

# ADVANTAGES OF USING SMARTWAY TECHNOLOGIES

**Energy Center Workshop  
Tarrant County Community College  
April 28, 2016**



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North Central Texas Council of Governments**

# Structure of Presentation

Introduction to NCTCOG

Overview of Trucking Industry

Energy Consumption and Emissions  
of Heavy-Duty Trucks

Projected Challenges

Mandates

SmartWay Technologies

SMARTe Program



# North Central Texas Council of Governments

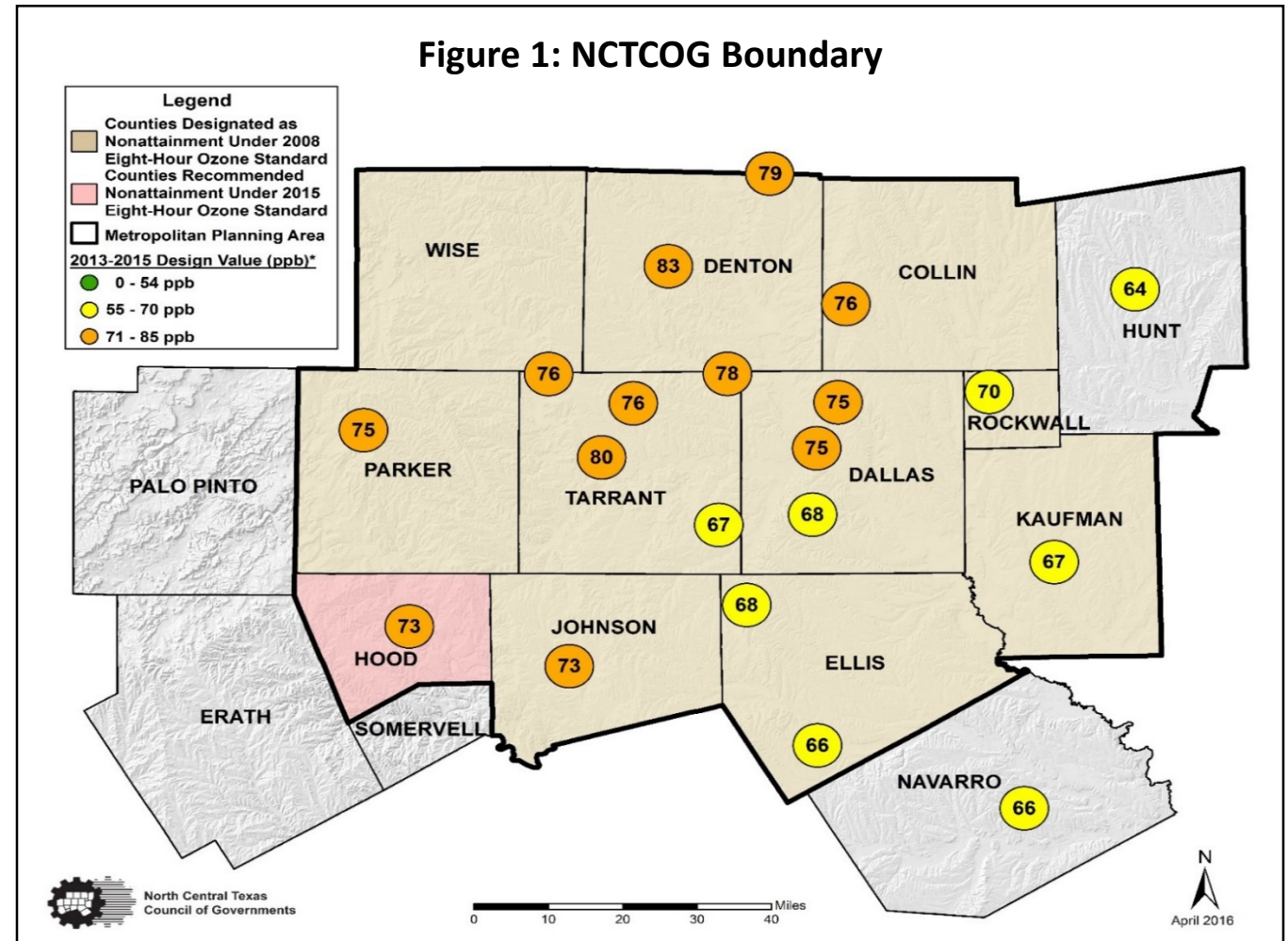
Council of Governments (COG)

Metropolitan Planning  
Organization (MPO)

230 member governments

Goals

- Planning for common needs
- Cooperating for mutual benefit
- Coordinating for sound regional development



# 2008 8-Hour Ozone National Ambient Air Quality Standards

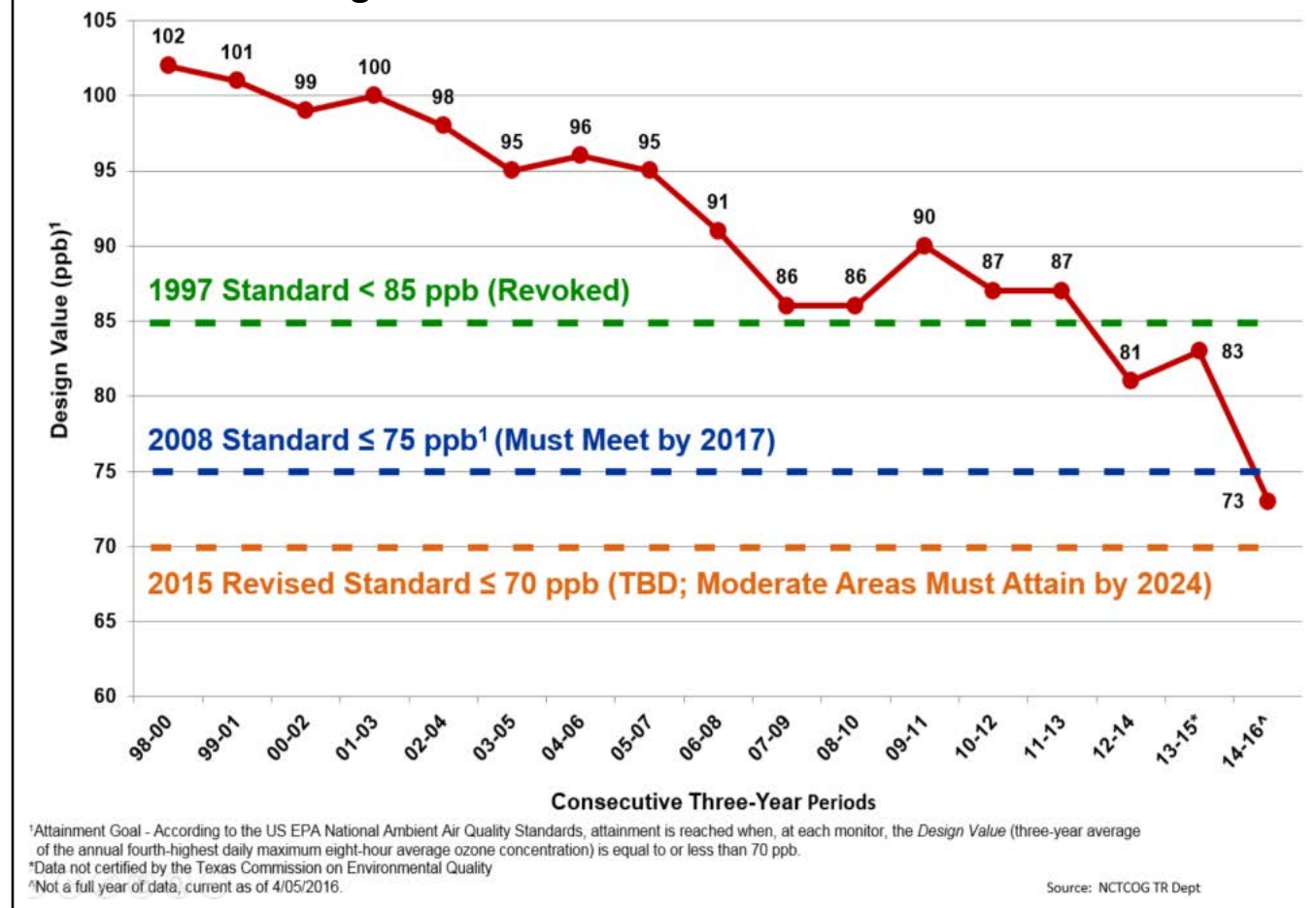
Ground level ozone ( $O_3$ ) formation: Nitrogen Oxides ( $NO_x$ ) and Volatile Organic Compounds (VOCs) along with sunlight

