

**ALABAMA
PARTNERS
FOR
CLEAN AIR**

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**Alabama Partners for Clean Air (APCA)
Voluntary Air Quality Program**

**Annual Activity Report
October 1, 2021 – September 30, 2022**

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APCA Annual Report

October 1, 2021 – September 30, 2022

This document is posted at
<http://alabamacleanair.org>

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This report was prepared as a cooperative effort of the U.S. Department of Transportation (USDOT), Federal Highway Administration (FHWA), the Alabama Department of Transportation (ALDOT), Environmental Protection Agency (EPA), and the Regional Planning Commission of Greater Birmingham (RPCGB), as staff to the MPO, by the requirement of Title 42 USC 7401 et seq., Clean Air Act and 40 CFR Parts 51 and 93, Air Quality Conformity Rules and Regulations. The Contents of this report do not necessarily reflect the official views or policy of the USDOT.

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EXECUTIVE SUMMARY

This report comprises activities of the Alabama Partners for Clean Air (APCA) program from October 1, 2021 – to September 30, 2022. The 8-hour ozone standard (0.070 ppm) was effective on December 28, 2015. EPA designated Jefferson and Shelby Counties as attainment of the 8-hour standard and was effective January 16, 2018. The EPA also has the Birmingham area (Jefferson and Shelby Counties and a portion of Walker County) designated as attainment for the 2006 24-hour PM_{2.5} standard (35 µg/m³). Effective April 15, 2015, the EPA designated the Birmingham area as attainment of the 2013 annual PM_{2.5} standard (12 µg/m³). The Birmingham area is currently designated as attainment of all of EPA's National Ambient Air Quality Standards through calendar year 2021.

A combination of national and state regulatory programs to control emissions and voluntary actions taken by individual citizens and organizations will be required to maintain healthy air quality for the region. While EPA, the Alabama Department of Environmental Management (ADEM), and the Jefferson County Department of Health (JCDH) have the responsibility to establish regulatory programs to reduce air pollution in the Birmingham area, APCA takes the lead in implementing voluntary strategies to improve air quality. While regulatory programs focus on industrial emissions, the APCA program focuses on reducing mobile source emissions.

APCA's strategies include:

- A public awareness media advertising campaign, including survey research
- Technical assistance to forecasting agencies and support for the Birmingham Air Quality website
- Distribution of air quality materials at public events and local companies
- Efforts to get area employers and their employees to take part in pollution reduction activities
- Promoting Idle Free Zones at schools
- Science and environmental education outreach to schools
- Alternative fuels program
- Voluntary emissions testing and car care program

The media outreach included interviews on local radio and television stations and a media buy on local television stations, print, and digital platforms. Media efforts continued to bring awareness to air quality alert days and actions the public could take on air quality alert days.

Expenditures during these 12 months were **\$367,886**. Documented emissions reductions attributable to the APCA program were 62.61 pounds per day of hydrocarbons, 54.22 pounds per day of nitrogen oxides, and 2.75 pounds per day of PM_{2.5}.

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SECTION 1

AIR QUALITY INFORMATION

MONITORING DATA

Air Quality Reports were sent out to members of APCA monthly. These reports include daily AQI information for all monitored criteria air pollutants in the Birmingham area, a listing of alerts that were issued, and daily meteorological data. It should be noted that information in these monthly reports was preliminary and was not put through QA/QC procedures.

Below is detailed ozone and fine particulate matter monitoring data that is used to determine compliance with the Environmental Protection Agency's (EPA) National Ambient Air Quality Standards. Air monitoring data shown in this report is only through 2021. This is because air monitoring data is on a calendar year basis (i.e., January 1, 2021 – December 31, 2021) and this report is based on a fiscal year basis (i.e., October 1, 2021 – September 30, 2022).

OZONE STANDARD

Effective December 28, 2015, EPA lowered the 8-hour ozone standard to 70 parts per billion (ppb). Compliance with the 8-hour standard at each site is determined by a design value that is an average of the 4th highest daily 8-hour ozone value at each site over a 3-year period. The most recent 3-year monitoring period was 2019-2021. The ozone monitoring network consists of 6 monitors in Jefferson County and 1 monitor in Shelby County. The table below displays the design values for ozone at each monitoring site throughout the Birmingham area. For the monitoring period of 2019-2021, no monitors violated the standard.

