The VW settlement can Clean the Air, Create Jobs, and Promote new Technology

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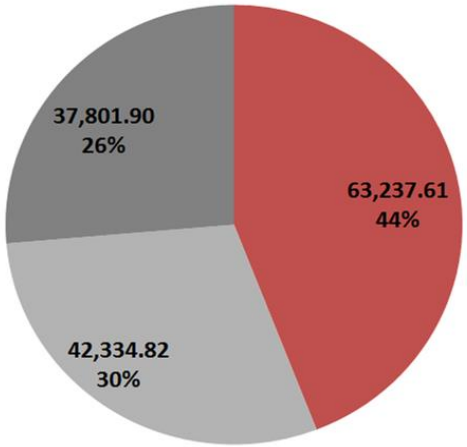
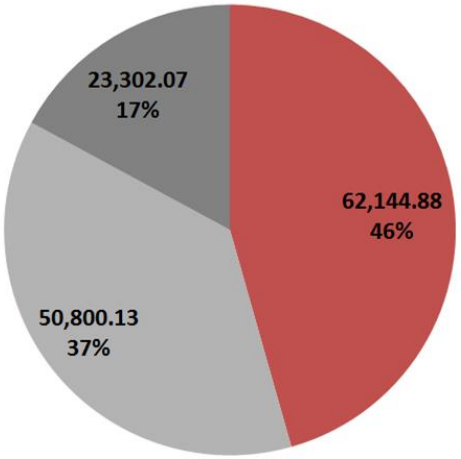
Diesel Emissions are the Largest Sources of NOx in 3 of 4 of Metro Areas (2014)

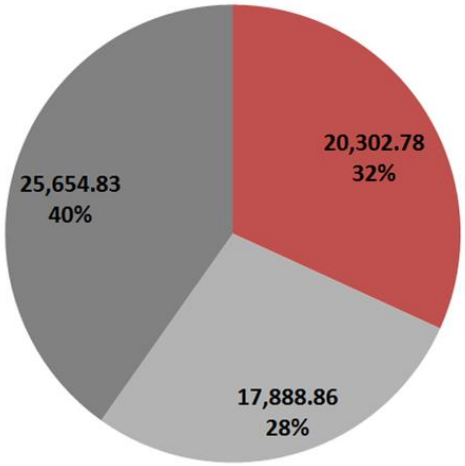
Houston Galveston Brazoria
NOx Emissions, Tons/Year



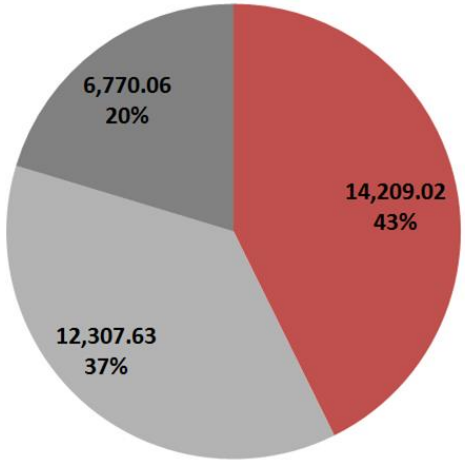
Dallas-Fort Worth
NOx Emissions, Tons/Year



San Antonio,
NOx Emissions, Tons/Year



Austin
NOx Emissions, Tons/Year

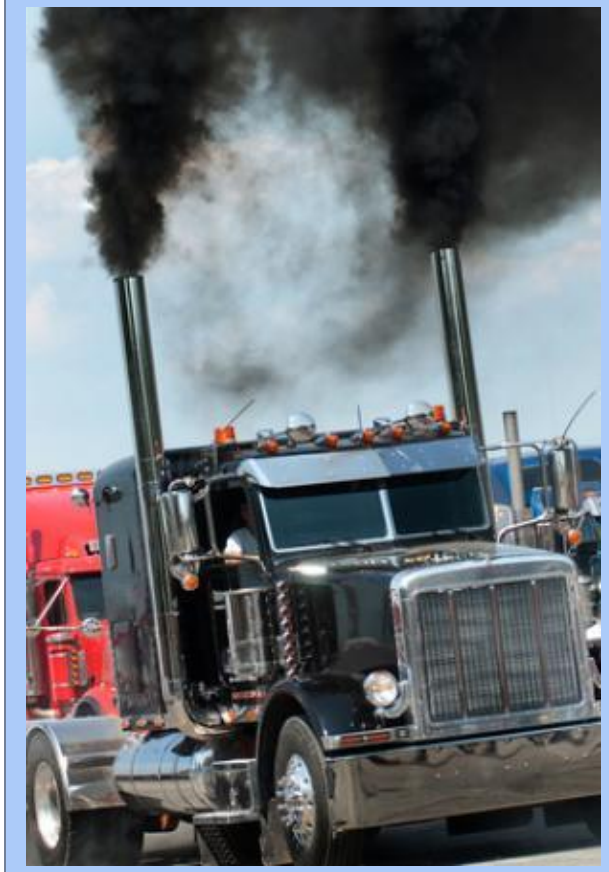


Mobile Source Diesel

Mobile Source,
Other Fuels

Stationary Sources

Dirty Diesel



"Trucks contribute a considerable share of pollutants to the regional atmosphere and emit

- 72 percent of the region's transportation-related NOx,
- 68 percent of the transportation-related PM2.5,
- 53 percent of the region's transportation related CO_2,
- 37 percent of the region's VOCs."

