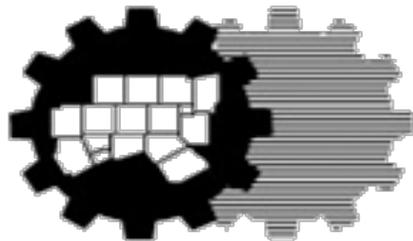


ADVANTAGES OF USING SMARTWAY TECHNOLOGIES



Energy Center Workshop Tarrant County Community College April 28, 2016



**Jasper Alve, Air Quality Planner
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



SMARTE

Saving Money and Reducing Truck Emissions



North Central Texas Council of Governments

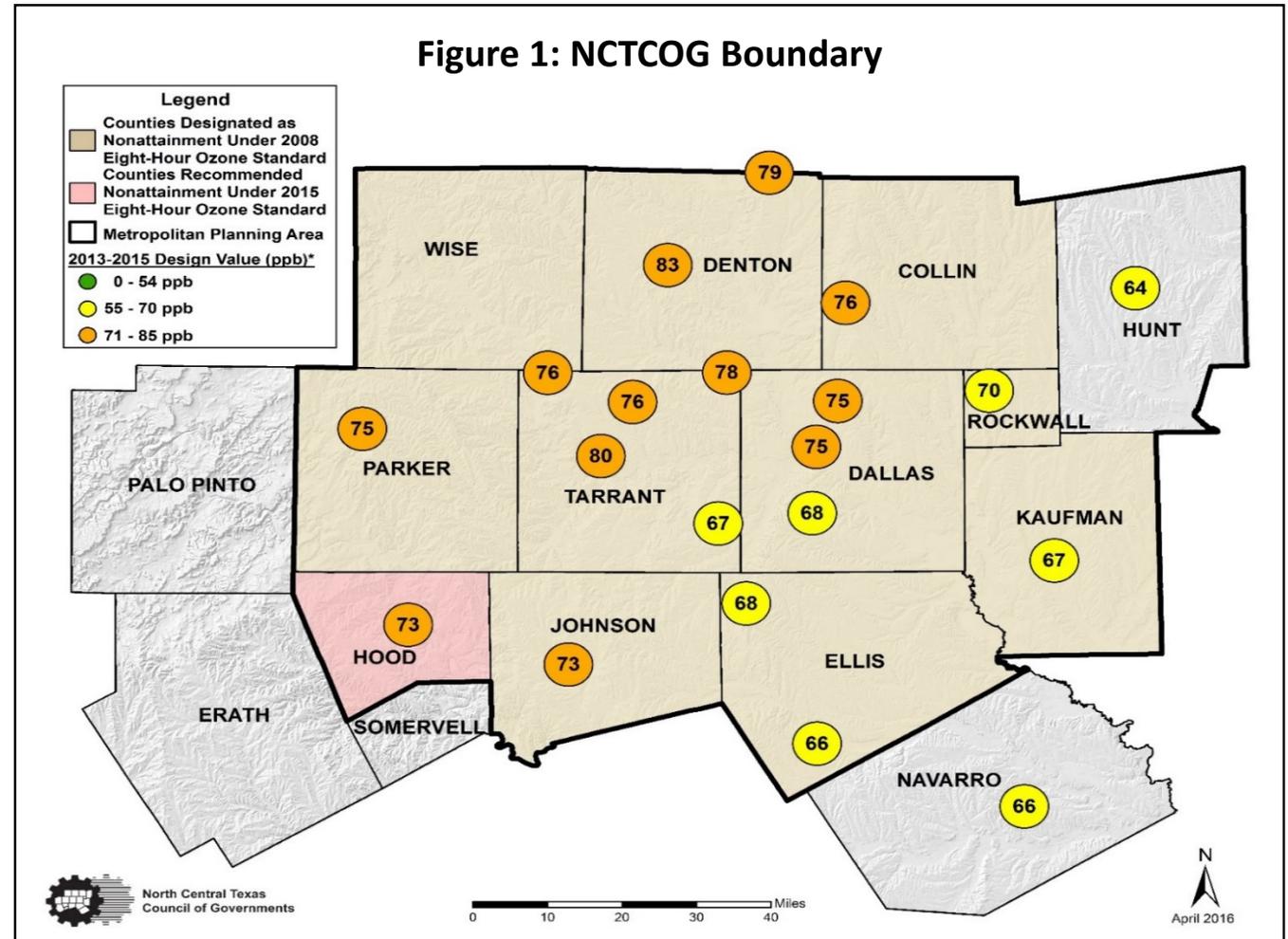
Council of Governments (COG)