TABLE 1

8-Hour Ozone Design Values (2019-2021)	
Monitor	Design Value (ppb)
Corner	60
Fairfield	66
Helena	63
Leeds	62*
McAdory	65
North Birmingham	65
Tarrant	62

*Due to not meeting data completeness criteria, the design value is not valid

FINE PARTICULATE MATTER (PM_{2.5})

Effective March 18, 2013, the EPA lowered the annual PM_{2.5} standard to 12 µg/m³. A 3-year average of annual means is compared to the annual standard to determine compliance. The 24-hour PM_{2.5} standard is a 3-year average concentration, based on the 98th percentile for each year, and is set at 35 µg/m³. The most recent 3-year monitoring period was 2019-2021. The fine particulate matter (PM_{2.5}) monitoring network consists of 5 monitors throughout Jefferson County. The tables below display the annual and 24-hour design values for PM_{2.5} at each monitor throughout Jefferson County. There were no violations of the annual and 24-hour PM_{2.5} standards for 2019-2021.

TABLE 2

Annual PM_{2.5} Design Values (2019-2021)	
Monitor	Design Value (µg/m³)
Arkadelphia	9.6
Leeds	8.2
McAdory	8.4
North Birmingham	10.1
Wylam	8.5

TABLE 3

24-Hour PM_{2.5} Design Values (2019-2021)	
Monitor	Design Value (µg/m³)
Arkadelphia	22
Leeds	16
McAdory	17
North Birmingham	21
Wylam	18

AIR QUALITY EXCEEDANCES

Below are tables showing the exceedances of the 8-hour ozone standard from 2011 through 2020 and exceedances of the 24-hour PM_{2.5} standard from 2011 through 2019. The EPA lowered the 8-hour ozone standard in 2015, so there was a lower threshold to violate the standard. The 2 exceedances of the 24-hour PM_{2.5} standard in 2020 were due to the influence of Saharan dust.

TABLE 4
Exceedances of the 8-Hour Ozone Standard for 2012-2021

Station	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Corner	1	1	0	0	1	0	0	1	0	0
Fairfield	5	0	0	2	2	0	1	7	0	0
Helena	4	0	1	2	4	0	1	3	0	0
Hoover	3	0	0	2	2	0				
Leeds	4	0	0	0	1	0	1	1	0	0
McAdory	4	0	0	0	2	0	1	5	0	0
N. Birmingham	6	0	0	4	3	1	2	4	0	1
Pinson	3									
Providence	2									
Tarrant	6	1	0	4	3	1	3	2	1	0
Total	38	2	1	14	18	2	9	23	1	1

TABLE 5
Exceedances of the 24-Hour Fine Particulate Matter (PM_{2.5}) Standard
for 2012-2021

Station	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Arkadelphia			0	0	0	0	0	0	1	0
Leeds	0	0	0	0	0	0	0	0	0	0
McAdory	0	0		0	0	0	0	0	0	0
N. Birmingham	0	0	0	0	0	0	0	0	1	0
Wylam	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	2	0

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SECTION 2

SUMMARY OF AIR QUALITY FORECASTS AND MONITORED DATA

“Air Quality Alerts” are forecast one to two days before the date of the alert. JCDH provides PM_{2.5} forecasts year-round and the Alabama Department of Environmental Management provides O₃ forecasts during the warm season (approximately mid-April to mid-October) every year. For the period of October 2021 – September 2022, no air quality alerts were issued for either fine particulate matter (PM_{2.5}) or ozone (O₃).

On Air Quality Alert Days, the Regional Planning Commission of Greater Birmingham (RPCGB) staff contacted Birmingham-area media (local television and radio stations and AL.com) to ensure the message was disseminated to the public. The staff used a combination of emails, faxes, and follow-up telephone calls to ensure the media was informed. The RPCGB also contacted the Alabama Department of Transportation to get the alert information on the highway message boards.

Individuals and organizations receive air quality forecasts directly from the U.S. Environmental Protection Agency (USEPA) through an email system called EnviroFlash. Subscribers define whether they want to receive the forecast every day or only when the forecast is above a certain level on the Air Quality Index (AQI), which follows.