Diesel is a known human carcinogen

- Diesel concentrations are highest along port and rail yards where the oldest and dirtiest diesel trucks and freight handling vehicles operate.

Diesel Particle Emissions Are Deadly

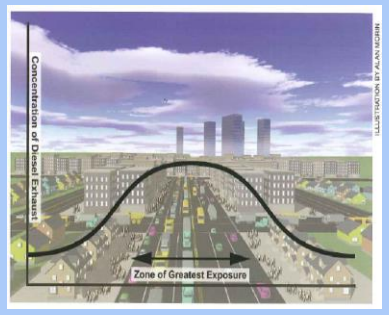
How does diesel effect health?

- Diesel particles create obstructions that clog lungs and pass through the bodies respiratory defenses to get into our blood stream. This strain on the lungs & heart damages the respiratory & cardiovascular systems

How does Diesel effect the climate?

- Dr. Hansen, at NASA, found that soot was twice as potent as carbon dioxide in changing global surface air temperature.

Where is it?



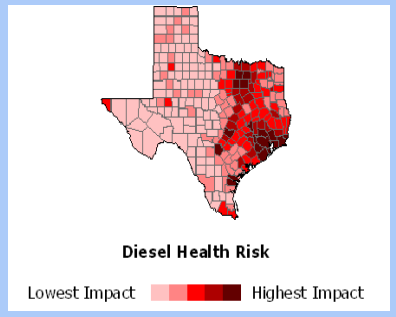
8,000 U.S. public schools are located within 500 feet of highways, truck routes and congested roads

People living & working near concentrated diesel emissions (busy roadways, downtown areas, schools, hospitals, truck stops and train yards) have the greatest exposure to diesel exhaust

What is it linked to:

- Premature death
- Cancer
- Asthma
- Breathing difficulty
- Sudden Infant Death Syndrome (SIDS)
- Chronic obstructive pulmonary disease
- Coughing
- Pneumonia
- Chronic bronchitis
- Stroke

Where does Texas Rank?



- **5th for diesel related deaths.**
- **1st in overall in diesel PM emissions.**

Passenger Buses

Each bus costs about $800,000, or $200,000 more than a normal diesel bus. Lifetime cost of operation, however, is estimated to be $400,000 less, based on fuel cost compared to electric power.

Table 1: Typical Emissions Impact per Bus Replacement – NOx lbs/yr

Repower or Replacement Equipment – School Bus					
Replacement Vehicle Year	New Diesel	CNG/LNG	Propane	All Electric	
				National Average grid mix	Texas' Cleaner Electric Grid
1992	-466	-477	-458	-464	-585
1995	-466	-477	-458	-464	-585
2000	-232	-243	-224	-230	-290
2005	-179	-189	-170	-177	-223
2008	-81	-91	-72	-79	-100
2010 +	-12	-22	-3	-10	-13

Heavy Duty Intra City Trucks

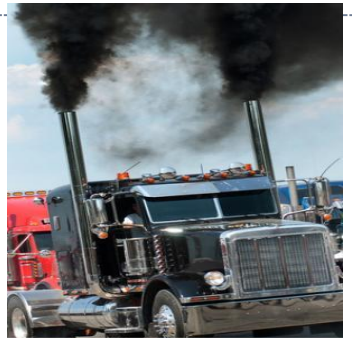


Table 2: Typical Emissions Impact of a Port Drayage Truck per Year – NOx lbs/yr

Replacement Vehicle Year	Port Drayage Truck	Repower or Replacement Equipment – Port Drayage Truck					
		New Diesel	CNG/LNG	Hybrid	Plug-In Hybrid	All Electric	
						(National Average grid mix	Texas' Cleaner Electric Grid
	Pre-1991	-1,282	-1,298	-1,298	-1,301	-1,326	-1,671
	1991-1993	-1,061	-1,077	-1077	-1,080	-1,105	-1,392
	1994-1997	-1,061	-1,077	-1,077	-1,080	-1,105	-1,392
	1998-2003	-840	-856	-856	-859	-884	-1,114
	2004-2006	-398	-413	-414	-417	-442	-557
	2007-2009	-221	-237	-237	-240	-265	-334
	2010 +		-15	-16	-19	-44	-55

