Idle Reduction Strategies for the Heavy-Duty Sector

Congestion Mitigation and Air Quality Program

Knoxville Regional Transportation Planning Organization Experience

Congestion Mitigation and Air Quality (CMAQ)

The CMAQ program was established to fund transportation projects and programs in nonattainment and maintenance areas that reduce transportation related congestion and emissions.

CMAQ Project Eligibility

- Emission Reductions: Projects funded under the CMAQ Program must result in reductions of CO, ozone producing emission such as NOx and VOC, and Particulate Matter.

CMAQ Project Evaluation Criteria

The Knoxville Regional TPO evaluates applications for CMAQ funding based on the following:

- Is the project included in a plan?
- Does the project address congestion?
- Does the project address air quality and does it provide quantitative emissions reductions?
- Is the project included in the Early Action Compact?
- Is the project eligible under FHWA guidelines?

CMAQ Projects Funded by Knoxville TPO- 2004

Project	Air Quality Benefit	CMAQ Funds
1. Continuation of Smart Trips Program	99.8 kg/day NOx 136.1 kg/day VOC	$81,216
2. Purchase biodiesel fuel to operate in 60 buses for one year	241.2 kg/day NOx 3.6 kg/day VOC	$135,622
3. Free transit rides on Ozone Alert Days	4.99 kg/day NOx 6.49 kg/day VOC	$107,856
4. Fund activities for Regional Clean Air Coalition (RCAC)	217 kg/day NOx 222.6 kg/day VOC	$50,000
5. Purchase 500 monthly bus passes for 1 year to downtown employees	2.3 kg/day NOx 3.3 kg/day VOC	$160,000

CMAQ Projects Funded by Knoxville TPO- 2004

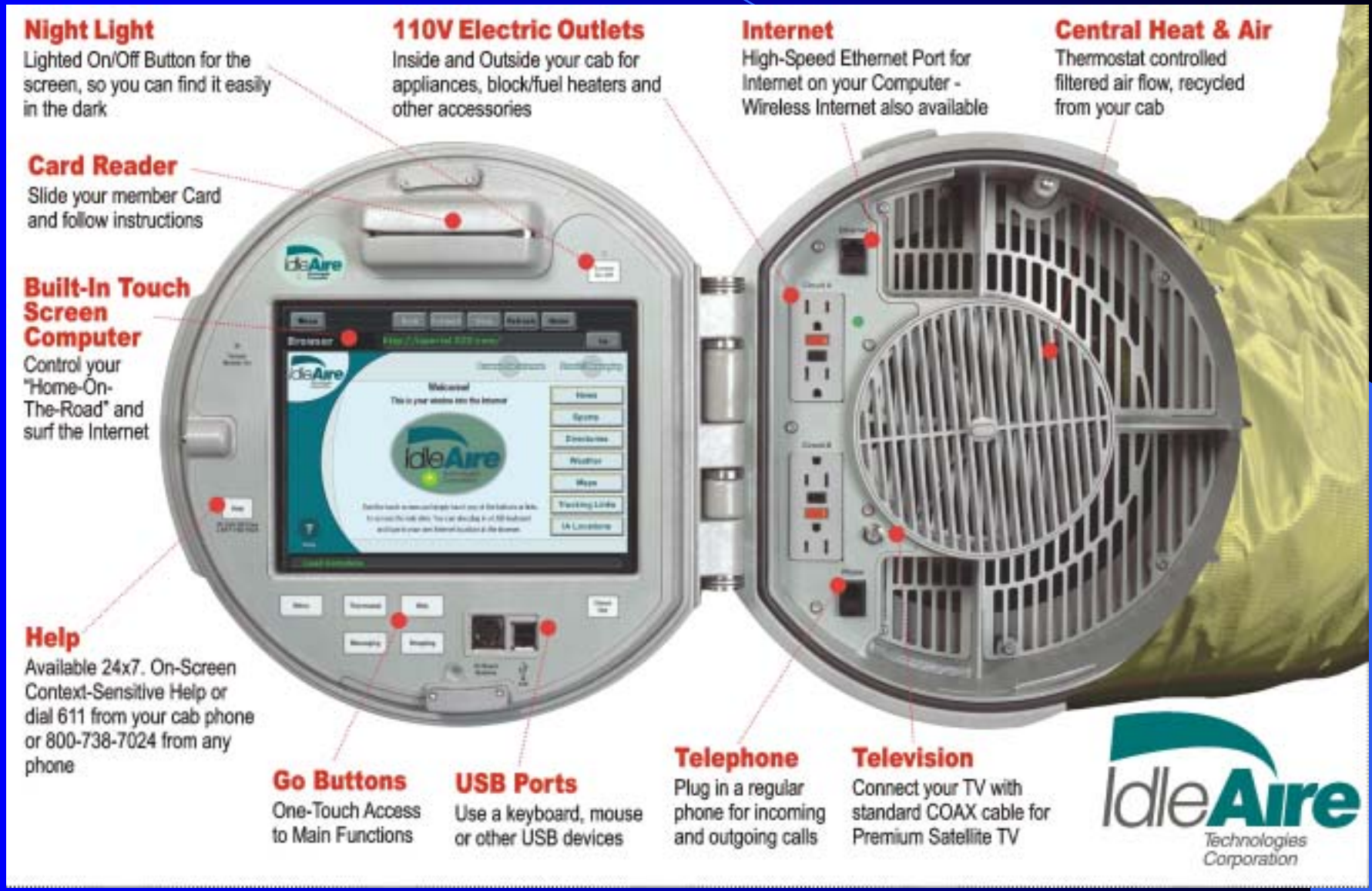
Project	Air Quality Benefit	CMAQ Funds
6. Advanced Travel Center Electrification (ATE)- IdleAire	90.4 kg/day NOx 8.0 kg/day VOC	$1,000,000
7. Traffic signal timing/coordination	1.5 kg/day NOx 2.6 kg/day VOC	$50,400
8. Purchase 15 commuter vans	2.7 kg/day NOx 3.8 kg/day VOC	$330,000
9. Purchase 4 propane powered vehicles for on-demand transportation	5.8 kg/day NOx 1.2 kg/day VOC	$192,000

