Low Rolling Resistance Tires	Advance Lubricants
CANTWELL POWER SOLUTIONS - FW Matt Benton 2727 East Loop 820 South Fort Worth, TX 76119 817.731.2841 www.cantwellequip.com				 (On-Board)		
CENTRAMATIC Mike Hagar 5345 I35W South Alvarado, TX 76009 817.783.6396 www.centramatic.com				 (On-Board)		
CONVOY SERVICING COMPANY Randy Olson 3323 Jane Lane Dallas, TX 76106 682.777.6712 www.convoyservicing.com				 (On-Board)		
IDLEAIR Melvin Choat 629 N. Broad Way Knoxville, TN 37917 254.447.4063 www.idleair.com				 (Off-Board)		
MHC KENWORTH Tom Lawless 4040 Irving Blvd. Dallas, TX 75247 214.920.7300 www.mhc.com				 (On-Board)		



North Central Texas
Council of Governments



SMARTE **||** VENDOR DIRECTORY

Saving Money and Reducing Truck Emissions

The following vendors have signed up to participate in the SMARTE Program. This means they support program goals and sell EPA SmartWay-verified technologies. Inclusion in this listing does not imply endorsement by the North Central Texas Council of Governments.

Please bring a SMARTE Program brochure or directory when you purchase technologies from any of the following vendors. At their own discretion, each vendor *may* offer a promotion to you when you mention the SMARTE Program at the time of purchase.

Vendors	SmartWay Certified Tractors & Trailers	Trailer Strategies	Aerodynamic Devices	Idling Reduction Equipment	Low Rolling Resistance Tires	Advance Lubricants
PORTER TRUCK SALES, L.P. Davy Compton 1200 North Highway 310 at I-45 Hutchins, TX 75141 972.225.2480 www.portertrk.com						
RUSH TRUCK CENTERS DALLAS Toby Malone 515 North Loop 12 Irving, TX 75061 469.706.5239 www.rushtruckcenters.com				 (On-Board)		
RUSH TRUCK CENTERS FORT WORTH Curtis Stoner 1480 NE Loop 820 Fort Worth, TX 76106 817.740.4996						
SHOREPOWER TECHNOLOGIES Alan Bates 5291 NE Elam Young Parkway Hillboro, OR 97124 503.892.7345 www.shorepower.com				 (Off-Board)		
UTILITY TRAILER OF DALLAS, INC. Bo Watson 3241 Lyndon B. Johnson Freeway Dallas, TX 75241 972.225.8845 www.utilitytrailerofdallas.com						



SMARTE || UPGRADE PROFILE FORM

Saving Money and Reducing Truck Emissions

CONTACT INFORMATION:

Company Name:		Phone Number:	
Contact Name:		Email Address:	
Number of Trucks:		Number of Trailers:	
Fleet Total:		Date:	
Owner Operator/Fleet Manager: (Choose One)			

TRUCK INFORMATION:

ENGINE INFORMATION:

Truck Make:		Annual Mileage:	
Truck Year:		Fuel Volume (gal/year):	
Day Cab or Sleeper:		Fuel Type:	
Vehicle Class:		Idling (hours/year):	
Lease or Own:		Current Odometer:	

ROUTE TYPE: (Choose One)

ROUTE DETAILS:

Local (DFW region):	
Long-Haul (100,000+ m/year):	
Drayage/Yard Hostler/Spotter:	

STRATEGIES:

	In Use	Interested		In Use	Interested
Advanced Lubricants:			Idling Control Strategies:		
Aerodynamic Devices:			Speed Management Policy:		
Engine & Truck Upgrades:			Tire Technology:		

CATEGORY	TECHNOLOGY	BRAND	MODEL NUMBER
Advanced Lubricants	Low Friction Drive Train Lubricants		
	Low Friction Engine Lubricants		
	Other Advanced Engine Lubricants		
Aerodynamic Devices	Aerodynamic Profile Tractor		
	Cab Side Fairing		
	Cab Aerodynamic Mirrors		
	Cab Air Dam Front Bumper		
	Cab Over Engine Tractor		
	Cab Roof Deflector		
	Cab Roof Fairing		
	Cab Integrated Roof Fairing		
	Flatbed Trailer Tarps		
	Trailer Bubble		
	Trailer Tails		
	Trailer Gap < 36"		
	Trailer Gap 36"-44"		
	Trailer Side Skirts		
	Full Length Side Skirt		
	Half Length Side Skirt		
	Under Tray System		
Engine	Engine Replacement		
	Engine Repower		
Engine & Truck Upgrades	Direct Drive		
	Single Axle vs. Double Axle		
Idling Control Strategies	Auxiliary Power Unit		
	Driver Team		
	Engine Shut Down		
	Driver Training		
	Truck Stop Electrification		
	Other		
Speed Management Policy	55 to 65 MPH (select max)		
Tire Technology	Automatic Tire Inflation		
	Single Wide Tires		
	Low Rolling Resistance Tires		
	Other		

NOTES:

SMARTE || TRUCK TECHNOLOGY DIAGRAM

Saving Money and Reducing Truck Emissions



Technology Checklist

2007 or Newer Engine: ☐ Y ☐ N

Certified Clean Idle: ☐ Y ☐ N

Retrofit Exhaust ☐ Y ☐ N

Idle Reduction: ☐ Y ☐ N

Low Rolling Resistance Tires: ☐ Y ☐ N

Weight Reduction: ☐ Y ☐ N

Aerodynamics

Trailer Skirts: ☐ Y ☐ N

Rear Fairing: ☐ Y ☐ N

Fuel Tank Skirts: ☐ Y ☐ N

Idle Reduction Overview

SMARTE || IDLE REDUCTION OVERVIEW

Saving Money and Reducing Truck Emissions

The freight industry, while vital to the North Central Texas economy, has a significant impact on ozone-forming pollutants within the 10-county nonattainment area, making it an ideal target for significant air quality improvement goals.

Behavior Change

Driver behavior can be one of the most important factors in reducing cost due to idling. Excess idling can be reduced by warming up the engine for three to five minutes when starting a shift or simply turning off the engine when staging at a pick up or drop off location.

Nationally, overnight idling is estimated to contribute over 200,000 tons of nitrogen oxides (NO_x) and 5,000 tons of particulate matter (PM) annually. NO_x emissions contribute to regional ozone levels and reduced visibility. Because of this and the inherent health impacts of poor air quality, idle reduction efforts are being made across North Central Texas.

Idle reduction efforts can be divided into two broad categories:

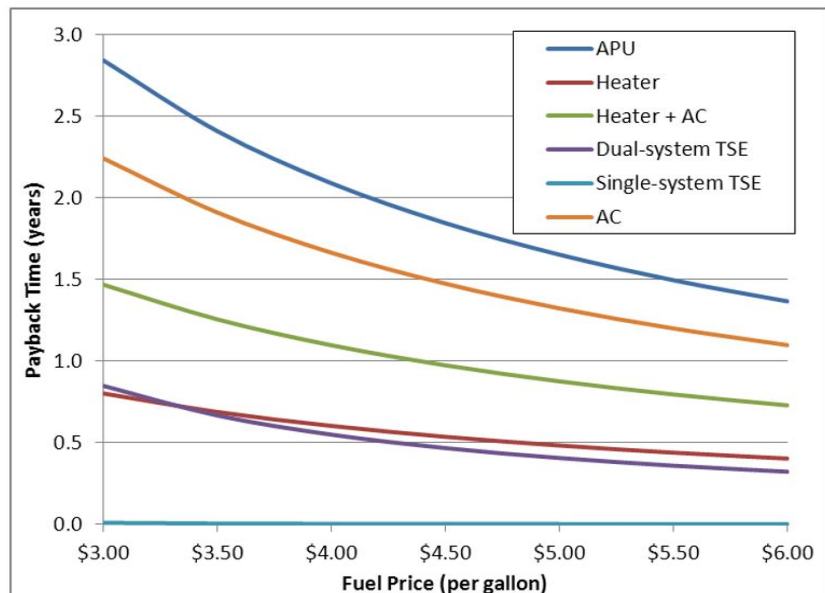
1. Idle Reduction through Technology
2. Idle Reduction through Behavior Change

BENEFITS OF IDLE REDUCTION TECHNOLOGY

Idle reduction technology is often called the “low-hanging fruit of fuel economy.” Because the upfront costs to investing in idle reduction technologies are relatively small, the return on investment is quick.

Idle Reduction Technology **cuts operational costs**— the typical U.S. tractor-trailer uses approximately one gallon of diesel fuel every hour and costs an additional 50 cents to 95 cents an hour in maintenance. By using idle reduction technologies, drivers can save thousands of dollars in operational costs each year.

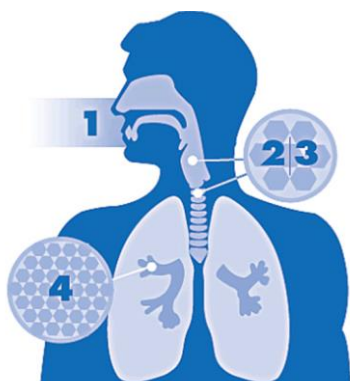
Exhibit 1: Idle Reduction Technology Payback



Source: National Academy of Sciences Committee Review of the 21st Century Partnership

Idle reduction equipment pays for itself in six months to two years (at 2013 fuel prices). **Exhibit 1** represents the payback time for a long-haul truck that idles an average of 40 hours per week.