10 counties are designated in nonattainment of the 2008 8-hour ozone standards

Expanding to include Hood county (2015 revised standard)

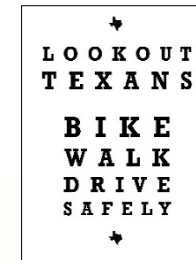
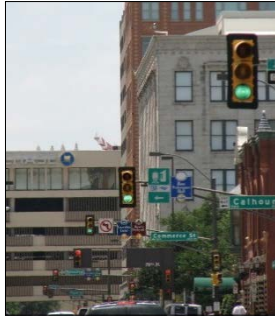
Pollutants harmful to public health and environment

Figure 2: 8-Hour Ozone Historical Trends





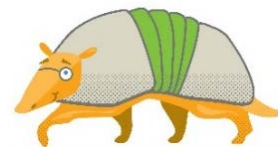
# Mobile Source Air Quality Programs



Rideshare. Record. Reward.



northcentral.texas.clean.school.bus.program



<http://www.nctcog.org/trans/air/programs/>

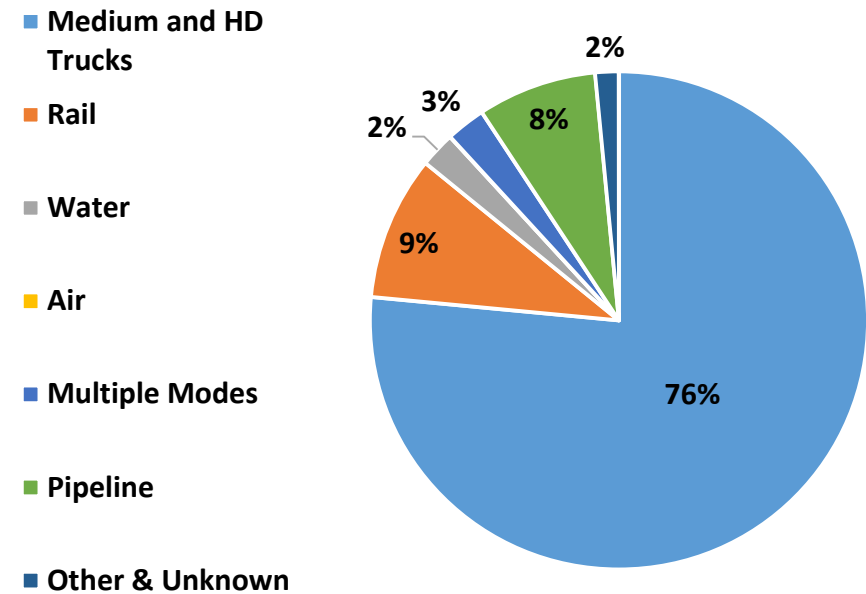
# Trucking Industry

## Overview (2013)

- Trucks moved around 13.7 billion tons of freight shipments
- Value of shipment was approximately \$10.8 billion
- Employed 30.5% of all transportation and warehousing sector employment
- Account 4.1%, but heavy duty trucks (HDTs) account approximately 1% of all highway vehicles
- Account roughly 9.2% of all highway vehicle miles traveled (VMT) – (HDTs) account for 5.6%

Source: U.S. DOT. (2015). *Freight Facts and Figures*.

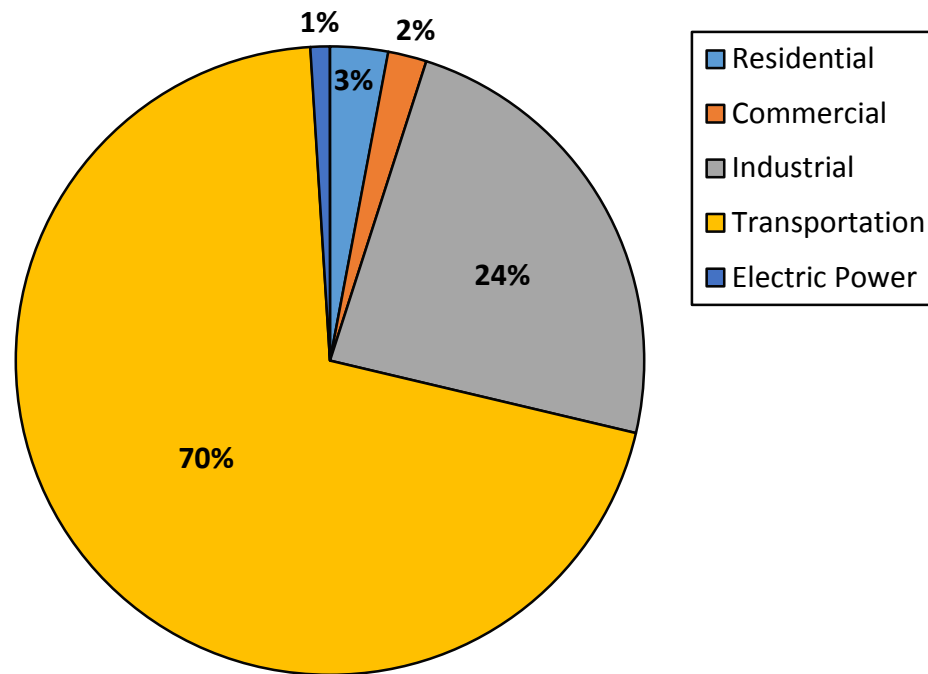
**Figure 3: 2013 U.S. Freight Shipment by Mode**



# Transportation Sector Petroleum Consumption

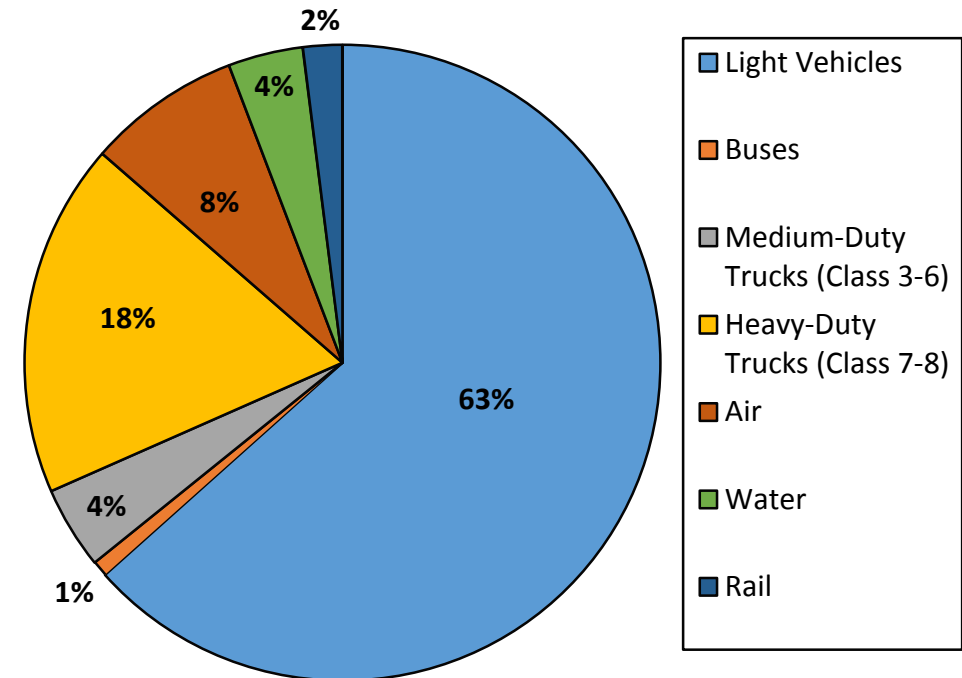
- Consumed, on average, approximately 13.64 million barrels of petroleum per day
- Trucking industry, medium and heavy-duty trucks, account for approximately 26%

**Figure 4: Consumption by Sector (percent)**



Source: U.S. DOE. *March 2016 Monthly Energy Review*. Figure 3.7 (barrels, Dec 2015).