CMAQ Projects Funded by Knoxville TPO- 2004

Project	Air Quality Benefit	CMAQ Funds
10. Construct an additional turn lane at intersection identified as congested in the CMS	0.9 kg/day NOx 3.9 kg/day VOC	$329,600
11. Fund activities for East Tennessee Clean Fuels Coalition	1.9 kg/day NOx	$60,000
12. Bearden Village Trip Reduction	< 2 kg/day NOx < 2 kg/day VOC	$400,000
13. Fund start up and activities of internet based traffic/ road construction management		$99,897

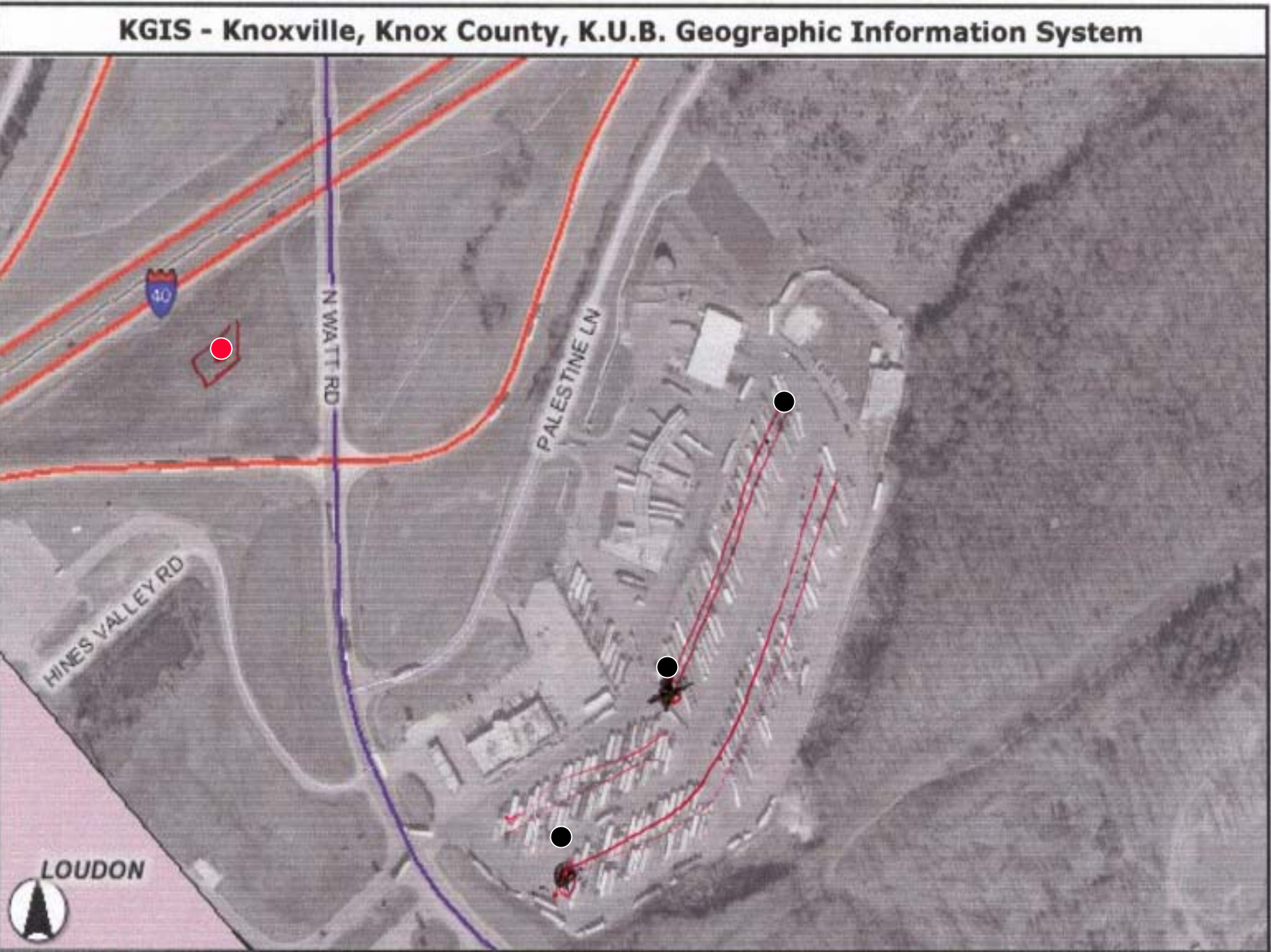

Since 2002 the Knoxville Regional TPO has funded $2 Million in Truck Stop Electrification
This will pay for the installation of 200 truck stop electrification units in Knox County

IdleAire Service Module




SCALES
EZZELL
EZZELL
NORTH
SOUTH


TRUCK WASH


KGIS - Knoxville, Knox County, K.U.B. Geographic Information System
40
N WATT RD
PALESTINE LN
HINES VALLEY RD
LOUDON

Fuel Consumed in Idling

Annual Impact

- 4.4 billion gallons (100+ million barrels)*
- $6.6 billion cost to truck owners ($1.50/gal)