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

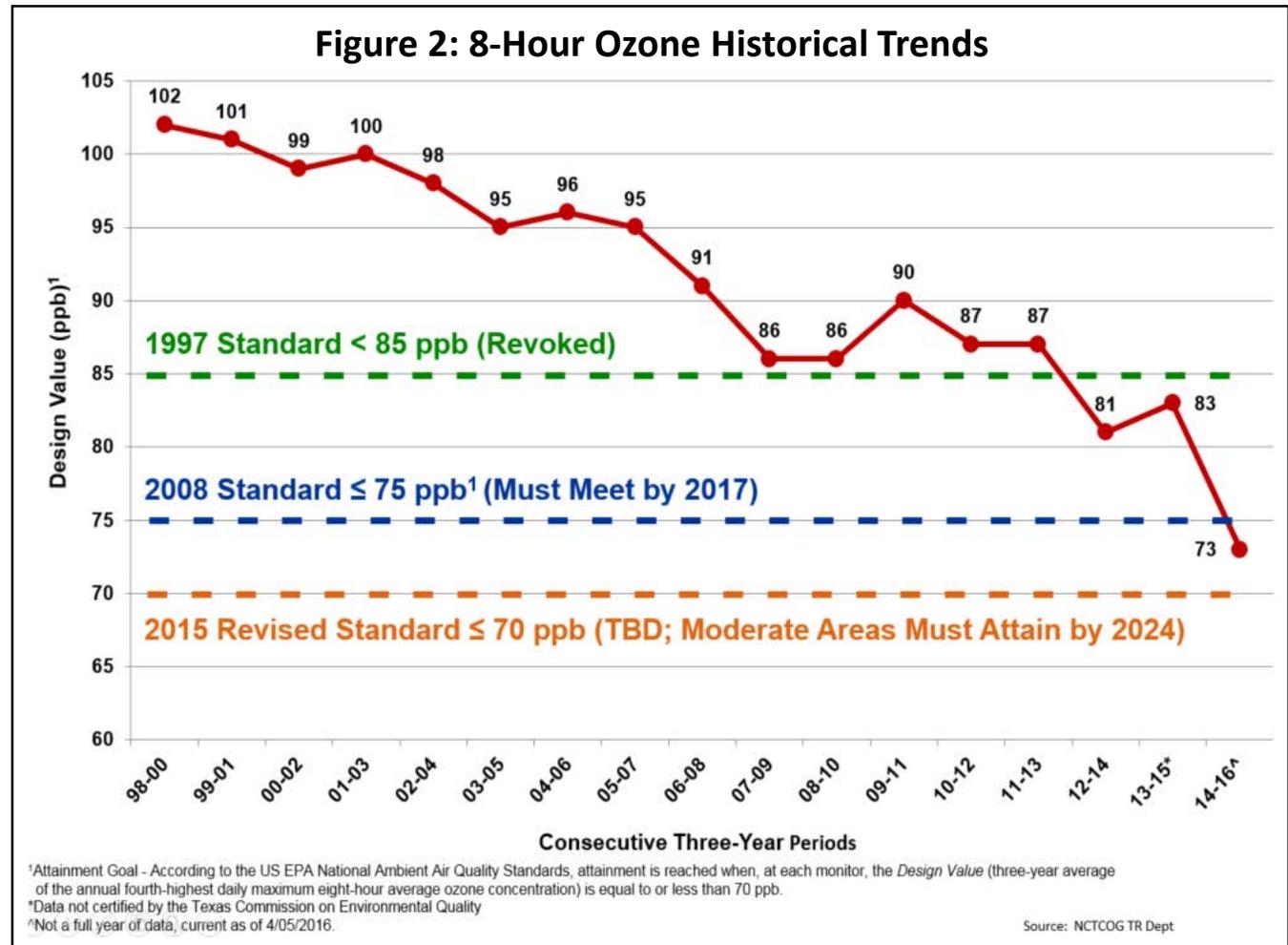
Ground level ozone (O₃) formation: Nitrogen Oxides (NO_x) and Volatile Organic Compounds (VOCs) along with sunlight

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



Don't Choke, Call #SMOKE



SMARTER

Saving Money and Reducing Truck Emissions



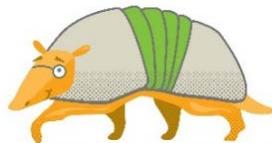
Rideshare. Record. Reward.



be air aware



northcentral.texas.clean.school.bus.program



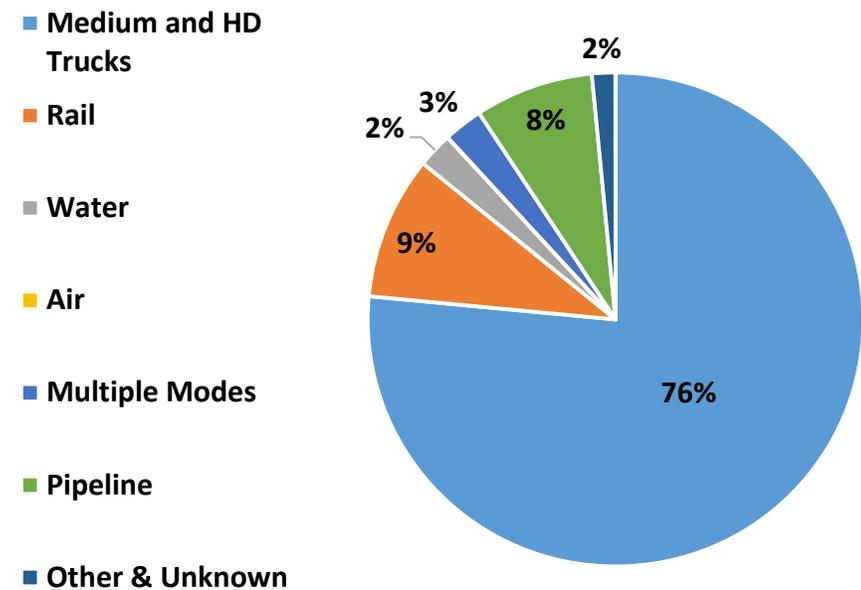
<http://www.nctcog.org/trans/air/programs/>

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)