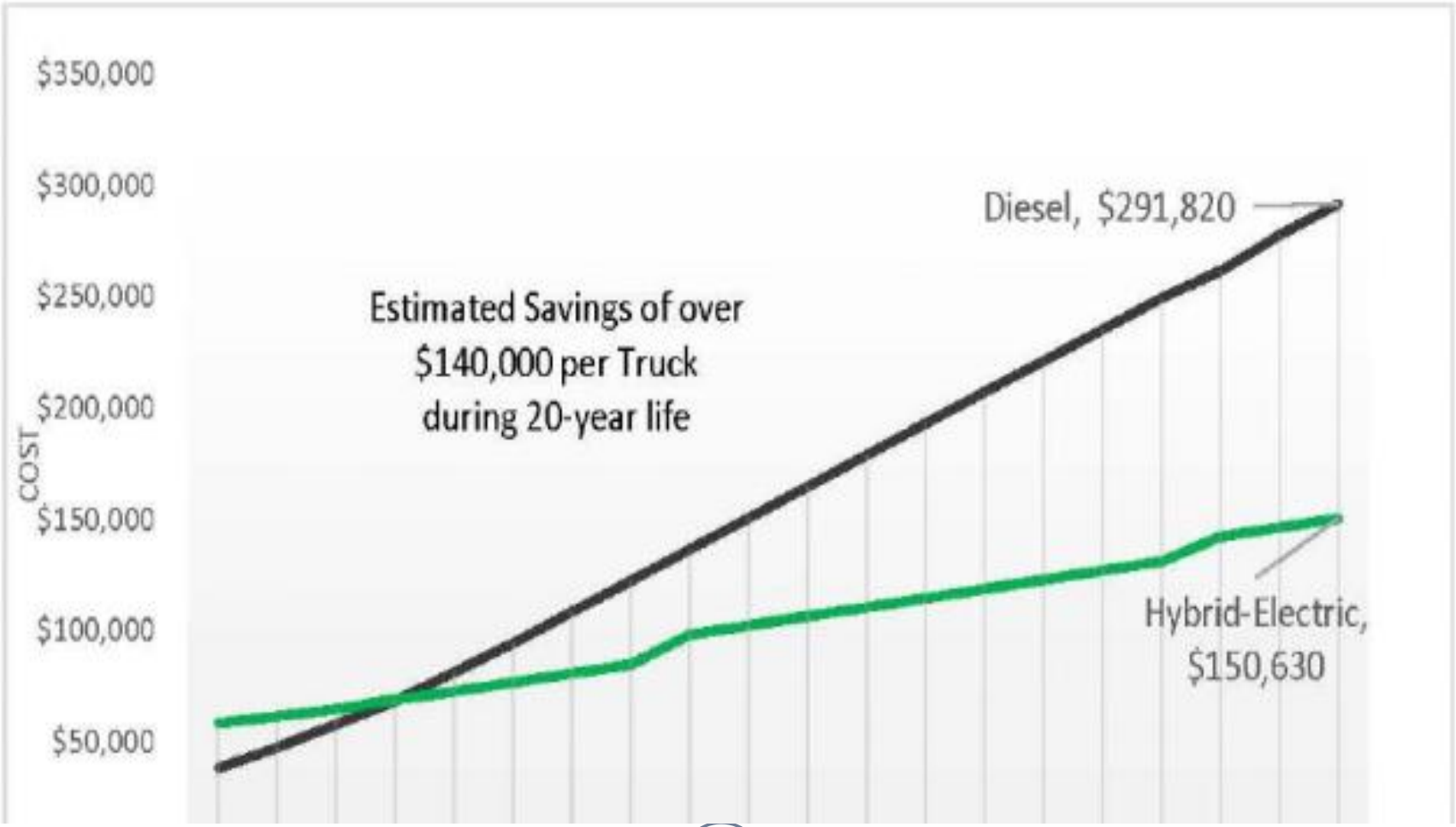
Delivery Van and Shuttle Buses

Table 3: Typical Emissions Impact per Step Truck Replacement – NOx lbs/yr
Location: San Antonio

Replacement Vehicle Year	Step Van					
		New Diesel	CNG/LNG	Propane	All Electric	
					(National Average grid mix)	Texas' Cleaner Grid
	1992	-462	-473	-479	-462	-582
	1995	-462	-473	-479	-462	-582
	2000	-255	-265	-272	-255	-321.
	2005	-190	-201	-207	-190	-239
	2008	-91	-101	-108	-91	-114
	2010 +	-14	-25	-31	-14	-18

Delivery Van and Shuttle Buses

Figure 13: Total Cost of Ownership: Hybrid-Electric Step Van vs. Diesel Step Van



NOx Emission Reductions Due to Electrification

Baseline Engine Tier	Terminal Tractor (200-hp) *Annual Hours = 1,261* NOx Reductions (tons/yr)	Crane (650-hp) *Annual Hours = 1,251* NOx Reductions (tons/yr)
Tier 0	1.42	3.48
Tier 1	1.05	2.47
Tier 2	0.71	1.63
Tier 3	0.43	1.02
Tier 4	0.05	0.11

Using communities' VW investments can create a market for new electric technologies and create local jobs

- Autonomous electric passenger shuttles

- Batteries
  - TESLA Giga factory

  - Expand demand for Houston made Toshiba vehicle batteries

- Create new autonomous freight shuttles being designed by Texas A & M

Together We Can:

- Realize a vision for a cleaner future
- Make big emissions reductions
- Set tough but attainable goals
- Set tougher 5 year goals
- Do bulk buys to reduce costs
- Lure new manufacturers
- Create jobs in Texas