- ~18% of America's Strategic Petroleum Reserves
- 3.2% of imported crude oil

* 1.0 gal/hour x 3,366 hours/ truck x 1,300,000 trucks

The Idling Situation

Idling Creates Emissions & Noise

Emission*	Single Truck (g/hr)	Single Truck (mtons/yr)**	100 Spaces 14.4 hrs/day (mtons/yr)	1.3 Million Trucks (mtons/yr)**
NOx	135.00	0.46	70.96	590,733
PM	3.68	0.012	1.94	16,103
VOC	6.84	0.023	3.59	29,930
CO	56.14	0.19	29.51	245,657
CO_2	10,397	34.99	5,464.66	45,495,193
	10,598.66	**35.68**	**5,570.66**	**46,377,616**

*US EPA & Mobile5/6 data

**Assume 3,366 hours/year idling

ATE Reduces Emissions

Layover Emissions—100 Parking Spaces

Emission*	Single Truck (g/hr)	100 Spaces 14.4 hrs/day (mtons/yr)	% Emissions Removed**
NOx	135.00	70.96	98.4%
PM	3.68	1.94	99.5%
VOC	6.84	3.59	99.7%
CO	56.14	29.51	99.7%
CO_2	10,397	5,464.66	88.7%
	10,598	**5,570.66**	**97.2%**

*US EPA & Mobile5/6 data

**Includes Electricity Production

ATE Reduces Fuel Use

Spaces	Fuel Saved (gallons) 1 year	Value ($1.50/gallon)
50	262,800	$394,200
100	525,600	$788,400
200	1,051,200	$1,576,800