FIGURE 1
AQI Guide

AQI Values	Levels of Health Concern	Colors
<i>When the AQI is in this range:</i>	<i>...air quality conditions are:</i>	<i>...as symbolized by this color:</i>
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

Contracts

As part of the larger Memorandum of Agreement between the RPC and JCDH for FY2022 (October 2021 – September 2022), JCDH had two subcontracts as a participating partner of

APCA. The Environmental Monitoring for Public Access and Community Tracking (EMPACT) website, which was re-launched in FY2014 as the “Birmingham Air Quality” website, is maintained by the University of Alabama in Huntsville (UAH). The website provides JCDH, the Alabama Department of Environmental Management (ADEM), and the public with near real-time air quality monitoring data for the Birmingham area. Baron Advanced Meteorological Systems (BAMS) provides air quality forecast model data to JCDH and ADEM. Outreach materials were also a part of the FY2022 budget. The details of JCDH’s budget are shown in the table below.

TABLE 6
JCDH FY2022 Budget

	OCT 2021 – SEP 2022
Birmingham Air Quality Website Maintenance by UAH	\$18,200
BAMS Subscription Meteorological Service	\$48,000
Outreach Giveaways	\$5,800
Total	\$72,000

SECTION 3

PROGRAM BUDGET SUMMARY

The APCA Voluntary Air Quality Program is funded primarily with federal Congestion Mitigation-Air Quality (CMAQ) dollars. Federal funds can pay for up to 80 percent of the program expenditures; the remaining 20 percent must be covered with local matching monies.

The Jefferson County Department of Health is a continuing funding partner. The contract partners, which include Alabama Clean Fuels Coalition, Advanced Consulting, LLC., and The Johnson Management Group, provide the 20 percent match for their respective programs.

TABLE 7
Air Quality Program Budget Summary for October 2021 – September 2022

Program Area	Total Budget	Amount Invoiced (Includes match \$)
Promotional Items / Print Material-RPC*	\$30,000	\$561.72
Media Buy-RPC**	\$41,250	\$40,515.00
Employer/Employee Outreach- Advanced Consulting	\$50,000	\$49,644.08
Idle Free Zones / School Education - Johnson Group	\$71,250	\$56,202.88
Idle Free Zones / School Education – UWCA	\$0	\$0
Clean Cities/Alternative Fuels and Diesel Retrofits- ACFC	\$260,000	\$18,363.45
EMPACT/Forecasts- JCDH	\$72,000	\$63,932.39
Emissions Testing- ACFC	\$110,580	\$5,229.10
Vehicle Repair- ACFC	\$80,000	\$2,296.73
Program Administration- RPC***	\$150,000	\$131,140.86
Contingency-RPC	\$10,000	
Total	\$875,080	\$367,886.21

*Promo/print materials, website, sponsorships, etc.

** Creative Directions & Media Buy

*** All staff time and Public Relations

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SECTION 4

MARKETING/PUBLIC OUTREACH

The Alabama Partners for Clean Air 2022 marketing outreach continued to teach individuals in our community how small changes can impact our air quality. This campaign delivered over 8 million impressions and included \$22,550.00 in added-value media.

The Alabama Partners for Clean Air each year utilizes Air Quality Awareness Week to keep air quality issues in mind. Jefferson County Department of Health Meteorologist Matt Lacke, the Alabama Partners for Clean Air spokesperson, was interviewed throughout the week on local media outlets. In addition to Mr. Lacke, other partners were interviewed on WBRC-TV's Good Day Alabama, including Ms. Jeniese Hosey with CommuteSmart and Mr. Michael Staley with the Alabama Clean Fuels Coalition. The interviews aimed to promote Air Quality Awareness and educate the public about ways they can help make a difference.

AIR QUALITY AWARENESS WEEK May 2-8, 2022

Air Quality Awareness Week kicked off with an interview on Talk of Alabama, a local community-oriented show that airs 9 am -10 am on WBMA-TV, ABC33/40. The interview aired on May 4th and reached 17,000 viewers. Here is a link to the segment: [Talk of Alabama | National Air Quality Awareness Week - AL Partners for Clean Air | 5.4 | WBMA \(abc3340.com\)](#)

On Tuesday, May 3rd, Matt Lacke was interviewed by Will Lochamy on Birmingham Mountain Radio's morning program, The Morning Blend. This local radio station has a high concentration of "environmentally friendly" listeners, a very targeted audience for the air quality awareness message. This interview reached 700 listeners. Matt Lacke was also interviewed on CBS42's Midday News on May 4th to talk about Air Quality Awareness Week. This program delivered 21,000 viewers.