- Idle Reduction Technology **improves regional air quality**— 10 counties in the DFW area are classified as moderate nonattainment for the pollutant ozone. Ozone is formed when NO_x and volatile organic compounds mix in the presence of sunlight and heat. Programs to reduce NO_x emissions from mobile sources, which produce approximately 76 percent of ozone forming pollutants, are an important element in working toward ozone attainment.
- Idle Reduction Technology **protects driver's health**— diesel engine exhaust is made up of two main parts: gases and particulate matter (PM); together, these two parts account for thousands of toxic chemicals and particulates that directly impact the health of drivers. In 2011, the World Health Organization formally classified diesel engine exhaust as carcinogenic to human health. By utilizing idle reduction technologies like publicly available electrified parking spaces (EPS), drivers can almost eliminate the amount of emissions they inhale using closed, filtered heating, ventilation, and air conditioning (HVAC) systems that draw air from inside the cabin.



- 1 PM enters the respiratory (lungs) system through the nose and throat.
- 2/3 Larger particulate matter (PM₁₀) is eliminated through coughing, sneezing and swallowing.
- 4 Fine particulate matter, PM_{2.5}, can penetrate deep into the lungs. It can travel all the way to the alveoli, causing lung and heart problems, and delivering harmful chemicals to the blood system.

TECHNOLOGY OPTIONS

Categories of Idle Reduction technologies include:

- **Off-Board Equipment:**
Truck Stop Electrification (TSE)
Electrified Parking Spaces (EPS)
- **On-Board Equipment:**
Auxiliary Power Units (APU)
Fuel Operated Heaters (FOH)
Battery Air Conditioning (AC)
Thermal Storage Systems (TSS)

For more information about idling restrictions in North Central Texas, visit engineoffnorthtexas.org

Electrified Parking Spaces (EPS)







EPS describe idle reduction technologies that allow drivers to turn off their engines while at rest by providing access to necessary systems HVAC systems and electricity for accessory use without idling the engine. The difference between EPS and other idle reduction technology options is that EPS are off-board, publically available solutions that require no previous investment in equipment. EPS are most widely used at truck stops—commonly referred to as Truck Stop Electrification (TSE) — where drivers use their vehicle's sleeper berth in order to comply with government mandated rest periods.

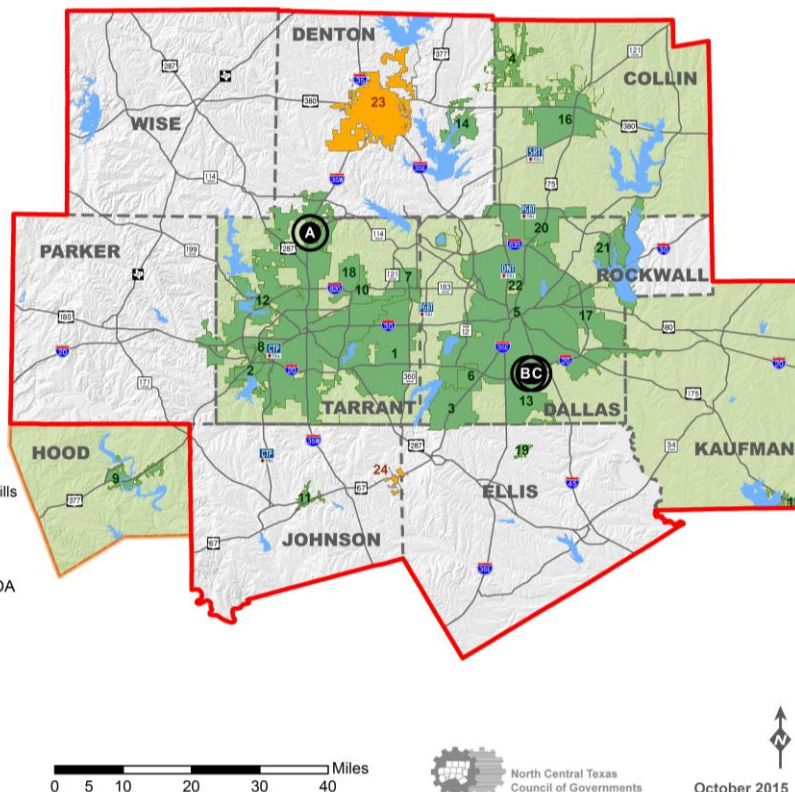
LOCALLY ENFORCED IDLING RESTRICTIONS

In some areas of North Texas, operators of gasoline or diesel vehicles with a gross vehicle weight rating (GVWR) of more than 14,000 pounds may not idle the main engine of the vehicle for more than five minutes when the vehicle is not in motion. This rule is in effect year round. Violation of this rule may result in a fine. The map below illustrates where these rules are in place. TSE sites are indicated on the map below with a colored star.

North Texas Idling Restrictions and Idle Reduction Infrastructure

Legend

-  Existing TSE Sites
 - A - Pilot Travel Center #434
2400 Alliance Gateway
Ft Worth, TX 76177
I-35 Exit 65
 - B - Exxon / DFW Oil
8181 S Lancaster Road
Dallas, TX 75241
I-20 Exit 470
 - C - Flying J Travel Center #726
7425 Bonnie View Road
Dallas, TX 75241
I-20 Exit 472
-  Counties with Idling Limitations and Memorandum of Agreement (MOA)
-  Cities with Idling Limitations and MOA
 - 1 - Arlington
 - 2 - Benbrook
 - 3 - Cedar Hill
 - 4 - Celina
 - 5 - Dallas
 - 6 - Duncanville
 - 7 - Euless
 - 8 - Fort Worth
 - 9 - Granbury
 - 10 - Hurst
 - 11 - Keene
 - 12 - Lake Worth
 - 13 - Lancaster
 - 14 - Little Elm
 - 15 - Mabank
 - 16 - McKinney
 - 17 - Mesquite
 - 18 - North Richland Hills
 - 19 - Pecan Hill
 - 20 - Richardson
 - 21 - Rowlett
 - 22 - University Park
-  Cities with Idling Limitations, No MOA
 - 23 - Denton
 - 24 - Venus
-  2008 8-Hour Ozone Standard Nonattainment Area
-  Near Nonattainment Counties



In order to comply with the rule, drivers can either invest in an on-board technology option, or take advantage of several publicly available truck stops that have TSE. Drivers are encouraged to use TSE whenever possible!

Exceptions to the Rule

Vehicles with a sleeper berth are exempt from idling restrictions during the government mandated rest-period. However, this exemption does not apply within a two-mile radius of a TSE/EPS connection. Officers use driver's log books to determine whether a driver's idling was allowed due to a government-mandated rest period.

North Central Texas Council of Governments Overview

THE NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

The North Central Texas Council of Governments (NCTCOG) is a voluntary association of, by and for local governments, and was established to assist local governments in planning for common needs, cooperating for mutual benefit, and recognizing regional opportunities for improving the quality of life in North Central Texas.

As part of this role, NCTCOG also serves as the region's Metropolitan Planning Organization (MPO) and is responsible for transportation planning.

NCTCOG'S ROLE IN REGIONAL AIR QUALITY PLANNING

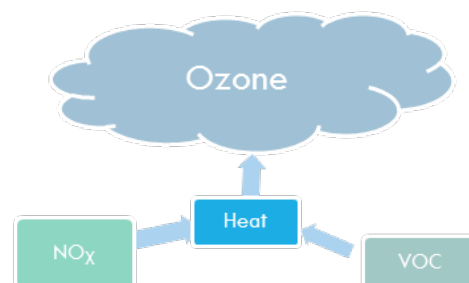
Ten counties in the DFW area have ozone levels that are higher than limits set by the EPA. About two-thirds of the ozone pollution is caused by "mobile sources"—cars, trucks, trains, buses, etc. Therefore, as the MPO, NCTCOG is also responsible for identifying and implementing programs, projects, and policies that reduce ozone-forming pollutants from the transportation system.

What We Know:

- **North Central Texas is a leader in global and domestic trade** – Despite being the largest metropolitan area in the nation without access to a sea port, the DFW area is the largest inland port in the nation with approximately 83 percent of all goods transported to and from the region on trucks, making ground level freight a vital part of the region's economy.¹
- **Diesel engines are a major source of ozone forming pollutants** – Generally, trucks and trains use diesel fuel. Diesel engines are a major source of nitrogen oxides (NO_x), which is the primary precursor to ground-level ozone formation in the 10-county eight hour ozone nonattainment area.
- **Ignoring air pollution will negatively affect the regions' economy** – Failure to meet federal standards for air quality could result in additional emission control requirements that negatively affect local businesses. It may also result in a freeze on all federally-funded transportation projects, costing the region millions in federal transportation funding and which would ultimately affect jobs in the region.

Exhibit 2.1 Ground Level Ozone Formation

Exhibit 2.1 illustrates the chemical reaction that takes place when NO_x and volatile organic compounds (VOC) mix in the presence of heat creating ground level ozone.