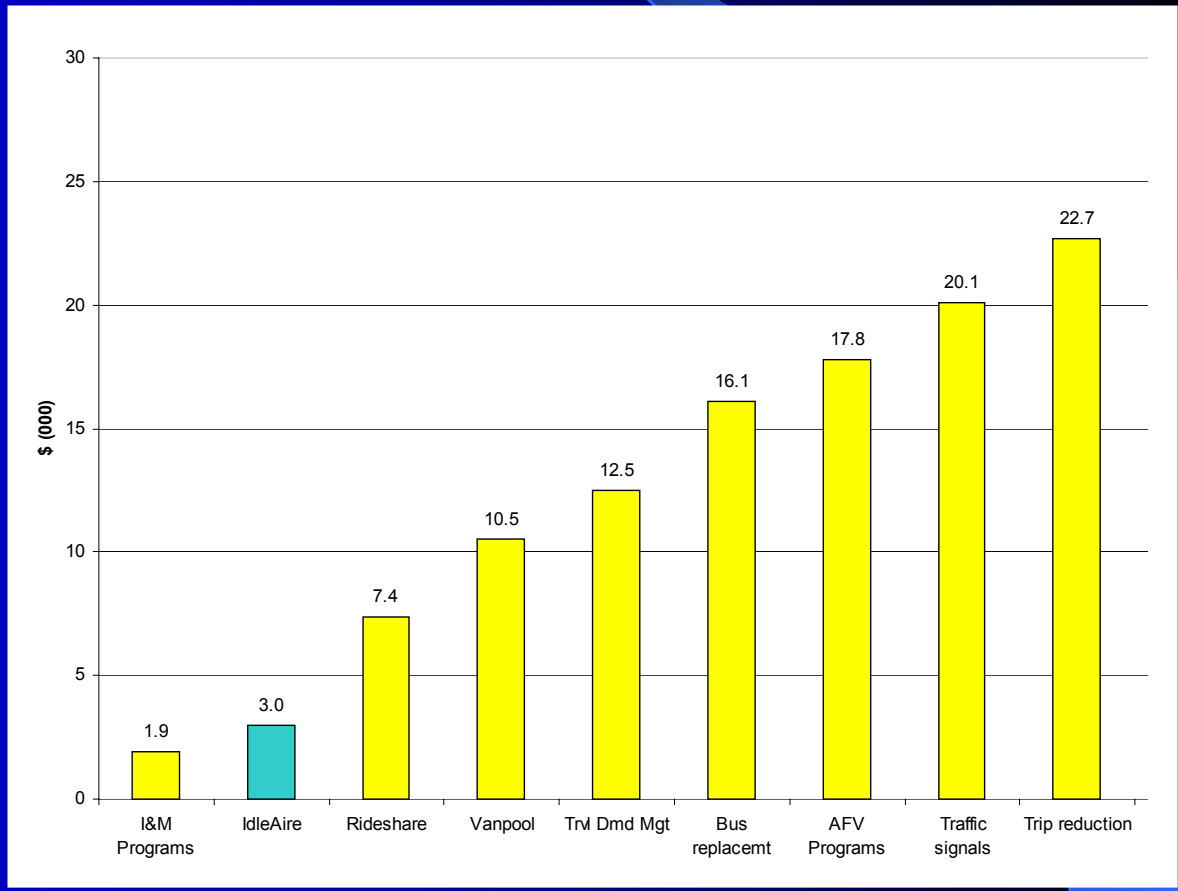
14.4 hours/day/space, 365 days per year

1 gallon fuel use per hour

Cost Effectiveness of ATE

- 5 Year NOx Rate is $4,851/ Metric Ton
- 15 Year NOx Rate is $3,010/ Metric Ton
- National CMAQ Median= $66,300

Cost-effectiveness per ton of NOx reduction of IdleAire versus the 9 best technology categories



Source: US Department of Transportation's CMAQ Program

ATE Economic Impact

A Win-Win Scenario

- Truck owners reduce operating costs ~ $3,200/yr/truck (fuel and maintenance costs)
- Travel centers gain new revenue source
- New employment (18 employees/ 100 spaces)
- Drivers rest better and are safer on road
- Reduced fuel use (less dependence on foreign oil)
- Significantly reduced emissions
- Neighborhoods quieter

IdleAire Emission Reductions

at Watt Road Petro Travel Center

Estimated emission reductions based on:

- **Hours of Use: 42,315.2**
- **Period of January 1 – March 31, 2004**
- **Mobile6 factors for idling trucks**

Emissions	Total Reduced in KG
CO	2,375.58
VOC	289.43
NOx	5,712.55
PM	108.75
CO_2	439,951.13

Evaluation of Emissions Reduction from Advanced Truck Stop Electrification

The TPO also funded an independent study to evaluate emissions reduction from this strategy

Main Objective

To evaluate the air quality benefits of installing the IdleAire Truck Stop Electrification technology at truck stops

Four Phases of the Research

- Determine idling emission rates of PM, NOx, CO and CO2 from heavy-duty diesel trucks (literature review and exhaust measurements)
- Measure ambient concentrations of PM & NOx at the Petro Truck Stop at I-40 & Watt Rd (hourly concentrations 24/7, 3-months)
- Measure ambient concentrations of EC/OC, aldehydes, and ultrafine particles (2 week intensives)
- Develop a computer model to predict air quality at truck stops with or without the IdleAire Technology

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