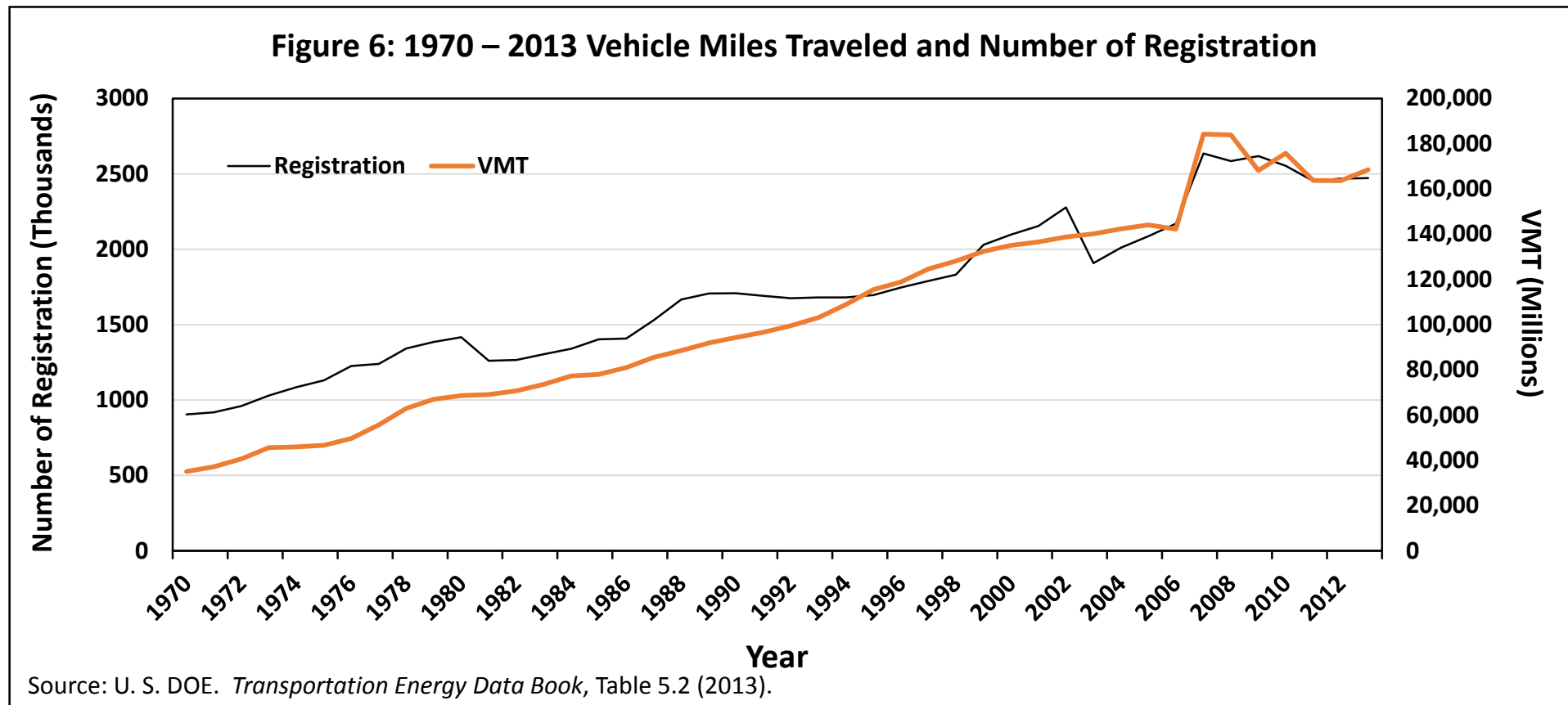
**Figure 5: Consumption by Mode (percent)**



Source: U. S. DOE. *Transportation Energy Data Book*, Table 1.16 (gallons, 2013).  
Classification: Class 7 (26,000 to 33,000 pounds) and Class 8 (33,000 pounds or more).

# Historical Vehicle Miles Traveled

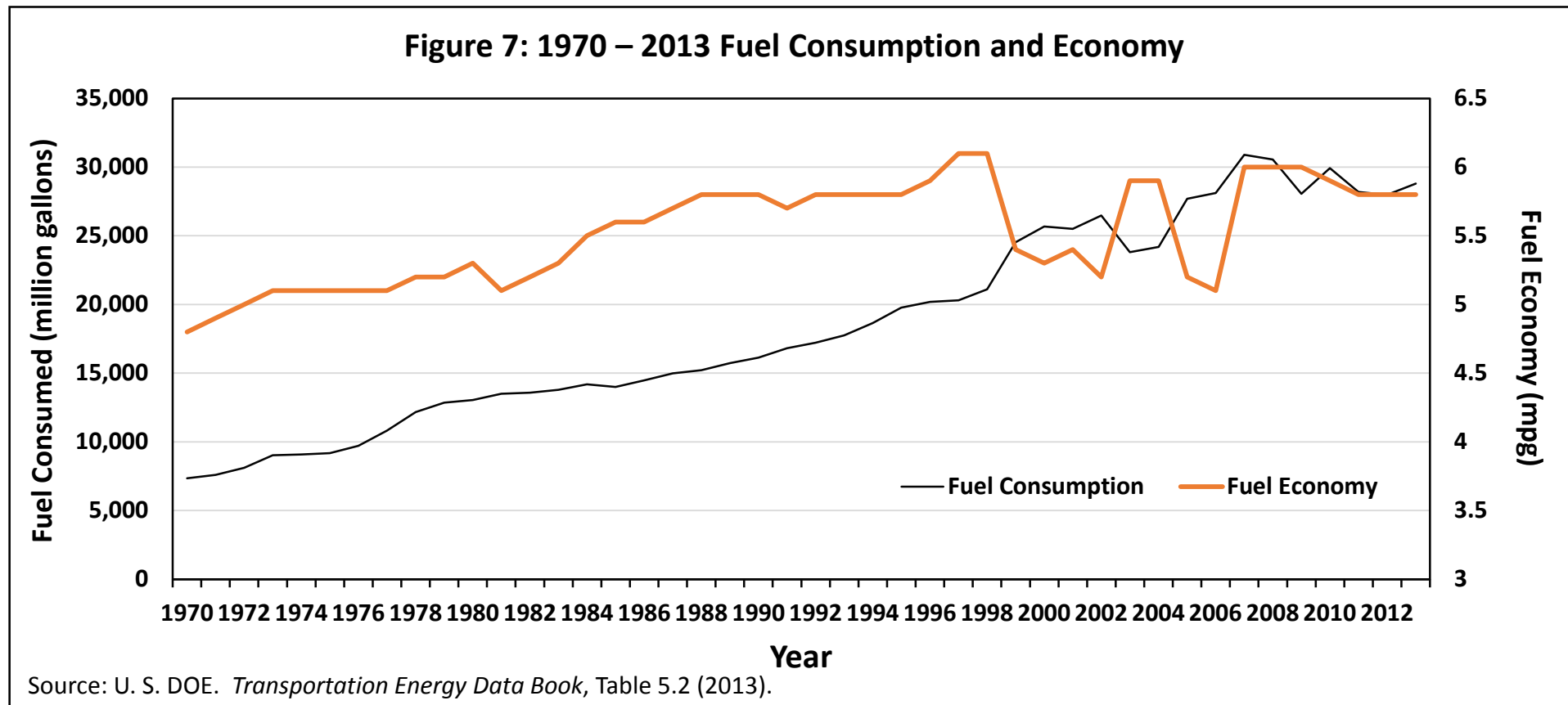
- HDT registrations jumped by 173% from 905K to 2.5M
- VMT increased by around 380% from 35B to 168B