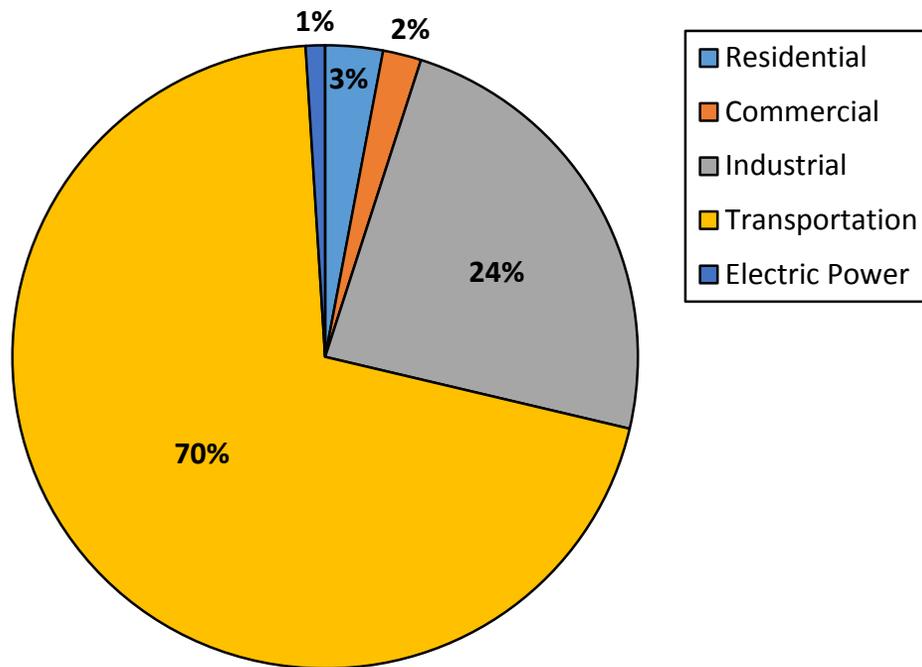
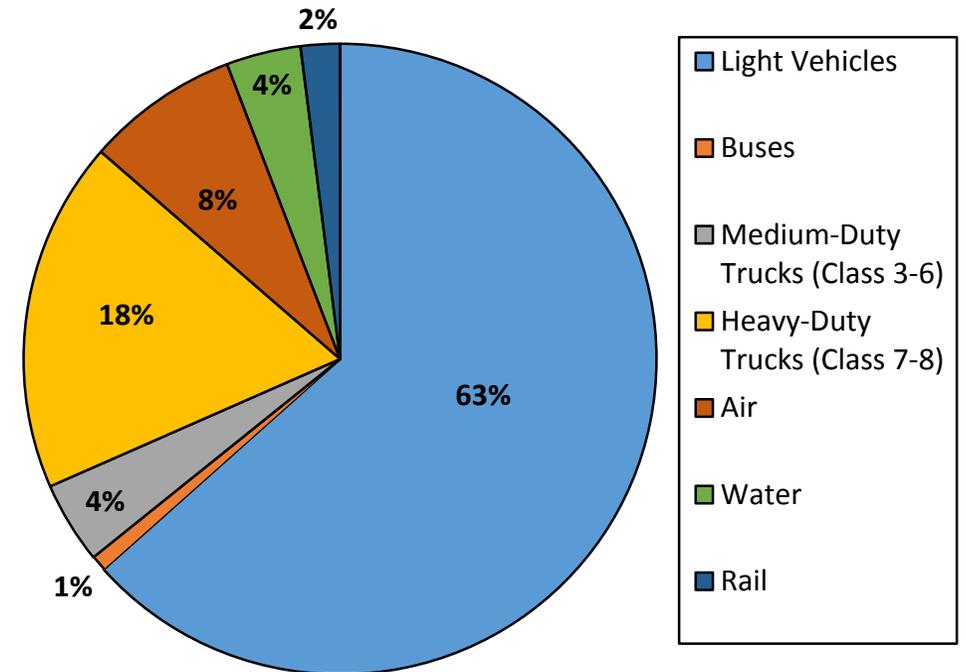


Figure 5: Consumption by Mode (percent)

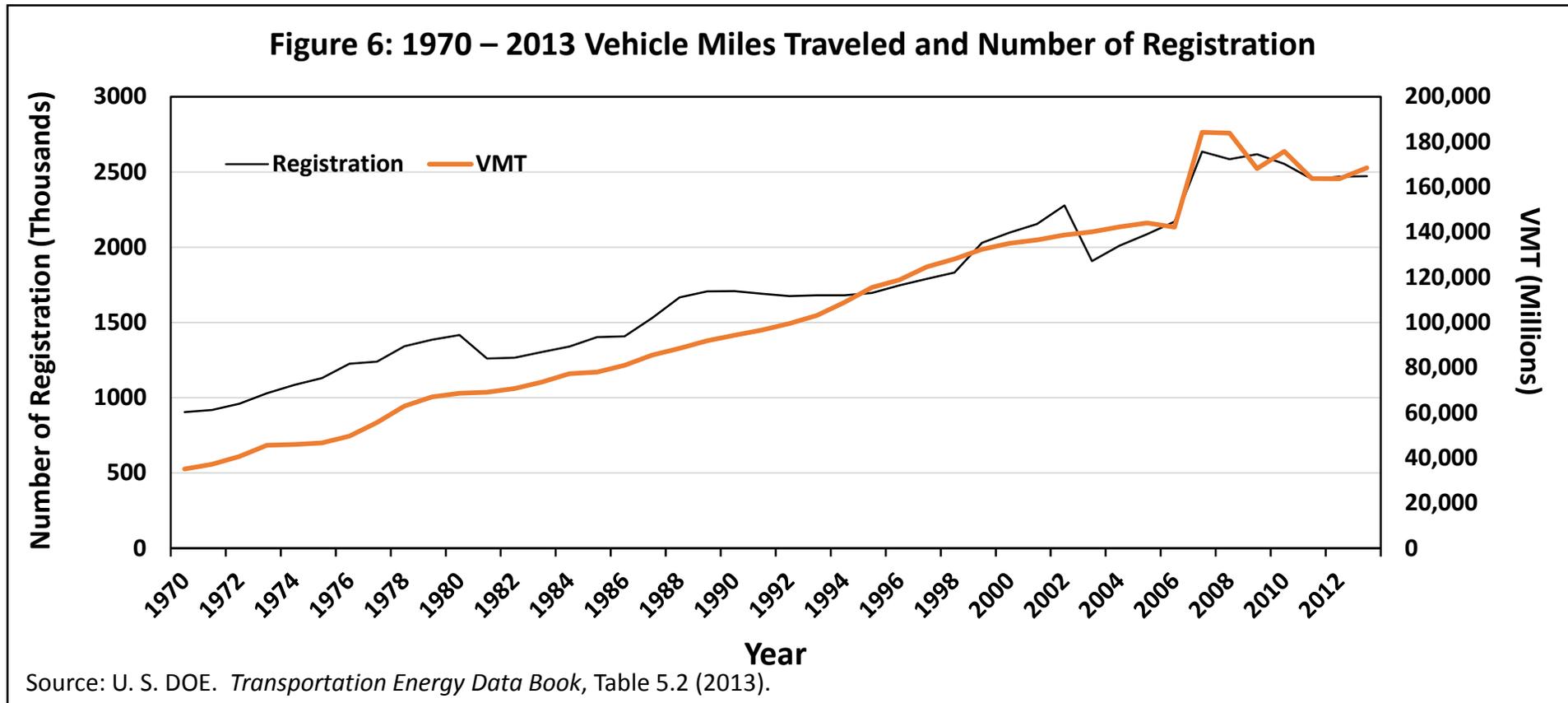


Source: U.S. DOE. *March 2016 Monthly Energy Review*. Figure 3.7 (barrels, Dec 2015).