On Friday, May 6th, morning reporter Jeh Jeh Pruitt featured the Alabama Partners for Clean Air live during Good Day Alabama from 7 am – 10 am. During this daily local news segment, Jeh Jeh Pruitt covers local events and issues in the community. A total of four interviews aired on May 6th, with an average of 4 minutes per segment. These segments included Matt Lacke, Jefferson County Department of Health, discussing Air Quality Awareness Week and providing viewers with valuable tips on making a difference. Michael Staley with the Alabama Clean Fuels Coalition talked about Electric Vehicles and had an EV onsite. The owner of the Electric Vehicle also spoke on camera and talked about the benefits of driving an EV. Jeniese Hosey, the Outreach Coordinator for CommuteSmart, was also interviewed and informed viewers about the CommuteSmart program and Bike to Work Day. All the partners helped promote ways to improve air quality in our community. The value of the interviews is based on the average cost of a 30-second message during that time period. The interview segments on Good Day Alabama delivered a total of 204,835 impressions.

TABLE 8
AIR QUALITY AWARENESS WEEK IMPRESSIONS May 2-8, 2022

Date	Station	Program	Interviewed	Impressions	Value
5/3/2022	BMR	Morning Blend	Matt Lacke	700	\$ 500.00
5/4/2022	ABC33340	Talk of Alabama	Matt Lacke	8,600	\$ 800.00
5/4/2022	CBS42	Midday News	Matt Lacke	21,000	\$ 800.00
5/6/2022	FOX6	Good Day Alabama	Jeniese, Matt & Michael	54,073	\$ 1,500.00
5/6/2022	FOX6	Good Day Alabama	Matt Lacke	53,600	\$ 1,500.00
5/6/2022	FOX6	Good Day Alabama	Jeniese Hosey	53,600	\$ 1,500.00
5/6/2022	FOX6	Good Day Alabama	Michael Staley	43,562	\$ 1,500.00
TOTAL				235,135	\$ 8,100.00

Media Campaign

The marketing outreach campaign continued with a media campaign that launched on July 11th and continued through August 15, 2022. This time period was selected because it falls in the peak season for Air Quality season. The campaign featured television, print and digital media.

The television messages featured the theme, “Everyone Can Help!”. Two :15 second commercials were produced to provide additional frequency for the messages. These messages provided simple things that everyone can do to help keep the air clean. The design was also used in print and digital ads that combined the bright blue and yellow colors to make the ads stand out. The same message and ad design were used across all media platforms.

WBRC-TV provided the following:

- 110 commercials aired in Good Day Alabama, Evening News, Late News, Late Fringe, and Weekend
- WBRC-TV delivered 4,340,600 impressions with a 91.2 reach and a 3.3 frequency
- 100 commercials aired on BOUNCE at a reduced rate of \$5.00 each (value of \$15.00 each) estimated delivery of 40,000 impressions (Value of \$1,000.00)
- Air Quality Update in late news throughout the campaign (Value of \$5,250.00)
- Good Day Alabama live interview segments (Value of \$6,000.00) and delivered 204,835 impressions
- Total number of impressions delivered = 4,545,543
- Total added value = \$12,250.00

WIAT-TV CBS42

- 221 commercials aired in Early Morning News, Midday News, Evening News, Late News, Weekend News and Prime Time

- 53 commercials aired at no charge (Value of \$5,300.00)
- Total impressions delivered = 1,748,500
- Interview on CBS42 Midday News (Value of \$800.00)
- Commercials aired in the 2022 World Games Specials
- Total added value = \$6,100.00

WBMA-TV ABC33/40

- 47 commercials aired on WBMA-TV in various dayparts including Early Morning, Daytime, Primetime, Late Fringe and Weekend programming.
- 6 commercials aired at no charge (Value of \$600.00)
- Total impressions delivered= 1,151,000
- 42 commercials aired on WABM-TV
- 10 commercials aired at no charge (Value of \$500.00)
- Total impressions delivered = 398,600
- Total impressions on WBMA-TV and WABM-TV = 1,549,600
- Interview on Talk of Alabama (Value of \$800.00)
- Total added value = \$1,900.00

DIGITAL:

The website alabamacleanair.org provides information and helpful tips for consumers to help find ways to keep the air clean. Throughout the campaign the website was promoted through television messages, media interviews and on the pledge cards.