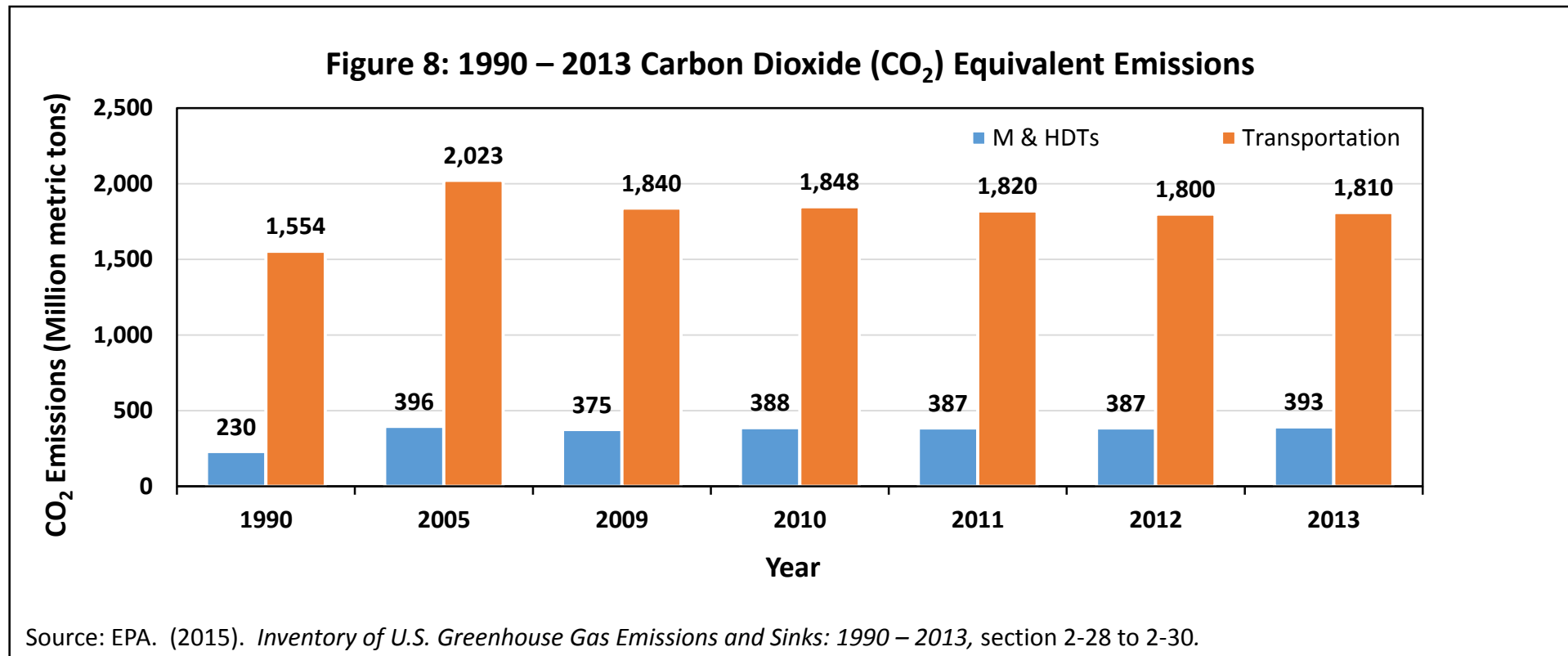
# Historical Fuel Consumption

- Consumed, on average, about 28.5 billion gallons of fuel; roughly 290% increase from 1970
- 4.8 mpg (1970) to 5.8 mpg (2013); increase of 21%



# Greenhouse Gas Emissions

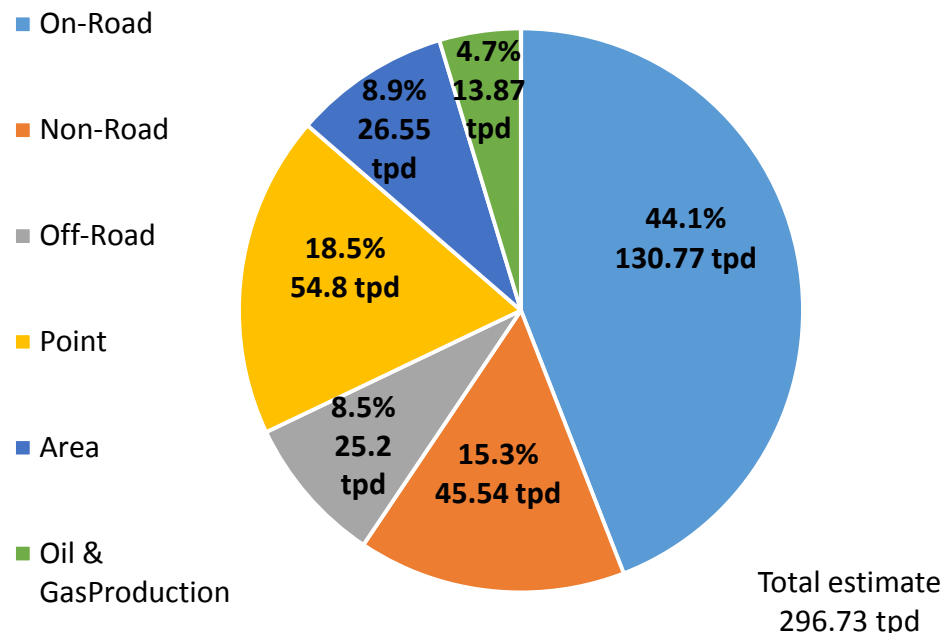
- Percent share: 15% (1990) vs. 21% (2013)
- 67% increase (230 MMT to 393 MMT)
- Gallon gasoline (19.64 pounds) vs. diesel (22.38 pounds)



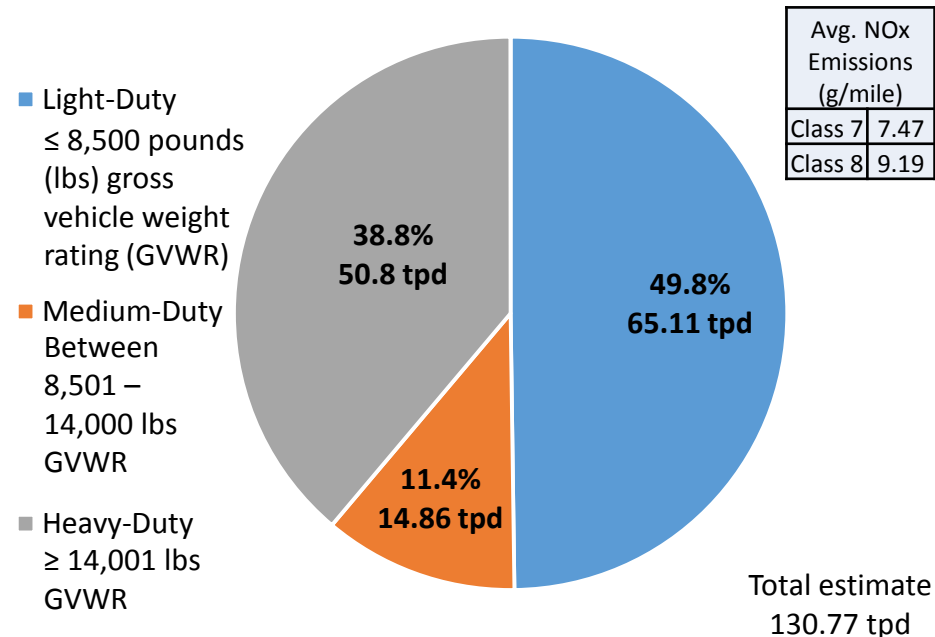
# Regional Nitrogen Oxides Emissions

- On-Road NOx emissions 130.77 tons per day (tpd) or approximately 44%
- HDTs NOx emissions 50.8 tpd or approximately 39% (on-road) 17% (total)

**Figure 9: 2017 Estimated Nitrogen Oxides Emissions (NOx) by Source**



**Figure 10: 2017 Estimated On-Road NOx Emissions by Mode**



Sources: Texas Commission on Environmental Quality. 2017 Dallas-Fort Worth 8-Hour Attainment Demonstration State Implementation Plan. EPA. Average In-Use Emissions from Heavy-Duty Trucks.