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).

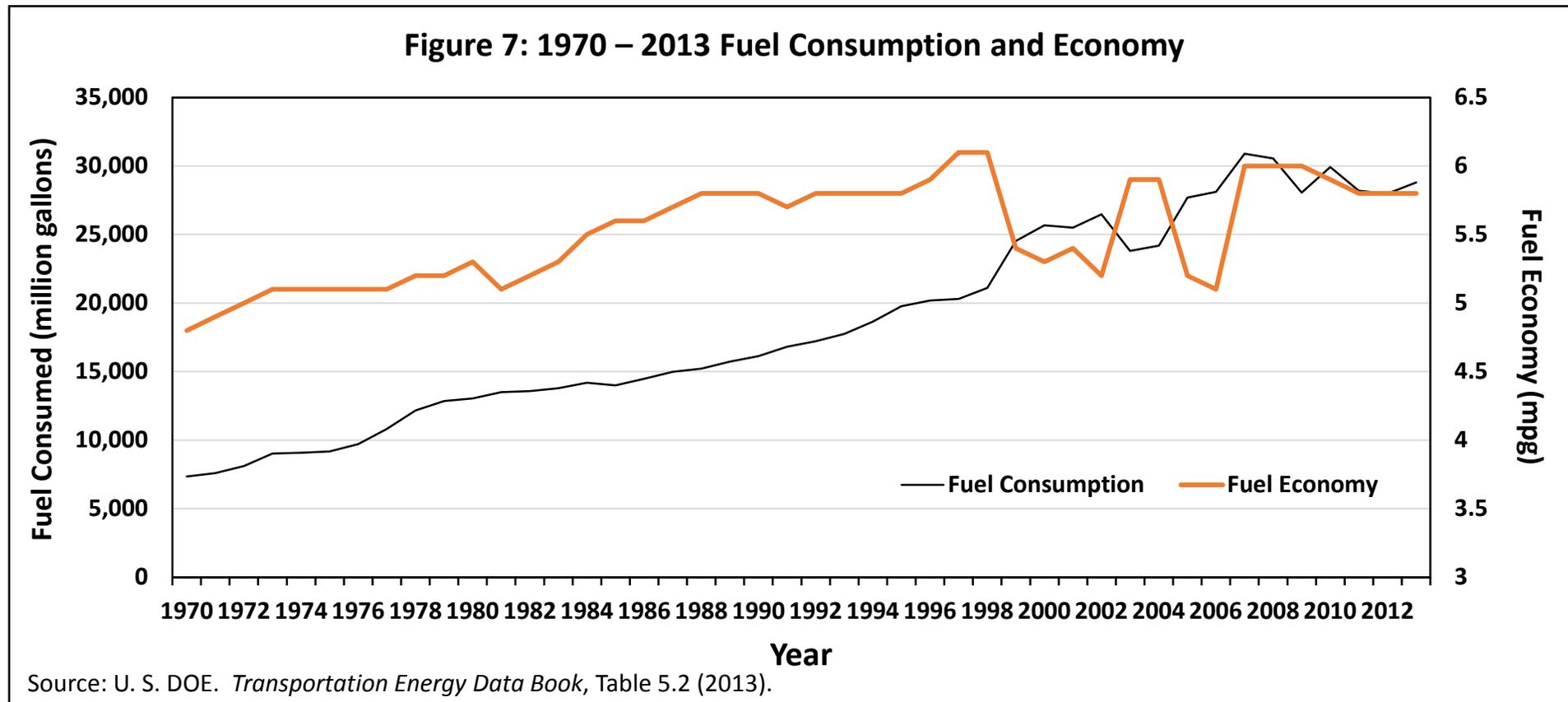
Historical Vehicle Miles Traveled

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



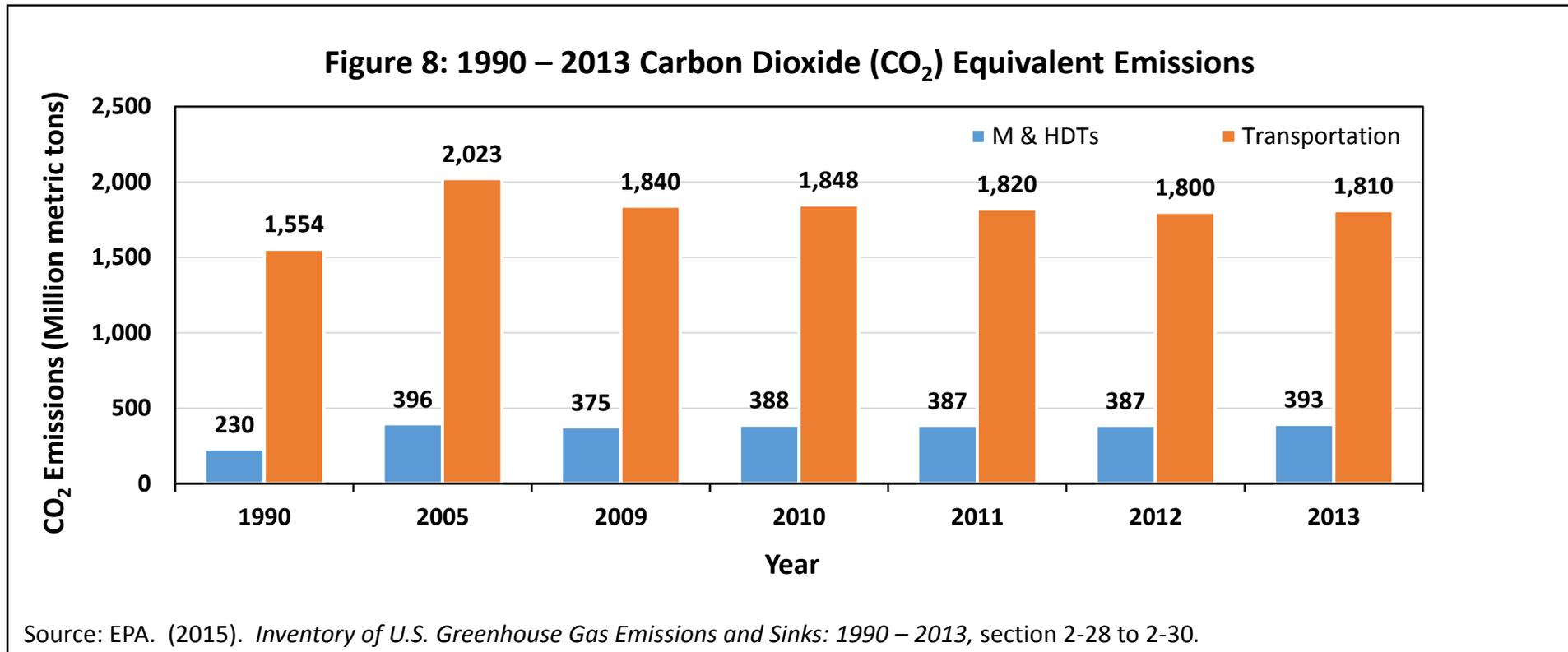