FUNDING RESOURCES

Regional Air Quality Solutions

NCTCOG, along with State and federal agencies, maintain a variety of funding programs to reduce regional emissions. NCTCOG staff are available throughout the year to provide application assistance for air quality funding programs. NCTCOG does not charge a fee for these services. The sections below highlight select local, State, and federal opportunities available.

To learn more or to sign up for email alerts about new funding opportunities, visit: www.nctcog.org/aqfunding.

Exhibit 2.2 Ozone Historical Trends in North Central



*Attainment Goal - According to the US EPA National Ambient Air Quality Standards, attainment is reached when, at each monitor, the Design Value (three-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration) is equal to or less than 75 parts per billion (ppb).
*2014 data not certified by the Texas Commission on Environmental Quality

Source: NCTCOG TR Dept

Exhibit 2.2 illustrates that while air quality has improved significantly, more work remains to be done.

Local Opportunities: NCTCOG

NCTCOG offers funding from time to time for projects that reduce emissions from vehicles and equipment. Since 2009, NCTCOG has administered about \$14.4 million in grant funding to complete over 1,000 individual activities that benefit heavy-duty trucks. Projects include idle reduction technologies, SmartWay-verified tires and aerodynamics, and replacement of older trucks with newer, cleaner models.

State Program: Texas Emissions Reduction Plan (TERP)

TERP is a State financial incentive program established to provide grants to reduce emissions from sources in the State's nonattainment areas and areas of concern. Since 2001, approximately \$1 billion has been awarded to for projects for replacing or upgrading over 16,000 vehicles and pieces of equipment. Applications are usually accepted once every other year. The programs outlined below are those that can be applicable to heavy-duty long haul trucks.²

- Emissions Reduction Incentive Grants Program (ERIG)
- Texas Natural Gas Vehicle Grant Program (TNGVGP)
- Rebate Grants Program
- Texas Clean Fleet Program (TCFP)

Federal Program: Diesel Emissions Reduction Act (DERA)

DERA is a federal funding assistance program established to meet critical local air quality needs by deploying both proven and emerging technologies that would otherwise not occur. From 2008 to 2010, nearly \$470 million was awarded to retrofit, replace, or repower more than 50,000 vehicles and equipment across the country.³

¹ Freight Analysis Framework 3, Federal Highway Administration

² TERP Project Summary Reports and Publications, www.tceq.state.tx.us/airquality/terp/leg.html

³ Second Report: Highlights of the Diesel Emissions Reduction Program., <http://www.epa.gov/cleandiesel/documents/420r12031.pdf>

Quick Take

Dallas-Fort Worth Nonattainment Area

Ten Dallas-Fort Worth area counties do not meet the EPA's regulation for ozone pollution, meaning the region has additional environmental responsibilities when completing transportation improvements. The nonattainment counties are Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant and Wise. The region has until 2018 to meet the new 75 parts per billion (ppb) standard.

What is ozone?

Ozone (O₃) is a gas formed in the atmosphere when three atoms of oxygen combine. Ozone is found both high in the stratosphere and near the ground. Ground-level ozone, which is harmful to our health, forms when nitrogen oxides (NO_x) and volatile organic compounds (VOCs) are released in the air and mix in the presence of sunlight. High concentrations of ozone usually occur during the summer.

Where does it come from?

Ozone emissions come from many sources. In DFW, mobile sources (vehicles, construction equipment) are the primary concern, accounting for 66 percent of NO_x emissions.

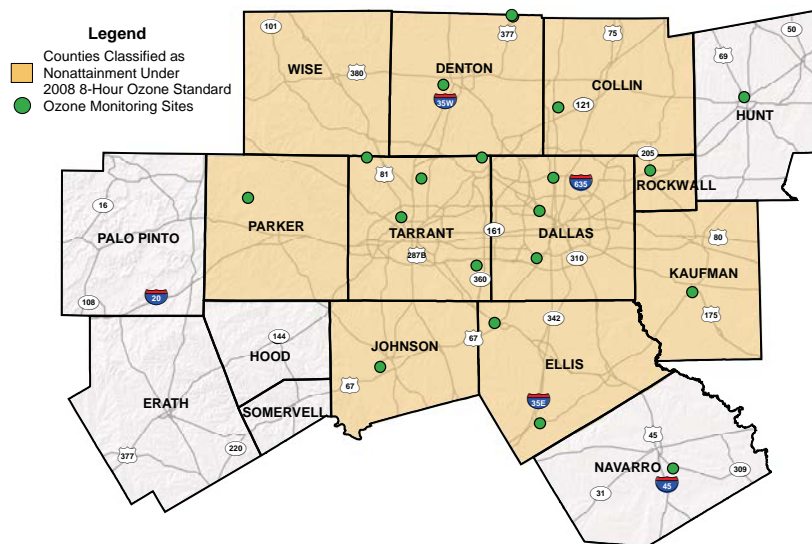
Air Quality Essential to DFW Transportation

The North Texas transportation system is an expensive asset to maintain. By 2035, the rapidly growing region expects to spend approximately \$94.5 billion in an effort to improve the reliability of its roads, rails and other transportation elements.

In North Texas, transportation planners have more to think about than how to get people where they are going more efficiently. Ten DFW area counties are out of compliance with the Environmental Protection Agency's (EPA) ozone standard. While there are a number of reasons for this, transportation professionals have to ensure mobility improvements can be made without negatively impacting the air. The region must implement measures to improve its air quality or face future sanctions from the EPA and potentially lose transportation funding. With a rapidly growing population and aging infrastructure, the DFW area needs more funding, not less.

The North Central Texas Council of Governments works closely with regional partners to develop and implement strategies, policies and programs to enhance air quality. NCTCOG periodically allows public and private entities to compete for funding intended to reduce the emissions of their fleets and purchase cleaner equipment. NCTCOG also uses programs that allow the public to participate in the process. Travel Demand Management and Transportation Systems Management strategies also help NCTCOG improve air quality.

10-County Nonattainment Area



The design value, which determines a county's or region's attainment status, is the three-year average of the fourth-highest value recorded at any given monitor. The 2008 8-hour National Ambient Air Quality Standard for ozone is exceeded when the design value in more than 75 ppb.

Categories of Emissions Sources

AREA – Oil and gas drilling, bakeries, paint shops, dry cleaners

NON-ROAD MOBILE – Construction, aircraft, locomotive, lawn and garden equipment

ON-ROAD MOBILE – Cars, trucks, buses

POINT – Cement facilities, power plants

BIOGENICS – Vegetation, wildfires

How is Ozone Harmful?

Ozone in the upper atmosphere, “good ozone,” is beneficial and serves as a protective layer blocking damaging ultraviolet rays from the sun. Ground-level ozone is potentially harmful. Studies indicate elevated levels of this “bad ozone” may make breathing more difficult, increase the frequency of asthma episodes and reduce the body’s ability to resist respiratory infections. In addition to threatening human health, high ozone concentrations pose a risk to the environment, wildlife, agriculture and manufactured structures in the region.

Air Pollution Alert System






It is important to stay informed of daily air quality information in North Texas. Residents can sign up to receive air pollution alerts when ozone levels are forecast to be high. These alerts indicate that air quality is likely to reach unhealthy levels within 24 hours. These email alerts inform residents, businesses and industries of expected high ozone days so they can make decisions that contribute to cleaner air.

It is recommended people stay indoors or limit their outdoor activity when ozone levels are high. The elderly and children, as well as those with respiratory problems, could suffer severe health problems from prolonged exposure even when the air quality is only moderately unhealthy. Residents can also make behavioral changes year-round, such as carpooling or taking transit, to help reduce emissions levels and decrease the number of bad ozone days.

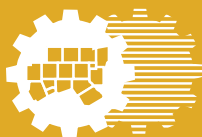
To sign up for air pollution alert emails, visit www.airnorthtexas.org/Commit.asp.

History

Ozone is one of six pollutants governed by National Ambient Air Quality Standards set by the EPA. The ozone standard is periodically reviewed and updated when a change is deemed necessary to protect people’s health. In 1990, the EPA established the 1-hour ozone standard, which North Texas has met. In 2004, an 8-hour standard was introduced to replace the 1-hour standard. The 10-county nonattainment area met the 84 ppb requirement in 2014. A more stringent 8-hour standard of 75 ppb, which DFW must meet by 2018, was adopted in 2008. Even when the current standard is reached, NCTCOG will continue working with regional partners on programs to help residents breathe easier for generations. A revised 8-hour standard is out for public comment and could result in the design value moving to between 65 and 70 ppb by December 2015.

Color	Air Quality	Actions to Protect Your Health
	good	None necessary
	moderate	Unusually sensitive people should consider limiting prolonged outdoor exertion
	unhealthy for sensitive groups	Active children and adults and people with respiratory disease, such as asthma, should <i>limit</i> prolonged outdoor exertion
	unhealthy	Active children and adults and people with respiratory disease, such as asthma, should <i>avoid</i> prolonged outdoor exertion; everyone else, especially children, should <i>limit</i> prolonged outdoor exertion
	very unhealthy	Active children and adults and people with respiratory disease, such as asthma, should <i>avoid all</i> prolonged outdoor exertion; everyone else, especially children, should <i>limit</i> prolonged outdoor exertion

Source: EPA



North Central Texas Council of Governments

Phone: 817-695-9240

Fax: 817-640-3028

E-mail: transinfo@nctcog.org

NCTCOG.org/trans

[Facebook.com/nctcogtrans](https://www.facebook.com/nctcogtrans)

[Twitter.com/nctcogtrans](https://twitter.com/nctcogtrans)

[YouTube.com/nctcogtrans](https://www.youtube.com/nctcogtrans)

[Instagram.com/nctcogtrans](https://www.instagram.com/nctcogtrans)



Quick Take

SmartWay Transport is a voluntary, public-private partnership with the freight industry that the Environmental Protection Agency started in 2004 to focus on reducing emissions, improving fuel economy and increasing energy efficiency.