# Reducing Fossil Fuel Consumption

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Vehicle Miles Traveled



Alternative Energy

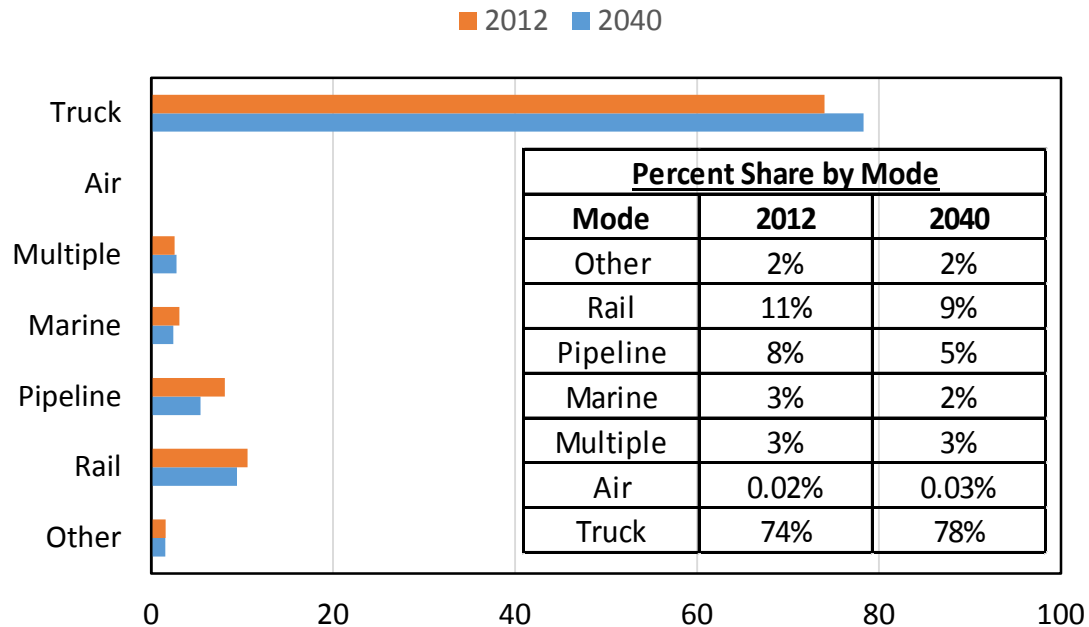


Vehicle Efficiency

# Projected Shipment and Energy Consumption

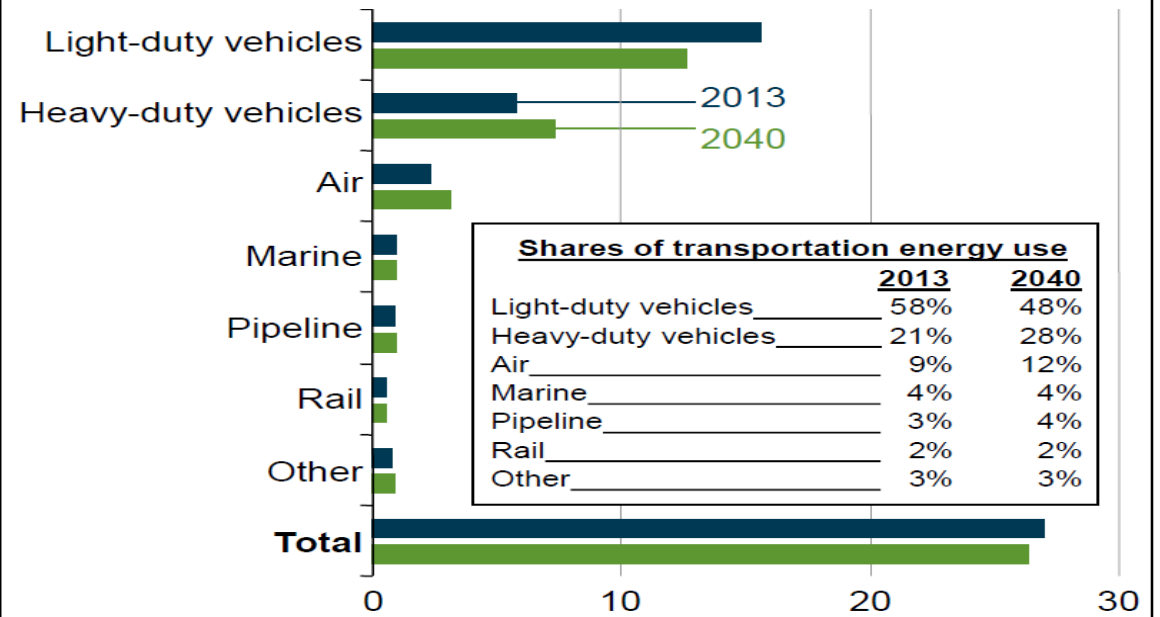
- On average, in 2013, a HDT traveled about 68,165 miles
- Shipment by truck projected to increase by approximately 4%, increase in energy consumption by 7%

**Figure 11: Projected Goods Movement by Mode**



Source: U.S. DOT. *Freight Facts and Figures 2013*, table 2-1 (domestic weight of shipment by mode – millions of tons)

**Figure 12: Projected Energy 2040 Consumption by Mode**



Source: U.S. DOE. *Annual Energy Outlook 2015 with Projections to 2040*, Figures 10. Due to independent rounding, shares may not equal 100 percent.



# Regional Heavy-Duty Truck Traffic Projection

- Freight flows expected to increase by 121%
- AADTT expected to increase by 40%

**Table 1: DFW Freight Flows by Truck (tons in millions)**

Trade Corridors		2011	2040	Change (percent)
IH-35	San Antonio - Dallas	26.83	61.52	129
IH-45	Houston - Dallas	18.48	35.26	91
IH-30	Dallas - Arkansas	9.82	24.88	153
IH-35	Dallas - Oklahoma	6.73	14.78	120
US 287	Dallas - Amarillo	4.50	9.78	117
IH-20	IH 10 - Dallas	4.31	11.42	165
US 75	Dallas - Oklahoma	3.18	6.02	89
IH-20	Dallas - Louisiana	0.94	1.46	55
Total		74.79	165.12	121

Source: TxDOT. 2012 International Trade Corridor Plan, pg. 22.

**Table 2: AADTT IN DFW**

Route	From	To	Length (mile)	AADTT (2013)	AADTT (2033)
<b>IH-20</b>	US-377	US-175	52	15,769	<b>22,114</b>
<b>IH-30</b>	IH-35W	IH-635	42	11,458	<b>16,040</b>
<b>IH-35E</b>	IH-20	US-380	50	12,198	<b>17,078</b>
<b>IH-35W</b>	IH-20	US-380	45	10,501	<b>14,701</b>
<b>IH-635</b>	SH-121	IH-20	38	17,655	<b>24,716</b>
<b>US-75</b>	IH-30	US-380	32	13,635	<b>19,088</b>

Source: Dr. Mohammad Najafi. Presentation on *Integrating Underground Freight Transportation (UFT) Into Existing Intermodal System*, slide 17.