Historical Fuel Consumption

- 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%



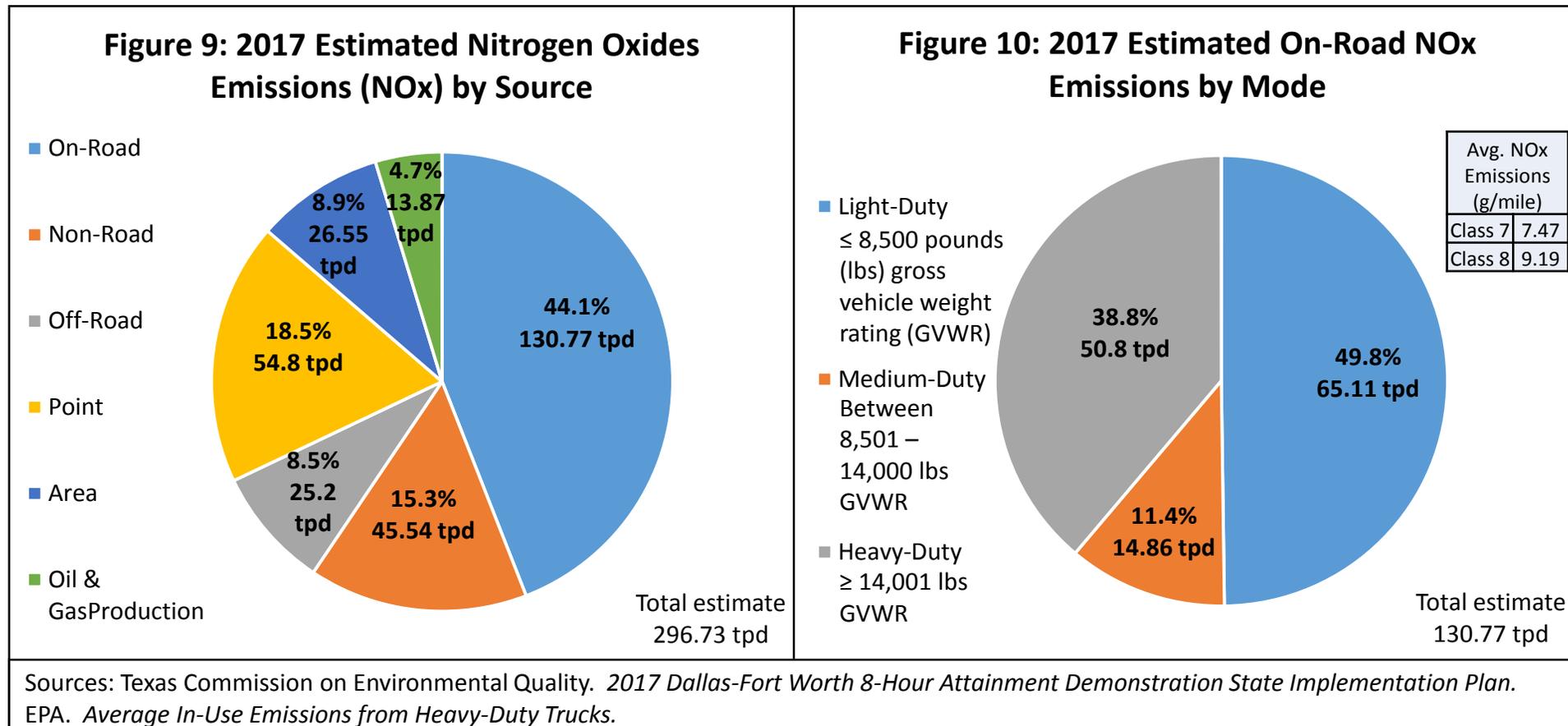
Greenhouse Gas Emissions

- 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)