Significance:

Reducing emissions in the freight sector is important. Heavy-duty diesel vehicles, specifically 18-wheelers, contribute about 30 percent of all regional on-road NOx emissions but are only 5 percent of the vehicle miles traveled in the DFW region. By reducing freight emissions, SmartWay is one of many programs the region is relying on to reach attainment of the federal ozone standard.

Inside the Numbers:

120 million

Barrels of oil saved by the SmartWay program since its inception in 2004. This has resulted in \$16.8 billion less spent on fuel.

SmartWay Helps Freight Industry Contribute to Cleaner Region

The SmartWay program is a voluntary, public-private partnership with the freight industry that the Environmental Protection Agency (EPA) started in 2004 to focus on reducing emissions, improving fuel economy and increasing energy efficiency. These goals are synonymous with ongoing efforts to improve air quality and meet the federal ozone standard, which suggests that SmartWay can be a powerful tool for reducing emissions in the Dallas-Fort Worth (DFW) area. These emissions reductions are important because heavy-duty diesel 18-wheelers contribute about 52 tons of on-road mobile nitrogen oxide (NOx) emissions in the DFW area, thus significantly impacting ozone levels. SmartWay also saves participating companies money.

The North Central Texas Council of Governments (NCTCOG) joined SmartWay as an affiliate in October 2006. In this role, NCTCOG promotes the initiative in the region and provides education and outreach to potential partners and affected industries. Partners enjoy the financial benefits SmartWay technologies provide, while the region's air quality improves. Supported by major freight industry associations, environmental groups, states, companies and trade publications, SmartWay presents a model of government and industry cooperation.

Due to the success of the program, the EPA expanded SmartWay to include SmartWay Transport Partnership, SmartWay Technology Program, SmartWay Vehicles and Smartway International interests.



This truck is equipped with SmartWay-verified aerodynamics, low-rolling resistance tires and an auxiliary power unit (APU). With the help of an American Recovery and Reinvestment Act grant, six freight companies secured improvements needed to boost the fuel efficiency of their fleets in the DFW area.

Source: Southeastern Freight Lines

FACTSheet

SmartWay Transport is the EPA's primary program for improving fuel efficiency and reducing emissions in the transportation supply chain industry. Texas is home to nearly 200 SmartWay Transport partners from many sectors of the transport industry. Almost half are located in the DFW area.

EPA SmartWay Technology Program provides EPA-verified technologies designed to reduce emissions and improve fuel economy. Trailer aerodynamics, idle-reduction technologies and low-rolling resistance tires are examples of equipment SmartWay promotes to improve the environmental impact of the freight sector.

Through the EPA-American Recovery and Reinvestment Act (ARRA) support, NCTCOG funded the SmartWay Technology Upgrade Project. This project helped six companies purchase over 500 technologies for DFW-based trucks, reducing approximately 20.6 tons of NO_x, 0.47 tons of particulate matter (PM), and 3,450 tons of carbon dioxide (CO₂) emissions annually. The CO₂ savings is the equivalent of what would be produced by powering 431 homes for one year. This would also save 310,813 gallons of diesel fuel annually.

SmartWay Certified Vehicles: The EPA also created a system to help consumers make informed choices when purchasing a new vehicle through development of a rating system for emissions and fuel economy of every new car, truck and SUV. A SmartWay-certified vehicle produces far fewer emissions and uses less fuel than the average vehicle. Only about 20 percent of vehicles available in a given model year earn the SmartWay certification. By

choosing to purchase such a vehicle, consumers can feel confident that they are helping themselves and the region. To view the complete list of SmartWay-certified vehicles, visit www.epa.gov/greenvehicle.

BENEFITS

Fuel Savings

Fuel is often the primary expense for truck fleets. Annual fuel costs for 18-wheelers can be in the range of \$70,000 to \$125,000. This means 10 percent improvement in fuel economy can save \$7,000 to \$12,500 per year. These fuel savings provide a return on investment for aerodynamic and idle-reduction technologies, often in less than one year.

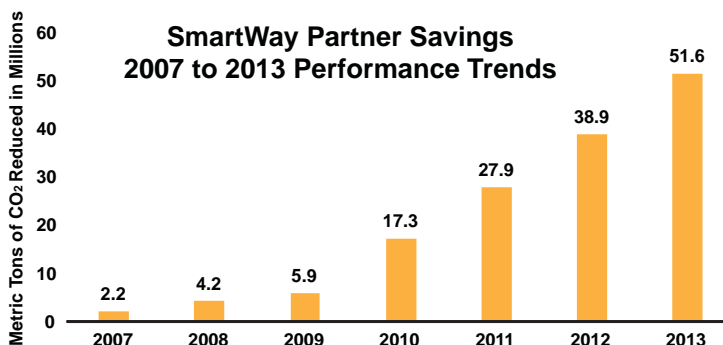
Idle Reduction

A typical long-haul combination truck that eliminates unnecessary idling can save over 1,000 gallons of fuel, or \$3,600 each year. This will also lower engine maintenance costs for the truck, reduce NO_x and PM emissions, and remove nine metric tons of CO₂. The CO₂ reduction is equivalent to the amount of fuel used to run a Ford F-150 for more than one year, assuming a fuel economy of 16 miles per gallon.

Aerodynamics

Aerodynamic technologies increase fuel economy. Using a streamlined-profile tractor with aerodynamic devices can improve fuel economy by over 3 percent and will reduce fuel costs by over \$2,000. When adding an aerodynamic trailer, up to an 11 percent increase in fuel economy can be realized, saving 16 metric tons of CO₂.

The growth of the EPA's SmartWay program has resulted in significant environmental benefits for North Texas and the rest of the nation. This graph shows the region's cumulative savings as a result of the program.



North Central Texas Council of Governments

Phone: 817-695-9240

Fax: 817-640-3028

E-mail: transinfo@nctcog.org

www.nctcog.org/trans

[Facebook.com/nctcogtrans](https://www.facebook.com/nctcogtrans)

[Twitter.com/nctcogtrans](https://twitter.com/nctcogtrans)

[YouTube.com/nctcogtrans](https://www.youtube.com/nctcogtrans)

[Instagram.com/nctcogtrans](https://www.instagram.com/nctcogtrans)

SmartWay Information

Truck and rail transportation provides a cost-effective means to transport much of America's freight. There are simple actions that can be taken to make ground freight more efficient and cleaner for the environment. The following technologies and practices can help truck carriers save fuel and money, reduce air pollution, and cut carbon dioxide emissions that contribute to climate change.

Idle Reduction

An idling truck burns nearly one gallon of diesel fuel per hour. Reducing unnecessary idling could save each truck over \$3,000 in fuel costs, reduce air pollution, and cut 19 metric tons of carbon dioxide annually.

- On-board idle reduction systems include auxiliary power units that provide electricity to the cab, direct-fired heaters and coolant systems that provide temperature control, and programmable automatic engine shut-off systems.
- Truck plazas equipped with truck stop electrification systems allow trucks to draw electrical power and in some cases heating, cooling, telecommunication, and Internet hookups from a ground source.

Improved Aerodynamics

Reducing the aerodynamic drag of a typical line-haul truck by 15 percent could cut annual fuel use more than 2,000 gallons, save over \$3,500 in fuel costs, and eliminate 20 metric tons of carbon dioxide.

- Tractor aerodynamics can be improved by adding integrated roof fairings, cab extenders, side fairings, and aerodynamic bumpers. New truck buyers can purchase aerodynamic models with streamlined profiles.
- Trailer aerodynamics can be improved by minimizing tractor-trailer gap, adding side skirts and rear air fairings, and arranging cargo and tarpaulins as low, taut and smooth as possible.
- Single-unit trucks can be improved with air deflector bubbles or by purchasing new streamlined models.

Improved Freight Logistics

Improved logistics can reduce the miles that a truck drives empty. Eliminating 15 percent of a line-haul truck's empty miles could save \$3,000 in fuel and reduce 24 metric tons of carbon dioxide annually.

- Improved logistics include load matching, more efficient routes and delivery schedules, and improved shipping and receiving practices.
- A carrier may employ low-cost options like triangular routing, coordinating loads with other fleets, and checking electronic load boards, or the carrier may purchase freight broker services and logistics software.

Automatic Tire Inflation Systems

Retrofitting a line-haul truck with an automatic tire inflation system could save 100 gallons of fuel annually and reduce tire wear and maintenance, while eliminating one metric ton of carbon dioxide.