FIGURE 2
Alabama Partners for Clean Air Website



PRINT AND DIGITAL:

The Birmingham Times Media Group, Inc. The Birmingham Times is a weekly newspaper that is distributed throughout Jefferson County on a weekly basis with a focus on the African American community. A total of 4 quarter page full colors ads ran on 7/14, 7/21, 7/28 and 8/4. In addition to the discounted rate for the ads, BT Group featured digital ads each week on www.birminghamtimes.com.

Total Added Value = \$800.00

DIGITAL:

Starnes Media produces and distributes publications in local communities throughout Jefferson and Shelby Counties including Hoover, Homewood, 280 Corridor, Vestavia, and downtown Birmingham. In addition to print, Starnes sends out a daily email blast to each of these targeted areas. Digital ads were featured throughout the campaign featuring Air Quality Awareness Tips through daily email blasts targeting these specific communities. The ads are designed to match the font and look of the television messages. A total of 4 ads ran throughout the campaign that provided clean air tips. APCA was given the non-profit rate which is 50% of rate card for a value of \$1,000.00.

Total Opens/Views = 121,439 Total Clicks = 666

Total added value - \$1,000.00

TABLE 9
Starnes Digital Impressions

Publication	Opens/Views	Click throughs
280 Living	16,679	89
Hoover Sun	44,697	113
Homewood Star	15,951	46
Vestavia Voice	14,598	192
Village Living	29,514	226
	121,439	666

TABLE 10
Marketing Campaign Overview

STATION	Total # of ads	Impressions	Added Value
WBRC	110	4,545,543	\$12,250.00
BOUNCE	100	40,000	
WIAT-TV	221	1,748,500	\$6,100.00
WBMA-TV	47	1,115,100	\$1,900.00
WABM-TV	42	398,600	
TOTAL # TV ads	520		
BMR	Interview	700	\$500.00
Digital/Print			
The Birmingham Times	4 ¼ page ads & online	80,000	\$800.00
Starnes Publishing	100 digital ads	121,439	\$1,000.00
TOTAL		8,049,882	\$22,550.00

SECTION 5

EMPLOYER/EMPLOYEE OUTREACH

Advanced Consulting, LLC., working with the APCA on business and community outreach, developed programs to expand education on air quality issues in Jefferson and Shelby Counties. This synopsis breaks down many avenues of outreach and information received from corporations, cities, and other groups.

From October 2021 to September 2022, Advanced Consulting continued to work on keeping and building relationships with current corporations. They also worked on getting the message out to the community through community events and programs.

Advanced Consulting spoke to and attended 93 community events. Advanced Consulting also had 6,037 pledge cards signed

Community Events

<u>DATE</u>	<u>EVENT</u>	<u>ATTENDEES</u>	<u>PLEDGE CARDS</u>
<i>October 2021</i>			
Oct 2	Oktoberfest/ Leeds	700	86
Oct 2	Whistle Stop	700	113
Oct 3	Pepper Place Pop Up	200	46
Oct 8	Bessemer Food Connection	100	43
Oct 9	Shelby Iron Works Festival	500	61
Oct 9	Trussville Farmer's Market	200	38
Oct 16	Off the Beaten Path Pop Up	200	54
Oct 16	Zion Star Health Fair	200	51
Oct 17	Pepper Place Pop Up	200	48
Oct 19	Center Point Night Out	300	51
Oct 23	Montevallo Art Stalk	500	118
Oct 24	Barking at the Moon Festival	500	84

DATE	EVENT	ATTENDEES	PLEDGE CARDS
Oct 29	Hoover Hay Day	500	64
<i>November 2021</i>			
Nov 6	Bark in the Park	300	72
Nov 7	Moss Rock Festival	750	88
Nov 13	Gopher Hole/ Hueytown	300	74
Nov 13	Harpersville Day	700	91
Nov 16	Shelby County National Night Out	400	101
Nov 20	Heavenly Handmade Trussville	200	61
Nov 21	Rocky Ridge Market	200	68
<i>December 2021</i>			
Dec 4	Winter Festival/AL 4H Center	400	73
Dec 5	Craig's Pop Up at Back Forty	200	77
Dec 11	Cahabazaar Christmas Fest	500	102
Dec 12	Woodlawn Street Festival	300	82
Dec 18	Trussville Christmas Farmer's Market	200	64
Dec 18	Calera Christmas Bazaar	300	49
<i>January 2022</i>			
No Events in January.			
<i>February 2022</i>			
Feb 7	Hoopersville Senior Citizen Party	100	33
Feb 16	Senior Health Fair Fountain Heights	100	61