Reducing Fossil Fuel Consumption

S
T
R
A
T
E
G
I
E
S



Vehicle Miles Traveled



Alternative Energy

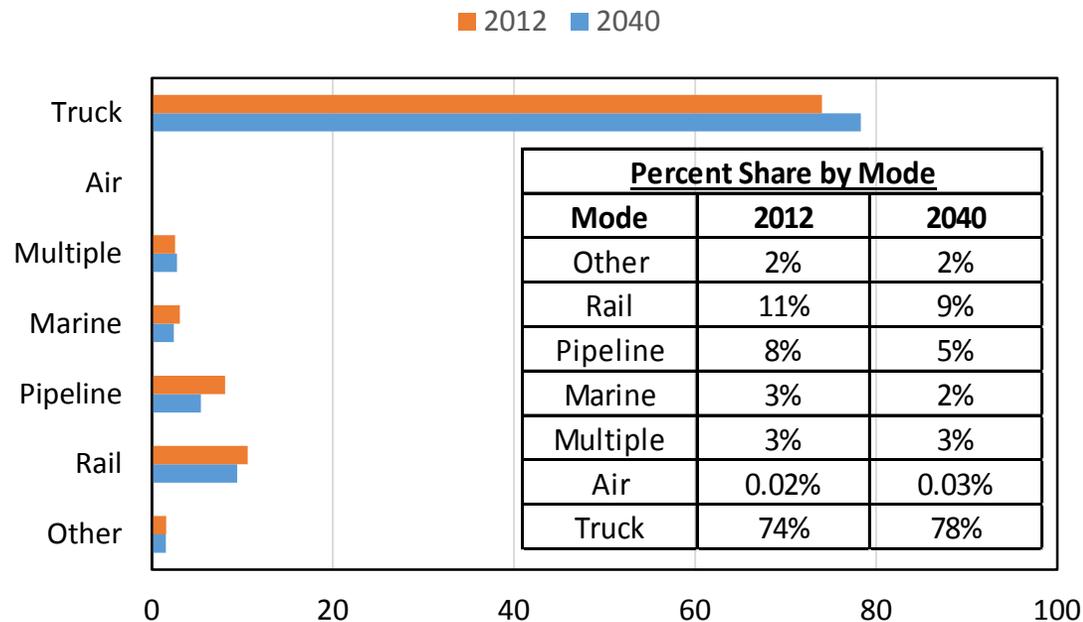


Vehicle Efficiency

Projected Shipment and Energy Consumption

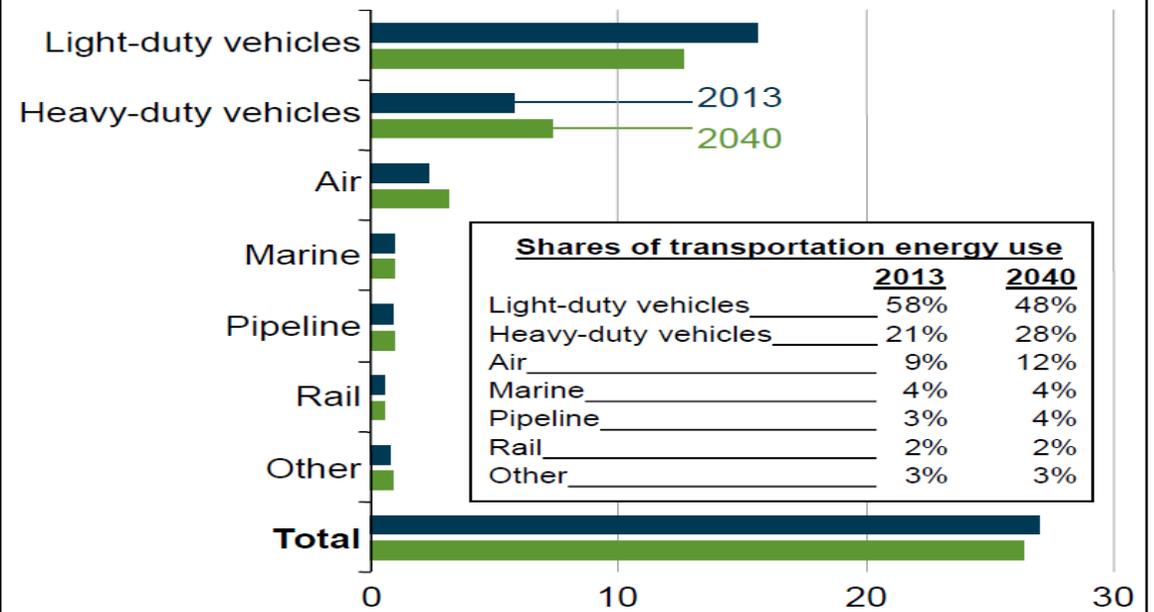
- On average, in 2013, a HDT traveled about 68,165 miles
- Shipment by truck projected to increase by approximately 4%, increase in energy consumption by 7%

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)
IH-20	US-377	US-175	52	15,769	22,114
IH-30	IH-35W	IH-635	42	11,458	16,040
IH-35E	IH-20	US-380	50	12,198	17,078
IH-35W	IH-20	US-380	45	10,501	14,701
IH-635	SH-121	IH-20	38	17,655	24,716
US-75	IH-30	US-380	32	13,635	19,088

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

AADTT: Average annual daily truck traffic

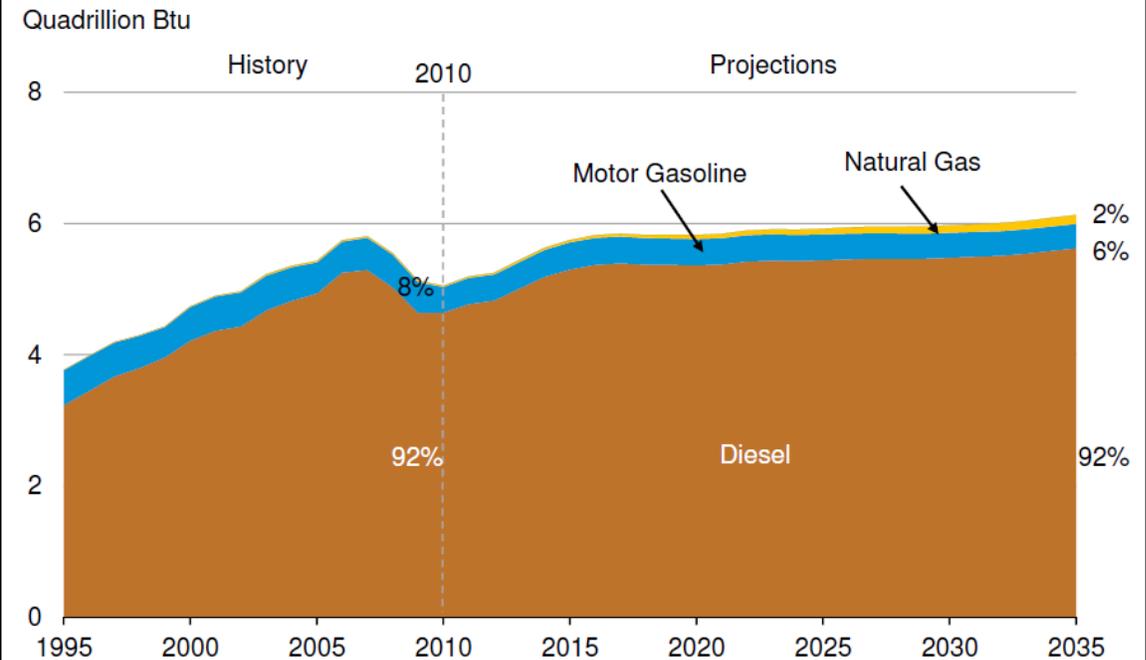
Alternative Energy

- 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 CO₂ (EPA) and fuel consumption (NHTSA) by MY 2017
- Reduce approximately 250 MT of CO₂
- Average 6.9 mpg