- Truck fleets that find it too difficult or expensive to monitor tire pressure on a regular basis should consider installing automatic tire inflation (ATI) systems on drive and trailer tires.
- An ATI system used on a typical line-haul truck can generally pay for itself in just over two years, while decreasing the risk of expensive tire failure caused by under inflation.

Single Wide-base Tires

Specifying single wide-base tires on a new combination truck could save \$1,000 immediately and reap annual fuel savings of 2 percent or more while cutting carbon dioxide by more than four metric tons.

- Single wide-base tires save fuel by reducing vehicle weight, rolling resistance and aerodynamic drag. These tires can also improve tank trailer stability by allowing the tank to be mounted lower.
- There are several single wide-base tire models from which to choose, plus these tires can be retreaded.

Driver Training

Even highly experienced drivers can boost their skills with training aimed at raising fuel economy by 5 percent or more, which would save \$1,200 in annual fuel costs and cut eight metric tons of carbon dioxide.

- Effective driver training programs can improve fuel economy by 5 percent or higher. Some fleets report fuel economy gains of up to 20 percent.
- Among other techniques, drivers learn progressive shifting, engine speed optimization, idle reduction, smoother braking and acceleration, anticipatory driving, speed control, and optimal gearing.

Low-Viscosity Lubricants

When used in a line-haul truck, synthetic engine and drive train lubricants can improve fuel economy by up to 3 percent, saving as much as 500 gallons of fuel and cutting up to five metric tons of carbon dioxide annually.

- Low-viscosity synthetic or semi-synthetic lubricants flow more easily and withstand the extreme pressure of engine, transmission, and drive train systems better than conventional mineral oil blends.
- The operator of a typical line-haul truck can save up to \$500 annually by switching to low viscosity lubricants, with additional savings possible due to reduced wear and maintenance of truck systems.

Intermodal Shipping

Intermodal freight transport combines the best attributes of both truck and rail shipping. Over long distances using intermodal can cut fuel and carbon dioxide by 65 percent, compared to truck-only moves.

- Carriers can maximize resources by using freight trains to handle the long-distance portion of a freight move, especially for less time-sensitive cargo that is shipped over 500 miles.
- Intermodal options include trailer on flat car (TOFC), container on flat car (COFC), double stack service, rail bogies and dual-mode trailers, and rail platforms that can accommodate standard trailers.

Longer Combination Vehicles

A freight truck using longer or multiple trailers can haul more cargo than a standard combination truck, potentially saving up to \$5,000 in fuel costs and 34 tons of carbon dioxide on a ton-mile basis annually.

- Common longer combination vehicle (LCV) configurations include the Rocky Mountain Double, Turnpike Double, Triples, and Eight-Axle Twin Trailers.
- A motor carrier operating in states that permit LCVs can reduce the number of trips required to haul a given amount of freight—saving time, money, and emissions.

Reducing Highway Speed

A line-haul truck with 90 percent highway miles that reduces its top speed from 70 to 65 miles per hour could cut its annual fuel bill nearly \$1,500 while eliminating almost 10 metric tons of carbon dioxide.

- Reducing highway speed also reduces engine and brake wear, which cuts down the cost and frequency of maintenance service, and keeps revenue earning equipment on the road longer.
- Any truck carrier can adopt a speed management policy at little or no cost. The most successful speed reduction policies combine electronic engine controls with driver training and incentives.

Weight Reduction

Reducing 3,000 pounds from a line-haul truck by using lighter-weight components could save up to 300 gallons of fuel annually and eliminate up to three metric tons of carbon dioxide.

- Aluminum alloy wheels, axle hubs, clutch housings, and cab frame can trim hundreds of pounds from a truck tractor. Downsizing to a smaller engine can also provide significant weight savings.
- Thousands of pounds can be reduced from a truck trailer using aluminum roof posts, floor joists, upright posts, and hubs and wheels.

Hybrid Powertrain Technology

Hybrid vehicles can provide roughly \$2,000 in fuel savings and cut carbon dioxide by up to 12 metric tons per year when used in stop-and-go freight applications like parcel delivery service.

- Hybrid vehicles have two propulsion power sources, making it possible to capture energy otherwise lost during braking and provide boost to the main engine which in turn can run more efficiently.
- Most hybrid vehicles use an internal combustion engine for the main power source with various secondary power and energy storage configurations, including electric and hydraulic systems.

Renewable Fuels

In addition to benefiting the environment and helping reduce U.S. dependence on foreign oil, using biodiesel can provide more lubricity which may help extend a vehicle's engine life. Most diesel engines can run on biodiesel without needing any special equipment, and when running on biodiesel, will have similar horsepower and torque as conventional diesel.*

- Biodiesel provides significant reductions in greenhouse gas (GHG) emissions -- B100 reduces lifecycle GHG emissions by more than 50 percent, while B20 reduces emissions by at least 10 percent.
- Biodiesel also reduces emissions of carbon monoxide, particulate matter, sulfates, hydrocarbons and air toxics.
- Biodiesel produced from crops grown in the U.S. can help America's family farmers while bolstering America's energy security.

* Always check with your engine manufacturer before switching to biodiesel, and look for biodiesel that meets applicable ASTM and BQ9000 requirements.

Idle Reduction

A Glance at Clean Freight Strategies

Energy & Fuel Savings

2400 Idling Hours

Gallons Saved
=
1440 gallons

CO₂ Savings
=
14.6 Metric tons

Fuel Cost Savings
=
\$5,472

1600 Idling Hours

Gallons Saved
=
960 gallons

CO₂ Savings
=
9.7 Metric tons

Fuel Cost Savings
=
\$3,648



Reducing unnecessary truck idling can save fuel, reduce greenhouse gas emissions, cut air pollution, and save money. A typical long-haul combination truck that eliminates unnecessary idling could save over 900 gallons of fuel each year. Saving this much fuel annually would effectively remove 9 metric tons of carbon dioxide, reduce nitrogen oxide and particulate matter emissions, save \$3,600 in fuel costs, and lower engine maintenance costs for the truck.

What is the challenge?

Many long-haul truck drivers idle their engines during rest periods to:

- provide heat or air conditioning for the sleeper compartment
- keep the engine warm during cold weather to avoid trouble with cold starts
- generate electrical power for appliances

Studies by EPA and others suggest that long-haul combination trucks often idle overnight between 5 and 8 hours per day, over 300 days per year. Typical combination trucks consume about 0.8 gallons of diesel fuel during each hour of idling, using between 900 and 1,400 gallons of fuel each year per truck.

Today's diesel engines do not need to idle for long periods of time before and after driving. Using a heavy-duty truck engine to power cab amenities is inefficient. It consumes fuel unnecessarily, increases fuel costs, and generates emissions that contribute to climate change and air pollution. Unnecessary engine idling also contributes to engine wear, which increases truck maintenance costs, and shortens engine life.

What is the solution?

Several technological options can assist drivers in reducing truck idling

- Auxiliary Power Units (APUs) are mounted externally on the truck cab. An APU typically consists of a small combustion engine and generator combination that can provide power to the truck when the main engine is shut off. Electricity from an APU can be used to power heating, air conditioning, and electrical accessories for the cab and sleeper.
- Automatic Engine Shutdown Systems start and stop the truck engine automatically to maintain a specified cab temperature or to maintain minimum battery charge. Drivers typically activate the system in the evening and program a desired temperature range. Drivers can also program the system to shut down after a specified period of idling time.
- Direct Fired Heaters are small, lightweight, and efficient fuel-fired devices mounted in the

Next Steps

1 Truck fleets can examine engine-operating records to determine the percent of time spent idling to determine potential fuel and cost-saving benefits.

2 Truck fleets can determine the idle reduction method that best fits their fleets.

3 Truck fleets can also check the availability of truck stop electrification facilities along frequent routes.

Idle Reduction

Energy & Fuel Savings

600 Idling Hours

Gallons Saved
=
360 gallons

CO2 Savings
=
3.6 Metric tons

Fuel Cost Savings
=
\$1,368

cab of a truck. The direct fired heater provides heat for driver comfort in the cab. This technology does not include any air conditioning capabilities.

- Truck Stop Electrification allows trucks to use electrical power from an external source. At properly equipped locations, drivers can shut off the main truck engine and plug into an electrical outlet that provides power for heaters, air conditioners, marker lights, and other accessories. Trucks need to be equipped with the appropriate internal wiring, inverter system, and HVAC system to take advantage of truck stop electrification.
- Advanced Truck Stop Electrification also provides electricity from an external source, but doesn't require the truck to be equipped with special systems. Truck parking bays are installed with equipment that provides the cab with electrical power, heating, cooling, and other amenities like telecommunication hook ups, through an external console that fits into the truck's window frame. The truck-side console has temperature controls, an air supply and return pipe, a credit card reader, keypad, and a 100-Volt AC outlet.

Savings and Benefits

The amount of idling varies widely among trucks by season, type of operation, and driver practices. A typical long-haul combination truck can idle between 1,600 and 2,400 hours per year, which would use about 900 and 1,400 gallons of fuel, respectively. Saving fuel annually through idle reduction by installing an APU would remove about 9 to 14 metric tons of carbon dioxide, reduce nitrogen oxide and particulate matter emissions, save between \$3,600 and \$5,500 in fuel costs, and lower engine maintenance costs. A short-haul truck can save 360 gallons per year, saving \$1,300 when using an idle reduction technology. Truck stop electrification can potentially eliminate all engine idling. However, because the systems can be used only at stations outfitted with appropriate equipment, not all the potential savings can be obtained immediately.