AADTT: Average annual daily truck traffic

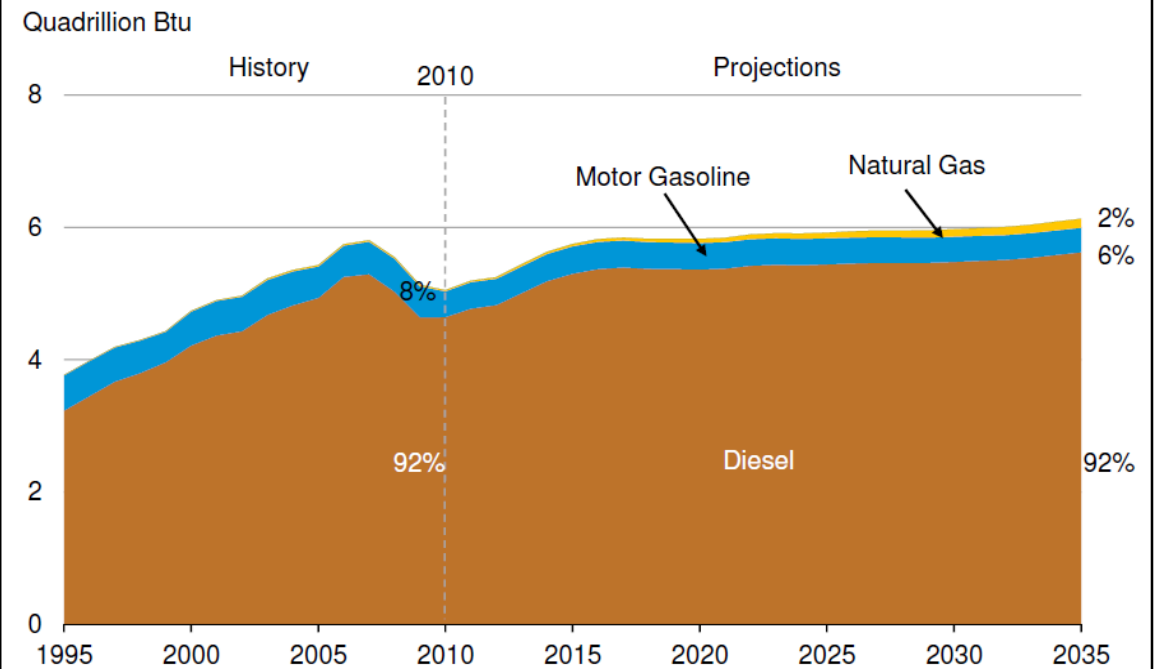
# Alternative Energy

- Range of 62 miles, takes 3 to 4 hours to fully charge (BMW)
- Natural gas around 2%



Source: Google image library.

**Figure 13: Historical and Projected HDT Energy Consumption**



Source: U.S. EIA. *Annual Energy Outlook 2012*.

# Heavy-Duty Truck Emission and Fuel Standards

## M A N D A T E S

### Phase 1

- First GHG emission and fuel standards for medium and heavy-duty trucks
- Applies to model years (MYs) 2014 – 2018
- 7 to 20% reduction in CO<sub>2</sub> (EPA) and fuel consumption (NHTSA) by MY 2017
- Reduce approximately 250 MT of CO<sub>2</sub>
- Average 6.9 mpg

### Phase 2

- Applies to MYs 2021 – 2027
- Achieve 24% lower CO<sub>2</sub> emissions and fuel consumption relative to Phase 1 standards
- Approximately cuts GHG emissions by approximately 1 billion MT, saves 1.8 billion barrels of oil, and reduce fuel cost by \$170 billion
- Average 8.5 mpg

Sources: EPA. *EPA and NHTSA Propose First-Ever Program to Reduce Greenhouse Gas Emissions and Improve Fuel Efficiency of Medium- and Heavy-Duty Vehicles: Regulatory Announcement* and EPA and NHTSA, *Propose Standards to Reduce Greenhouse Gas Emissions and Improve Fuel Efficiency of Medium- and Heavy-Duty Vehicles for Model Year 2018 and Beyond*.

# SmartWay Program

## Goals

- Develop public and private partnership
- Improve freight efficiency
- Reduce emissions

## Results

- Over 3,000 partners
- Saved 170.3 million barrels of oil
- Reduce emissions: 72M metric tons (MT) of CO<sub>2</sub>, 1.4M MT NO<sub>x</sub>, and 72K MT of Particulate Matter



Source: EPA. *Fast Facts About SmartWay Partnership*. Retrieved from <https://www3.epa.gov/smartway/about/index.htm>.

# SmartWay Strategies

## Technologies

- Aerodynamics
- Idling Reduction
- Low Rolling Resistance Tires
- SmartWay Tractors
- SmartWay Trailers

## Other Fuel Saving Strategies

- Alternative Fuels
- Engine Repower
- Speed Management Practices
- Weight Reduction Strategies





# Cab Roof and Side Extender Fairings

## Cab Roof

- 4 to 8%
- Saves, on average, around 700 fuel gallons
- Equivalent to \$1,400 savings in fuel cost
- 7.2 MT CO<sub>2</sub> reduction



## Side Extender

- 1 to 2%
- 175 fuel gallons
- Saves \$350 in fuel cost
- 1.8 MT CO<sub>2</sub> reduction



Sources: EPA, *Improved Aerodynamics: A Glance at Clean Freight Strategies* and U.S. DOE, *Transportation Energy Data Book*, Table 5.2 (2013).

# Trailer Side Skirts and Tails

## Side Skirts

- 4 to 7%
- Saves 645 gallons
- Reduces fuel cost by around \$1,300
- 13.1 MT CO<sub>2</sub>



## Tails

- 1 to 2%
- 175 fuel gallons
- Saves \$350 in fuel cost
- 1.8 MT CO<sub>2</sub> reduction



Sources: EPA, *Improved Aerodynamics: A Glance at Clean Freight Strategies* and U.S. DOE, *Transportation Energy Data Book*, Table 5.2 (2013).

# Idling Reduction Devices

## Auxiliary Power Unit

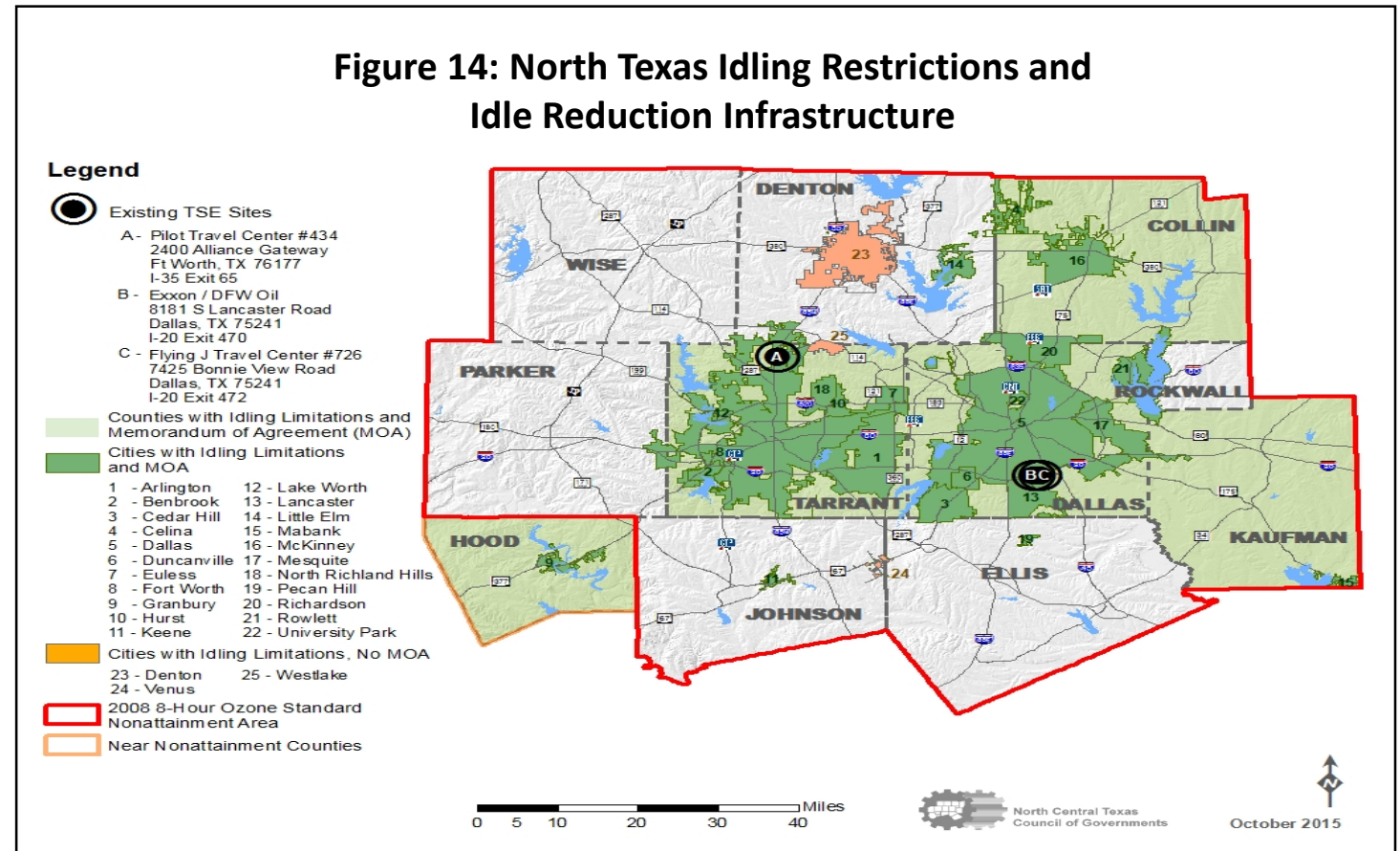
Heavy-duty trucks, on average, spend 2,400 idling hrs/year, burning 0.6 gal/hr