Phase 2

- Applies to MYs 2021 – 2027
- Achieve 24% lower CO₂ 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 CO₂, 1.4M MT NO_x, 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 CO₂ reduction



Side Extender

- 1 to 2%
- 175 fuel gallons
- Saves \$350 in fuel cost
- 1.8 MT CO₂ 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 CO₂



Tails

- 1 to 2%
- 175 fuel gallons
- Saves \$350 in fuel cost
- 1.8 MT CO₂ 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

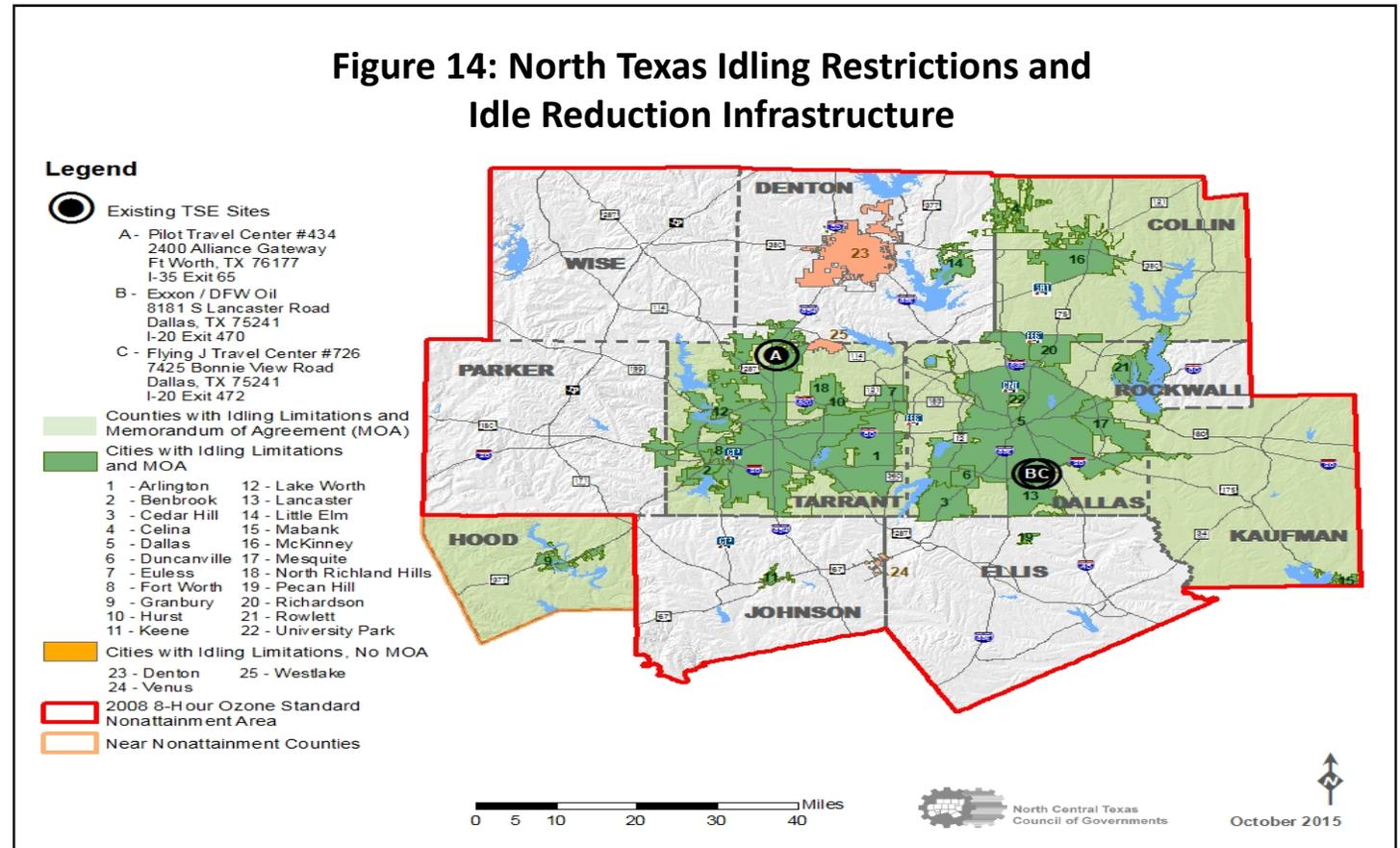
- Heating
- Air conditioning
- Electrical accessories