Improved Aerodynamics

A Glance at Clean Freight Strategies

Energy & Fuel Savings

Aerodynamic Long Haul Combination Truck

Gallons Saved
=
1,651 gallons

CO₂ Savings
=
16.7 Metric tons

Increase in Fuel Economy
=
11%

New MPG
(original 6 mpg)
=
6.6 mpg

Fuel Cost Savings
=
\$6,276



Using a streamlined-profile tractor with aerodynamic devices can improve fuel economy by over 3 percent and will reduce fuel costs by over \$2,000. When adding an aerodynamic trailer, you can get up to an 11 percent increase in fuel economy, saving 16 metric tons of carbon dioxide.

What is the challenge?

Aerodynamic drag (wind resistance) accounts for most truck energy losses at highway speeds. Reducing drag improves fuel efficiency. The longer the drive and the higher the speed, the greater the potential efficiency benefits become. Manufacturers have made significant progress over the past two decades in reducing the drag coefficient (a measure of wind resistance) of a typical freight truck from about 0.8 to about 0.65 – an improvement of nearly 20 percent. Additional efforts to improve aerodynamics could result in a further 25 percent reduction in the drag. This could have a significant impact on fuel economy. For example, cutting drag by 20 percent could boost fuel economy up to 15 percent at highway speed.

What is the solution?

A number of options exist to improve aerodynamics and improve fuel efficiency.

Tractor Aerodynamics

Truck tractor aerodynamic options:

- Roof fairings (an integrated air deflector mounted on the top of the cab)
- Side extender fairings (to reduce the gap between the tractor and the trailer)
- Side tank fairings
- Aerodynamic front bumper (to reduce air flow beneath the truck).
- Aerodynamic mirrors

Truck manufacturers offer aerodynamic models that include a streamlined front profile, sloped hood, and a full package of add-on devices. Selecting these features for a typical tractor model can improve fuel economy by over 3 percent. However when improving a classic combination truck with no aerodynamic features, one can see up to a 15 percent increase in fuel economy.

Next Steps

1 Trucking firms can specify aerodynamic options when purchasing a new truck and consider adding aerodynamic devices to existing trucks and trailers. Some aerodynamic options are standard on many trucks, like a streamlined hood. Others can be purchased and installed for an additional cost.

2 For more information on aerodynamic devices, contact your local truck dealer, truck equipment vendor, or trucking association.

Improved Aerodynamics

Trailer Aerodynamics

Truck trailer aerodynamic options:

- Gap Reducer (these devices affix to the front of the trailer to minimize the gap between the tractor and trailer, minimizing air turbulence in turn)
- Side Skirts (these panels hang down from the sides of a trailer at the bottom edge to enclose the open space between the rear wheels of the tractor and the rear wheels of the trailer)
- Cargo Configuration (reduce drag by arranging cargo as low and smooth as possible)
- Wheelbase and fifth-wheel settings (positioning the trailer as close to the rear of the tractor as possible to reduce tractor-trailer gap). For freight carried on flat bed trailers, securing loose tarpaulins and closing the curtains on curtain-sided trailers can improve fuel economy by up to 2.5 percent and 4.5 percent, respectively.

Gap reducers that decrease the trailer gap from 45 to 25 inches can improve fuel economy as much as 2 percent. According to the manufacturers, the addition of trailer side skirts can also improve fuel economy by up to 5 percent.

Single Unit Truck Aerodynamics

Single unit truck aerodynamic options

- Streamlined front profile with sloped hood to reduce drag
- Rounded air deflector can be added to van-style bodies to reduce drag

When using rounded air deflectors, manufacturers claim fuel savings of up to 5 percent, which reduces annual fuel use by about 80 gallons and saves over \$100 in fuel costs. Single unit trucks with higher annual mileage could realize even larger benefits.

Savings and benefits

An aerodynamic long-haul combination truck can realize a fuel economy increase of 11 percent, as compared to a typical long-haul combination truck. This would result in about 1,600 gallons saved, reducing fuel costs by over \$6,000 and saving 16 metric tons of carbon dioxide. A single unit aerodynamic truck improves fuel economy by 5 percent, saving 75 gallons and nearly 1 metric ton of carbon dioxide. The initial expense of installing aerodynamic features can be quickly recouped through fuel savings.

Aerodynamic Trailer Annual Savings		Single Unit Truck Annual Savings	
Fuel Economy Increase	3.6 %	Fuel Economy Increase	5%
New MPG (original MPG of 6)	6.2 mpg	New MPG (original MPG of 8.54)	8.97 mpg
		Gallons Saved	76 gallons
		CO ₂ Savings	0.76 metric tons
Fuel Cost Saving	\$2,200	Fuel Cost Saving	\$285

Low Rolling Resistance Tires

A Glance at Clean Freight Strategies

Energy and Fuel Savings

Gallons Saved
=
500 gallons

CO₂ Savings
=
5.08 Metric tons

Reduction in Fuel Consumption
=
3 %

New MPG
=
6.19 mpg

Fuel Cost Savings
=
\$1,900



Specifying single wide or low rolling resistance dual tires on a new combination truck could save \$1,900 in fuel costs, and cut almost 5 metric tons of greenhouse gas emissions per year. Fuel savings of 3% or higher begin immediately.

What is the challenge?

Tire rolling resistance accounts for nearly 13% of combination truck energy use. Most combination trucks have non low rolling resistance dual tire assemblies on the drive and trailer axles, with two sets of wheels and tires at each end of an axle. This configuration increases rolling resistance compared to single wide tires or low rolling resistance dual tires and wheels.

What is the solution?

A variety of tire options can improve truck fuel efficiency. One promising strategy is to use low rolling resistance tires either single wide or energy efficient dual tires. A single wide tire and wheel is lighter than two standard tires and wheels. Total weight savings for a typical combination truck using single wide-base tires on its drive and trailer axles ranges from 800 to 1,000 pounds. The weight savings would reduce fuel consumption, or increase cargo capacity for trucks that are weight-limited. Single wide tires have lower rolling resistance and aerodynamic drag, and generate slightly less pass-by noise than do, dual tires. Another benefit to using single wide-base tires is fewer tires need to be replaced. There are three types of wheels steel, low weight steel, and aluminum, with decreasing weight respectively. The less weight the rim holds the better fuel economy the truck will get.

Single wide tires may offer other benefits in combination truck stability. Single wide tires can improve the stability of tank trailers by allowing the tank to be mounted lower.

Materials used to reduce tire rolling resistance could decrease tire tread life slightly. However, in a test of 15 fleets driving 57 million miles using its latest wide-base tire models, one manufacturer reported that the tires wear at a rate comparable to conventional tires.

Next Steps

1 Fleet owners should consider purchasing tractors and trailers with single wide and energy efficient dual tires on their next new truck purchases.

2 Truck Fleets with non-tandem axle combination trucks should check "inch-width" laws in their states because wide-base tires may not comply. The new generation of wide-base tires has a section width of up to 17.5 inches, so these tires comply with pavement weight laws in all 50 states, for a typical tandem axle combination truck.

3 Single wide tire and wheel assemblies as a new fitment are less expensive than dual tire assemblies and provide immediate fuel economy savings. For more information, talk to your tire and truck dealers or contact the American Trucking Associations' Technology and Maintenance Council (www.trucking.org).

Savings and Benefits

Recent tests of low rolling resistance tires indicate a potential fuel economy improvement of 2 to 5 percent compared to conventional dual tires. By using low rolling resistance tires, a combination long-haul truck could save over 500 gallons of fuel per year and cut emissions of carbon dioxide (the most common greenhouse gas) by more than 5 metric tons annually. Most importantly, these environmental benefits can often be achieved while cutting costs.

Reducing Highway Speed A Glance at Clean Freight Strategies

Energy and Fuel Savings

Gallons Saved
=
1,292 gallons

CO₂ Savings
=
13 Metric tons

Increase in Fuel
Economy
=
9%

New MPG
(original 6 mpg)
=
7.12 mpg

Fuel Cost Savings
=
\$4,912

Fuel Consumption Savings
=
9%



Reducing highway speed by 5 miles per hour can cut fuel use and greenhouse gas emissions by about 7 percent while extending the life of a truck's engine, tires and brakes. An example is a long-haul truck that reduces its top speed from 65 to 60 miles per hour saves over 1,200 gallons of fuel, cutting its annual fuel bill by \$4,900 while eliminating nearly 13 metric tons of greenhouse gas reductions.

What is the challenge?

A typical combination truck spends 65 percent or more of its operating time at highway speeds. Line-haul trucks spend even more time on highways. The impact of speed on fuel economy depends upon many factors including vehicle aerodynamics, engine speed and operating conditions. As a general rule of thumb, increasing speed by one mile per hour reduces fuel economy by about 0.1 miles per gallon. Excessive speed also leads to higher maintenance costs of by increasing wear on the engine, tires and brakes.

What is the solution?