### Use

- Heating
- Air conditioning
- Electrical accessories

### Benefits

- 1,440 gallons saved
- \$2,880 fuel savings
- 14.6 MT CO<sub>2</sub>



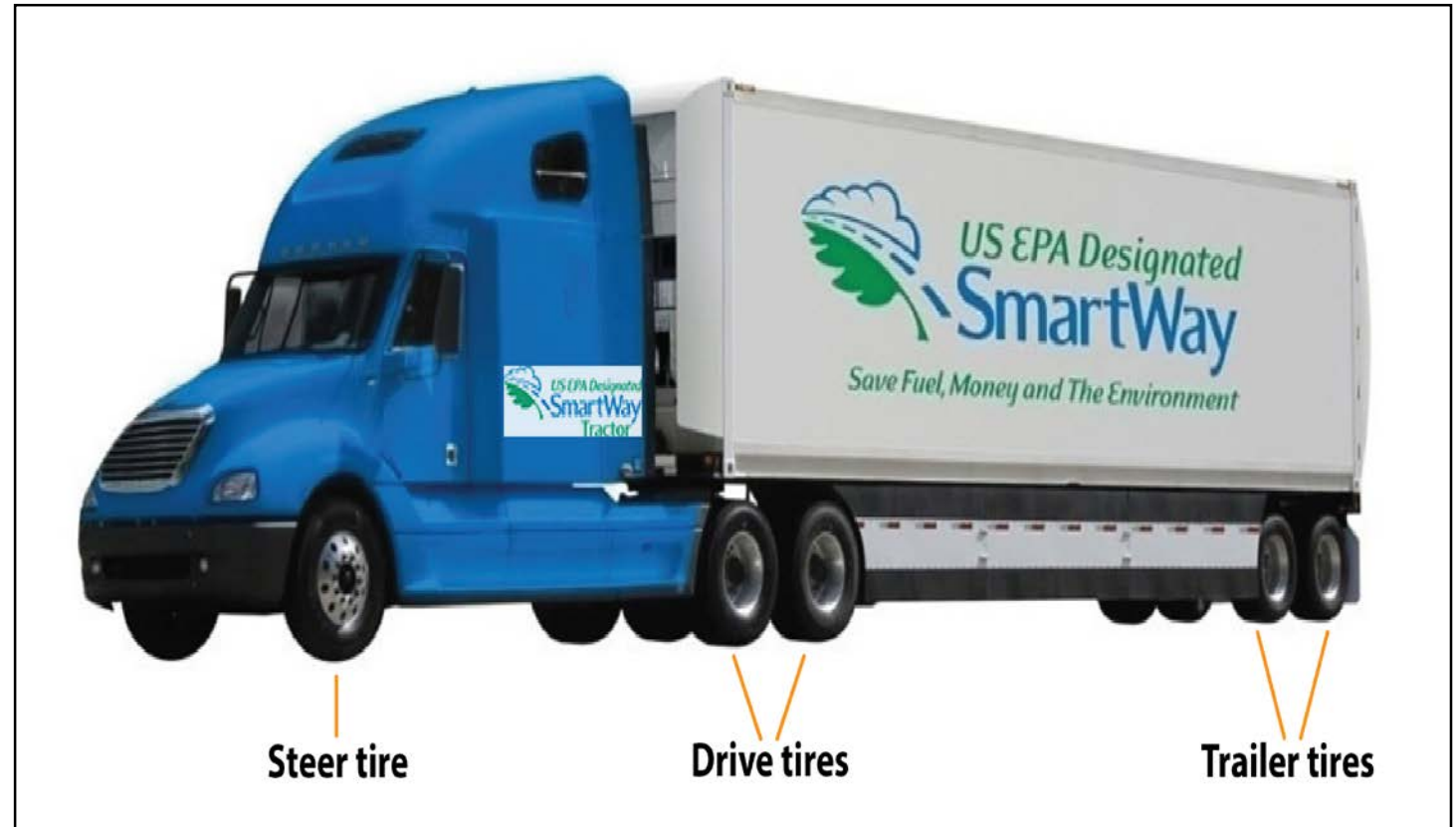
Source: EPA. *Idle Reduction: A Glance at Clean Freight Strategies.*



# Low Rolling Resistance Tires

## Single Wide Tires or Dual Tires

- 3% reduction in fuel consumption (6.19 mpg)
- Fuel reduction equivalent to 500 gallons
- Fuel cost savings \$1,000
- 14.6 MT CO<sub>2</sub>