Benefits

- 1,440 gallons saved
- \$2,880 fuel savings
- 14.6 MT CO₂



Figure 14: North Texas Idling Restrictions and Idle Reduction Infrastructure



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 CO₂



Reduce flexing and bending of tires

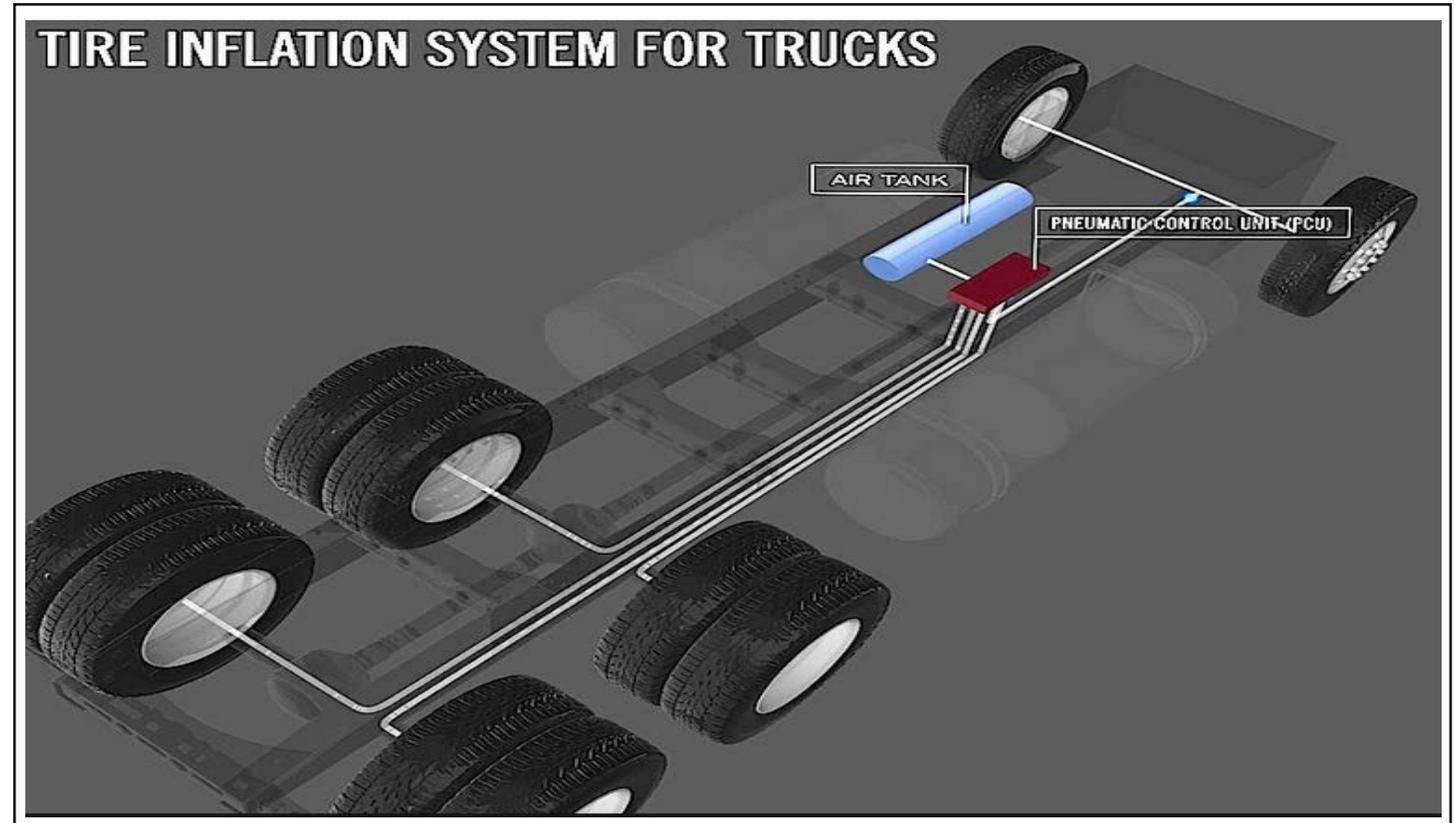
Source: EPA. *Idle Reduction: A Glance at Clean Freight Strategies.*

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 CO₂



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 CO₂ 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

SMARTER Program

Saving Money and Reducing Truck Emissions (SMARTER)

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

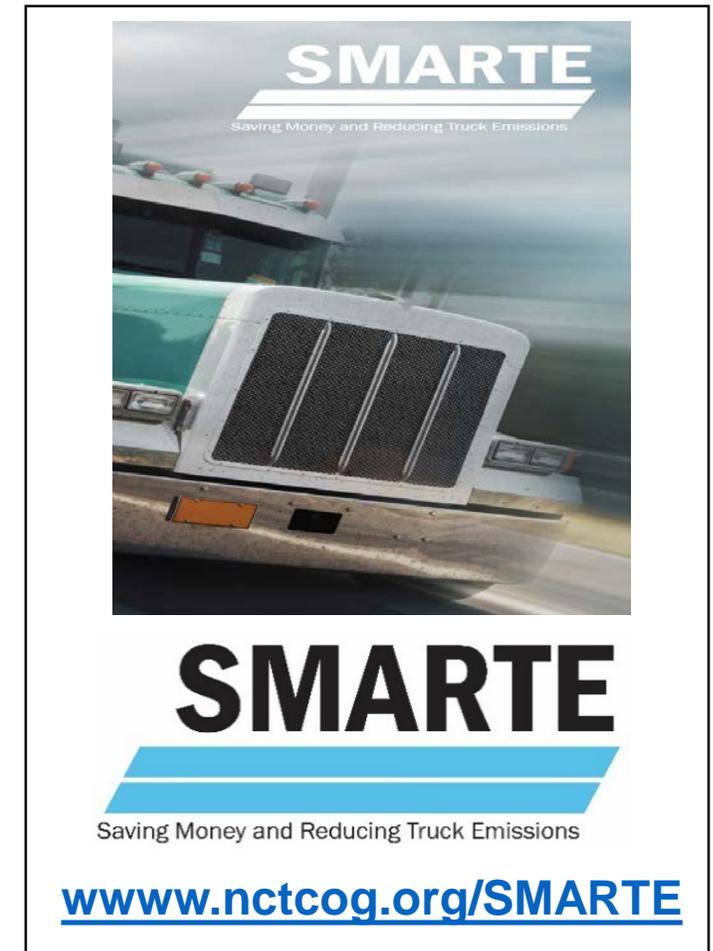
Technological and operational solutions

Program Resources

Driver, Fleet Manager, and Vendor information folders

Informational brochure

Application assistance



SMARTER 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 CO₂
- 15.93 ton of NOx

Concluding Remarks

Impact on Environment

R
E
C
A
P

- Despite just around 5% of on-road vehicles, HDTs account for nearly 18% and 21% of, respectively, fuel consumption and CO₂ emissions
- Roughly 36% of NO_x 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

Jasper Alve

Air Quality Planner

jalve@nctcog.org

817-695-9247

Jason Brown

Air Quality Operations Manager

jbrown@nctcog.org

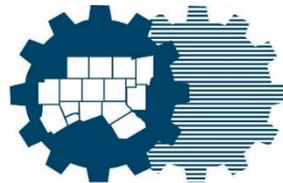
817-704-2514

Websites

www.nctcog.org/airquality

www.nctcog.org/smartway

www.nctcog.org/smarte



North Central Texas
Council of Governments