Speed management is an easy and effective way to save fuel, reduce emissions, and prevent excess wear. A trucking firm or driver can adopt a speed policy at little or no cost. The most successful speed management policies combine technology (e.g., speed settings on electronic engine controls) with driver training and incentive programs to encourage drivers to maintain speed limits. Most new truck engines are electronically controlled so the cost of changing maximum speed settings on these engines is negligible.

Savings and benefits

Although fuel savings may vary by vehicle and speed range, a combination truck driving 55 miles per hour uses up to 7 percent less fuel than a similar truck driving 65 miles per hour. Other analyses indicate that reducing the maximum speed of a typical long-haul truck from 65 miles per hour to 60 miles per hour could save about \$4,900 in annual fuel costs.

Reducing speed can cut truck maintenance costs and reduce the frequency of maintenance work. The time between engine overhauls, for example, is directly related to fuel use. Holding

Next Steps

1 A trucking company interested in saving fuel and lowering the cost and frequency of its equipment maintenance should consider adopting a speed management policy, particularly if its trucks spend considerable time on highways.

2 A number of well-managed truck fleets have programs in place to reduce highway speed and promote safe driving by using driver training, incentive programs, and electronic engine controls. A trucking fleet interested in following these examples may learn more by reading articles and fleet profiles in truck industry publications.

3 When purchasing new vehicles, a trucking company may also consider specifying equipment designed to optimize truck performance at lower maximum speeds. Trucking companies and drivers interested in learning more about the effects of speed on fuel economy may contact truck and equipment manufacturers or their state and national trucking associations.

Reducing Highway Speed

maximum speeds at 60 rather than 70 miles per hour reduces engine wear and extends time between engine rebuilds, saving hundreds of dollars per truck each year while keeping revenue-earning equipment on the road. Fleets that adopt speed policies report additional savings due to fewer brake jobs and other service work.

Reducing highway speed does increase travel time. Assuming ideal conditions, a trucker driving 60 miles per hour instead of 65 miles per hour could spend about eight percent longer on the road. Of course, the time difference may be less, depending upon road conditions, weather, and traffic congestion and road construction. If a trucking company pays its drivers by the mile or by the load rather than by the hour, reducing speed should not increase labor costs. It could reduce the productivity of trucking operations since slower trucks may carry fewer loads. However, the benefits of lower fuel and maintenance costs combined with less frequent out-of-service work and driver safety considerations may well outweigh any costs associated with an increase in delivery time

Driver Training

A Glance at Clean Freight Strategies

Energy and Fuel Savings

Gallons Saved
=
794 gallons

CO₂ Savings
=
8.06 Metric tons

Increase in Fuel Economy
=
5%

New MPG
(original of 6.0 mpg)
=
6.3 mpg

Reduction in Fuel Consumption
=
5%

Fuel Cost Savings
=
\$3,015



Driver training programs can help trucking companies save fuel and reduce greenhouse gas emissions by increasing drivers' skills, knowledge, and performance. A driver training program that improves fuel economy by 5 percent could save over \$3,000 in fuel costs and eliminate 8 metric tons of greenhouse gas emissions per truck each year.

What is the challenge?

Even highly experienced truck drivers can boost their skills and enhance driving performance through driver training programs. Training that targets fuel efficiency can help drivers recognize and change driving habits that waste fuel. For example, driving 65 mph instead of 55 mph can use up to 20 percent more fuel, idling a typical heavy-duty engine burns about 0.8 gallons of fuel per hour, and driving with the engine rpm too high can waste several gallons of fuel each hour. Other common habits that reduce fuel economy are frequent or improper shifting, too-rapid acceleration, too-frequent stops and starts from failing to anticipate traffic flow, and taking circuitous routes.

A few simple changes in driving techniques can produce sizable fuel savings of 5 percent or more. A Canadian study estimates that many fleets could achieve a 10 percent fuel economy improvement through driver training and monitoring. A study for the European Commission estimates that an annual one-day driver-training course will improve truck fuel efficiency by 5 percent.

What is the solution?

Well-trained drivers can reduce fuel consumption by applying a number of simple techniques.

- Use cruise control where appropriate
- Coast whenever possible
- Brake and accelerate smoothly and gradually

Next Steps

1 Trucking firms can consider implementing driver training programs to reduce fuel costs and teach drivers fuel saving techniques through employers, vocational schools, and for-profit training organizations.

2 Electronic engine monitors can be installed to review drivers' operating patterns and benchmark individual performance over time. Create successful incentive programs that are simple to administer by paying bonuses and setting realistic goals. To provide additional motivation, training can be combined with an incentive program to reward drivers for enhanced performance.

3 Fleets can contact their national or local trucking organizations for more details on improving driver performance and establishing a driver incentive program. Also contact truck dealers or equipment vendors for information on engine monitors and other fuel-saving devices.

Driver Training

- Progressive shifting (upshift at the lowest rpm possible)
- Limit unnecessary truck idling
- Start out in a gear that doesn't require using the throttle when releasing the clutch
- Limit unnecessary shifting; block-shift (go from, for example, 2nd gear to 5th gear)
- Drive at the lowest engine speed possible
- Reduce parasitic energy losses by limiting the use of accessories.

Savings and Benefits

Fleets that improve fuel economy by at least 5 percent through driver training and monitoring programs can save more than \$3,000 per truck each year in fuel costs and eliminate 8 metric tons of carbon dioxide emissions per truck each year. Driver training can generate larger efficiency gains for vehicles in urban service, where shifting practices have more influence on fuel economy. For a typical long-haul truck, the initial cost of training and the purchase of related equipment such as an electronic engine monitor and recorder could be recouped within 2 years from fuel cost savings. Trucking companies can realize even greater fuel and maintenance savings by using technologies that limit truck idling and highway speed.

Brochures

SAVING FUEL & REDUCING EMISSIONS

A typical truck retrofit of idling controls and tractor/trailer aerodynamics can offer the following benefits:*

ECONOMIC

Save up to \$15,000 on fuel cost

Claim certain tax credits and incentives that might be available



ENERGY SECURITY

Reduce dependence on foreign oil

Save up to 5,000 gallons of fuel per year

Reduce consumption of a limited resource



ENVIRONMENT

Reduce harmful emissions

Improve visibility

Eliminate 289 pounds of toxic diesel particulate matter

Eliminate 5,000 pounds of nitrogen oxides (NO_x), a key component of ground-level ozone

Mitigate climate change



PUBLIC HEALTH

Eliminate \$5,400 in health care costs

Reduce asthma attacks

Reduce respiratory illness



**Based on EPA diesel emissions quantifier, fuel costs of \$3 per gallon, with a lifetime benefit based on seven years remaining life on a 1994 model year truck.*

WHO WE ARE

The North Central Texas Council of Governments (NCTCOG), created in 1964, is a voluntary association of local governments that serves a 16-county area in North Central Texas. NCTCOG is responsible for regional planning and coordination. This includes work to reduce ozone pollution and improve air quality.

NCTCOG's air quality strategies seek to reduce emissions in a variety of ways, from energy and fuel efficiency to advancing clean technologies and encouraging changes in daily behavior. Such strategies are being implemented throughout the region to reduce emissions from different types of sources. Most programs target mobile source emissions due to the fact that transportation-related activities account for nearly half of all ozone-causing pollution in North Central Texas.

NCTCOG

Transportation Department

PO Box 5888 | Arlington, TX 76005

P: 817-608-2354 | F: 817-608-2358

nctcog.org/SMARTe | SMARTe@nctcog.org

SMARTe

Saving Money and Reducing Truck Emissions

SMARTe

Saving Money and Reducing Truck Emissions

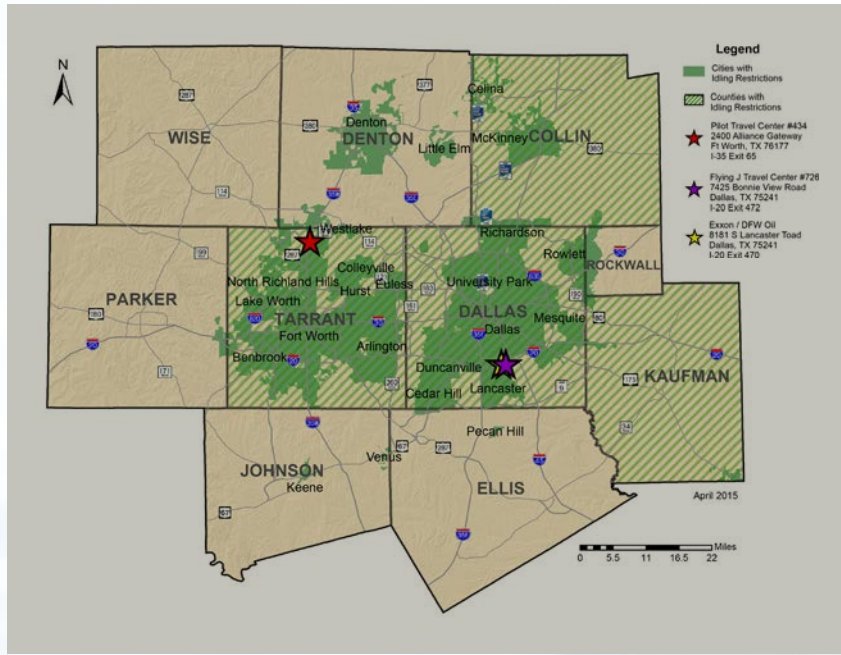


North Central Texas
Council of Governments



Image source: Thinkstock

ELECTRIFIED TRUCK STOPS



SAVE FUEL, MONEY AND THE ENVIRONMENT WITH A SMARTWAY TRUCK

Image source: United States Environmental Protection Agency



PROGRAM INFORMATION

NCTCOG is partnering with the U.S. Environmental Protection Agency (EPA) and private sector transportation companies in a new program designed to help companies and drivers Save Money and Reduce Truck Emissions (SMARTE).