Reduce flexing and bending of tires

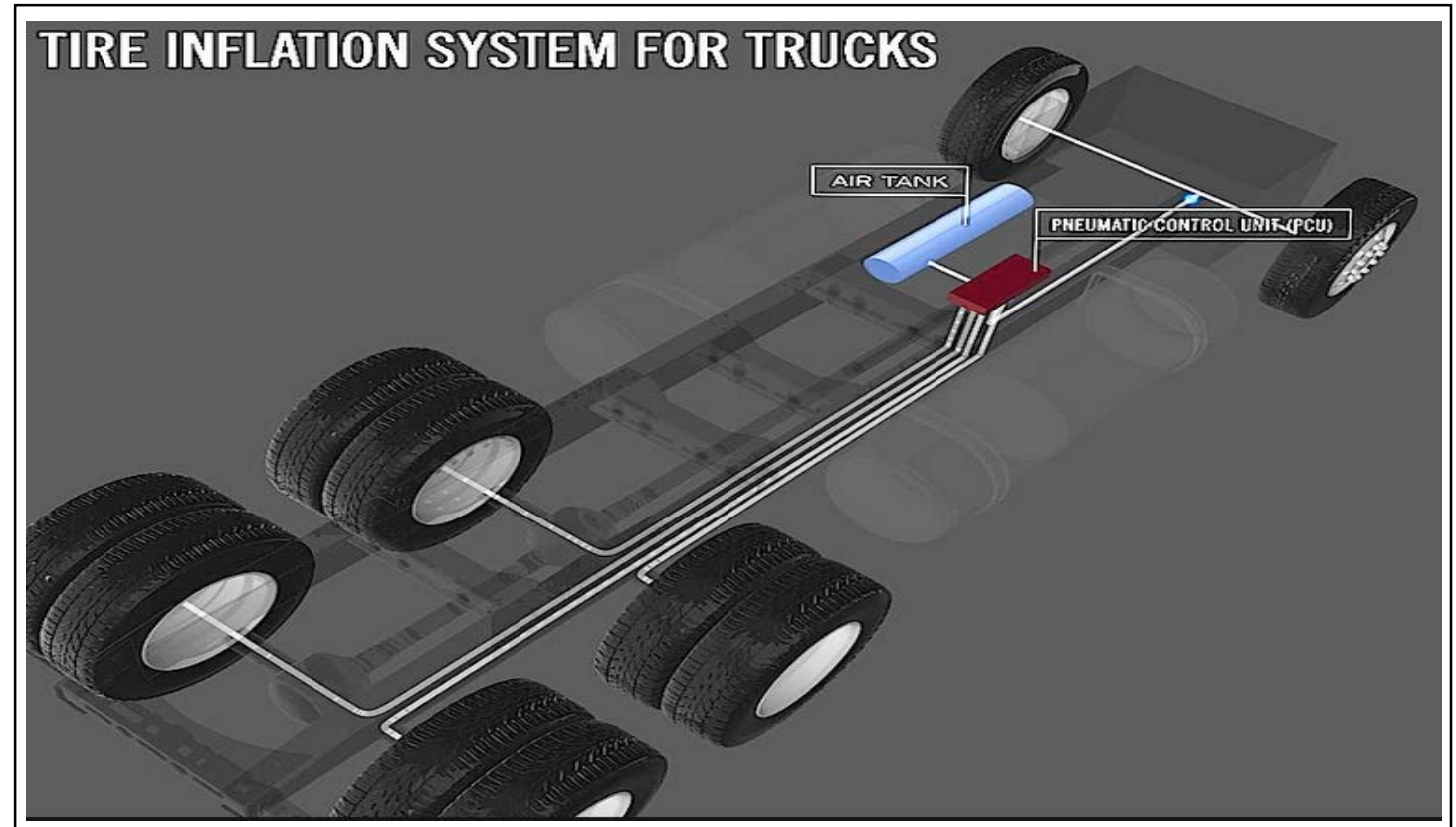
Source: EPA. *Idle Reduction: A Glance at Clean Freight Strategies.*

List of SmartWay tires is available online at <https://www.epa.gov/verified-diesel-tech/smartway-verified-list-low-rolling-resistance-lrr-tires-and-retread>

# Automatic Tire Inflation Systems

## Benefits

- 0.60% increase in fuel economy
- Fuel reduction equivalent to 100 gallons
- Fuel cost savings \$200
- 1.12 MT CO<sub>2</sub>



Reduce flexing and bending of tires



# SmartWay Certified Tractors and Trailers

## Benefits

- Reduce fuel consumption by up to 20%
- Equivalent to 2,000 to 4,000 gallons of diesel per year
- Fuel savings between \$4,000 to \$8,000 per year
- Reduces CO<sub>2</sub> between 20.3 MT to 40.7 MT



Sources: EPA, *SmartWay Designated Tractors and Trailers* and U.S. DOE, *Transportation Energy Data Book*, Table 5.2 (2013).

# SuperTruck Program (2010)

## Goal

Increase overall fuel economy to 9.75 mpg

## Partners

- Daimler Truck North America
- Cummins & Peterbilt
- Volvo
- Navistar

## Annual Projections

- Spend nearly \$30B less on fuel
- Consumer nearly 300M fewer barrels of oil



**Cummins & Peterbilt**  
85% increase from 5.8  
mpg to 10.7 mpg



**Freightliner**  
Achieved 110%  
increase from 5.8  
mpg to 12.2 mpg

Sources: The White House. (2014). *Improving the Fuel Efficiency of American Trucks – Bolstering Security, Cutting Carbon Pollution, Saving Money and Supporting Manufacturing Innovation.*

# SMARTe Program

## Saving Money and Reducing Truck Emissions (SMARTe)

Reduce fuel consumption and fuel-related emissions from the trucking industry

### Program Objective

Conduct outreach in order to provide awareness owner-operators and small-to-medium size trucking companies

Regulations

Funding opportunities

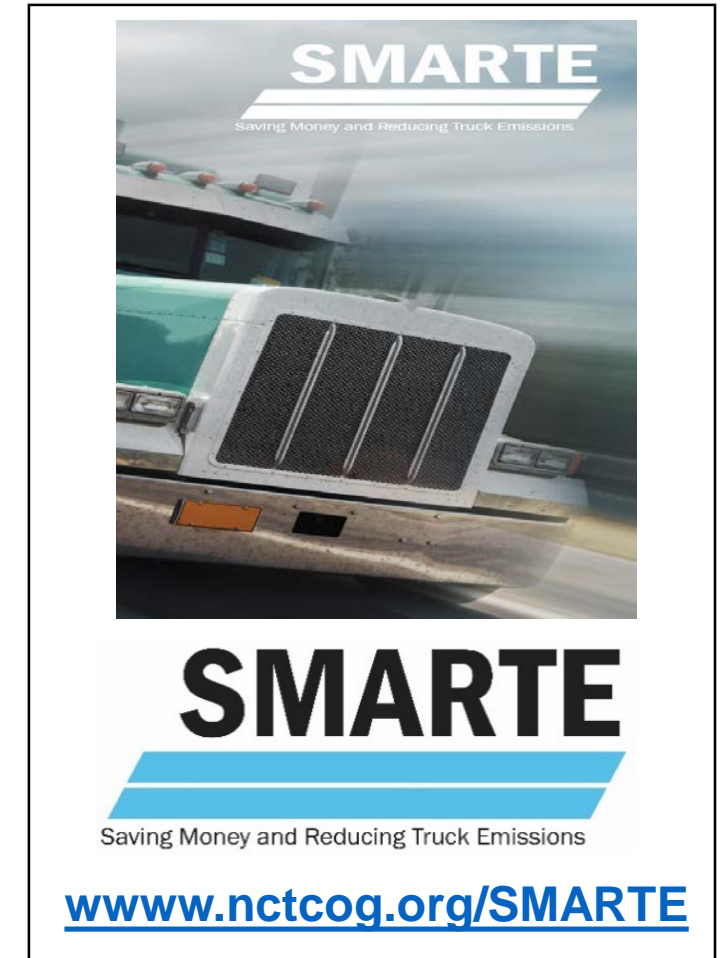
Technological and operational solutions

### Program Resources

Driver, Fleet Manager, and Vendor information folders

Informational brochure

Application assistance



# SMARTE Program Results

## Number of Technology Upgrades

- 74 idle reduction devices
- 25 aerodynamic devices
- 2 low rolling resistance tires

## Annual Fuel Consumption and Cost Reduced

- 90,229 gallons
- \$180,458

## Annual Pollutants Reduced (tons)

- 1,001 ton of CO<sub>2</sub>
- 15.93 ton of NOx



# Concluding Remarks

## Impact on Environment

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- Despite just around 5% of on-road vehicles, HDTs account for nearly 18% and 21% of, respectively, fuel consumption and CO<sub>2</sub> emissions
- Roughly 36% of NO<sub>x</sub> emissions in DFW is attributed to heavy-duty diesel trucks

## Challenges

- HDTs will continue to play a significant role in the movement of goods
- Energy demand from HDTs is expected to increase by roughly 33% by 2040
- Average annual daily truck traffic in DFW is projected to rise 40% by 2033

## Improving Fuel Economy

- SmartWay technologies expected to increase fuel efficiency up to 20% (saves 2,000 to 4,000 gallons)
- SuperTruck Program: achieve 9.5 mpg or above (10.7 and 12.2)



# Contact Information

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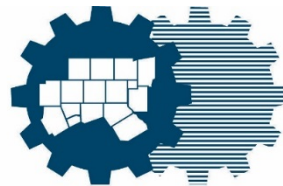
817-704-2514

## Websites

[www.nctcog.org/airquality](http://www.nctcog.org/airquality)

[www.nctcog.org/smartway](http://www.nctcog.org/smartway)

[www.nctcog.org/smartway](http://www.nctcog.org/smartway)



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