The SMARTE program's mission is to promote fuel savings and emissions reduction for the trucking industry. Conserving natural resources saves dollars and will help bring 10 North Central Texas counties into compliance with EPA air quality standards and enhance public health.

Through this program, NCTCOG provides outreach and information on regional programs that are relevant to the trucking industry and can help reduce fuel costs. Examples include the Dallas-Fort Worth Clean Cities program, Clean Fleet Policy and SmartWay Transport Partnership. SMARTE also has a heavy emphasis on promoting EPA SmartWay-verified technologies.

The SMARTE program provides information on the following strategies and locates dealers and installers:

IDLE REDUCTION - APPROX. 5% FUEL SAVINGS

A variety of on-board idle reduction devices and truck stop electrification systems allow engine-off cab comfort, save up to a gallon of fuel per hour and reduce engine wear.

WEIGHT REDUCTION - 1.5%

Aluminum alloy wheels, axle hubs, clutch housings, and cab frame can trim hundreds of pounds. Thousands of pounds can be reduced from a trailer using aluminum roof posts, floor joists, upright posts, hubs and wheels.

LOW ROLLING RESISTANCE TIRES - 3%

Tires save fuel by reducing vehicle weight and rolling resistance.

TIRE PRESSURE MONITOR SYSTEMS - 1%

Proper tire inflation improves fuel efficiency, extends tire life and enhances handling while decreasing the risk of tire failure.

FLEET MODERNIZATION - 10% TO 20%

When buying newer equipment, purchasing a truck manufactured after 2007 can reduce diesel particulate emissions by 85% and nitrogen oxides (NO_x) by 25%. Trucks manufactured before 1994 can emit 100 times the amount of particulate matter and NO_x that a new truck produces.

DRIVER TRAINING - 20%

Even highly experienced drivers can boost their fuel economy and become more efficient by using fuel reduction strategies.

IMPROVED AERODYNAMICS - 9%

Tractor and trailer aerodynamics can be improved by adding cab extenders, side fairings, side skirts and rear air dams.

NCTCOG.ORG/SMART

Image source: Thinkstock

North Texas Idling Restrictions



To Report An Idling Vehicle:
www.EngineOffNorthTexas.org
1-877-NTX-IDLE



What is the Rule?

Vehicles with a gross vehicle weight rating greater than 14,000 pounds may not idle for more than five minutes (30 minutes for buses) in cities and counties that have adopted idling limitations set by the Texas Commission on Environmental Quality. This restriction is in effect year-round.

Why is it Important?

Excessive idling is responsible for:

- Annual emissions of 11 million tons of carbon dioxide, 200,000 tons of nitrogen oxides, and 5,000 tons of particulate matter from diesel exhaust
- Annual fuel consumption of more than one billion gallons
- Increased engine-maintenance costs
- Decreased engine life
- Increased noise pollution
- Driver health problems due to less rest
- Public health problems caused by diesel exhaust

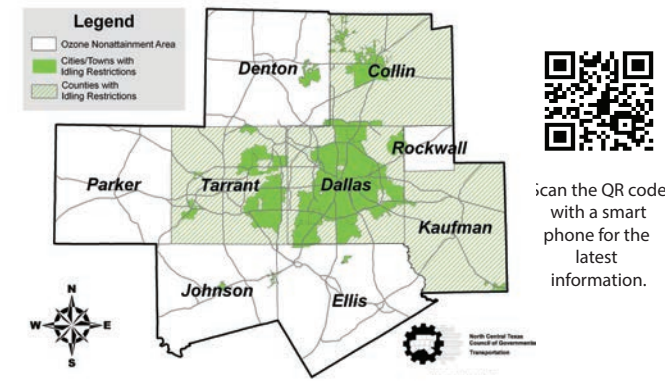
How to Reduce Idling

Alternative technologies allow drivers to be comfortable and safe, save money on fuel, and reduce emissions. Some technologies include:

- Automatic engine shut-down and start-up
- Battery power
- Auxiliary power units and generator sets
- Truck stop electrification

For technology funding opportunities, visit www.EngineOffNorthTexas.org.

Local Government Participation in North Texas



Are There Exemptions to the Rule?

The idling rule does not apply to:

- A military, emergency, law enforcement, or armored vehicle
- A vehicle being used as airport ground support equipment
- The owner of an idling vehicle that is leased or rented to persons not working for the owner
- A vehicle idling due to traffic congestion
- A motor running to power mechanical operations or for diagnostic or maintenance purposes
- A vehicle idling solely for the purpose of defrosting a windshield
- A vehicle idling to ensure employee health and safety during roadway construction or maintenance
- A vehicle idling to ensure passenger safety and comfort in commercial and public-transit vehicles (30-minute limit)
- A person using the sleeper berth while on a government-mandated rest period and not within two miles of a facility offering external heating and A/C connections

Restricciones a los motores al ralentí en el Norte de Texas

WARNING

5 MINUTE IDLE LIMIT
BUSES – MAXIMUM 30 MINUTES



STATE CODE 30 TAC 114.512
www.EngineOffNorthTexas.org

Reporte un vehículo con
el motor al ralentí:
www.EngineOffNorthTexas.org
1-877-NTX-IDLE



North Central Texas
Council of Governments

¿Cuál es el reglamento?

Los vehículos con la clasificación de peso bruto más de 14,000 libras (6.5 ton.) no podrán permanecer con el motor al ralentí por más de cinco minutos (autobuses - 30 minutos) en las ciudades y condados que hayan adoptado límites de tiempo para motores al ralentí establecidas por la Comisión de Calidad Ambiental de Texas. Esta restricción permanece en efecto todo el año.

¿Por qué es importante?

El exceso de motores al ralentí son responsables por:

- Emitir contaminantes anuales equivalentes a 11 millones de toneladas de bióxido de carbono, 200,000 toneladas de óxidos de nitrógeno y 5,000 toneladas de materia en partículas provenientes del tubo de escape
- El consumo anual de combustible que excede un billón de galones
- El incremento de los costos de mantenimiento del motor
- La disminución de la vida útil del motor
- El incremento del ruido contaminante
- Los problemas de salud de los conductores por la falta de descanso
- Los problemas de salud pública causados por la descarga del diesel quemado

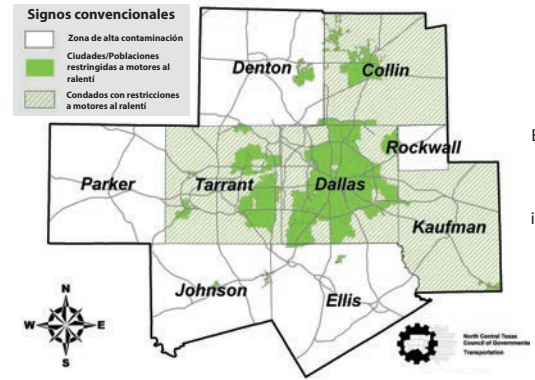
Cómo disminuir motores al ralentí

Tecnologías alternativas les permiten a los conductores sentirse cómodos y seguros, ahorrar dinero en combustible y disminuir los contaminantes. Entre algunas de las tecnologías están:

- Apagar y encender el motor automáticamente
- Energía de batería
- Las unidades auxiliares de energía y equipos generadores de electricidad
- La electrificación de las zonas de descanso para camiones

Para oportunidades para financiación de tecnologías, visite la página www.EngineOffNorthTexas.org.

Participación de los gobiernos municipales en el Norte de Texas



¿Hay excepciones al reglamento?

El reglamento de los motores al ralentí no es aplicable a:

- Los vehículos militares, de emergencia, policíacos o blindados
- Algún vehículo en uso como equipo de apoyo en plataformas aeroportuarias
- El propietario de un vehículo con el motor al ralentí que haya rentado o alquilado a personas que no sean empleados del propietario
- Un vehículo con el motor al ralentí debido a congestión de tránsito
- Un motor al ralentí para energizar operaciones mecánicas o para efectos de diagnóstico o mantenimiento
- Un vehículo con el motor al ralentí únicamente con el propósito de deshelar el parabrisas
- Un vehículo con el motor al ralentí para asegurar la salud y seguridad de un empleado durante la construcción o mantenimiento de cualquier camino
- Un vehículo con el motor al ralentí para asegurar la seguridad y comodidad de los pasajeros en vehículos comerciales y transporte público (limitado a 30 minutos)
- Una persona utilizando el dormitorio vehicular durante un periodo de descanso obligado por el gobierno y que no esté a dos millas (5 km.) de distancia de una instalación que ofrezca conexiones externas para calefactores o aires acondicionados