DATE	EVENT	ATTENDEES	PLEDGE CARDS
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March 2022

March 12	March Madness/ Calera	200	33
March 12	Hammerfest/ Pepper Place	500	84
March 15	Edgewater Fitness & Health Fair	200	56
March 20	Paws in the Park/ Pelham	200	48
March 26	Calera Spring Pop UP	300	77

April 2022

April 1	Warrior Regional Library Arts Council Spring Show	150	53
April 2	Warrior Regional Library Arts Council Spring Show	200	72
April 2	Be Well Shelby	200	41
April 9	Helena Spring Festival	200	47
April 9	Bessemer Train Station	300	83
April 16	Pepper Place FM	600	98
April 16	Lakeview Market	300	92
April 21	Earth Day Montevallo University	300	47
April 23	Strawberry Festival	300	69
April 23	Earth Day Botanical Gardens	400	102
April 26	Free Will Health Fair/Midfield	100	51
April 30	Hoover Day	900	86

May 2022

May 7	Cahaba Brewery Mother's Day Event.	500	112
May 10	Alwin Health Fair	100	29

DATE	EVENT	ATTENDEES	PLEDGE CARDS
May 14	Creekbank Festival Leeds	300	53
May 19	Glenwood Farmer's Market	100	42
May 20	Pinson Farmer's Market	200	43
May 21	Off The Beaten Path Pop Up	200	61
May 22	Pop Up on the Green/Railroad Park	200	48
<i>June 2022</i>			
June 2	Titusville Library Com Awareness Day	200	52
June 4	Lee Branch	200	51
June 5	Vulcan Birthday Bash	500	172
June 7	West Homewood	200	44
June 8	Shelby County Senior Picnic	200	60
June 11	East Lake Farmer Market	200	38
June 11	Eastlake Fishing Rodeo	500	104
June 12	Lake Wilborn	200	32
June 15	World Elder Abuse Awareness	200	70
June 17	Ross Bridge	200	38
June 18	Montevallo Art Festival	500	103
June 23	I Love America Night	500	101
<i>July 2022</i>			
July 6	Titusville Senior Resource Fair	200	68
July 10	Lake Wilbon Farmer's Market	200	46
July 12	West Homewood	200	43

DATE	EVENT	ATTENDEES	PLEDGE CARDS
July 15	Ross Bridge Market	300	67
July 16	Trussville Farmer's Market	200	62
July 23	Bessemer Farmer's Market	200	81
July 25	Montevallo Farmer's Market	200	39
July 30	Fairfield Health Fair	200	79
July 30	Lee Branch	200	73
<i>August 2022</i>			
August 2	Titusville Back to School	200	40
August 2	West Homewood	200	58
August 6	Vestavia City Center Pop Up	200	61
August 13	Columbiana Farmer's Market	200	39
August 14	Lake Wilborn Market	100	51
August 15	Montevallo Farmer's Market	100	29
August 27	Fountain Heights Health Fair	100	82
August 31	Bham Health & Wellness Expo	200	62
<i>September 2022</i>			
Sept 3	Bessemer Farmer's Market	200	54
Sept 7	Titusville Senior Expo	100	21
Sept 8	Titusville Community Resource	100	38
Sept 9	Jefferson County Senior Expo	200	111
Sept 10	Paw Palooza	300	78
Sept 10	Alabaster Health Fair	200	60

DATE	EVENT	ATTENDEES	PLEDGE CARDS
Sept 17	Pepper Place	500	97
Sept 17	East Lake Farmer's Market	200	39
Sept 23	Pinson Farmer's Market	200	38
Sept 23	TSAC Shred Learn Wellness Fair	200	59
Sept 24	Lee Branch Farmer's Market	200	49
Sept 29	Complete Health Fair Comm Fair	200	68

SECTION 6

SCIENCE AND ENVIRONMENTAL EDUCATION OUTREACH

The Johnson Management Group (JMG) works with Alabama Partners for Clean Air on science and environmental education outreach in Jefferson and Shelby County school districts.

JMG conducted 55 audits between Fall 2021 and Fall 2022. The following schools were included: Cornerstone, Parkway Christian, EPIC, Smith, Central Park, WJ Christian, Glen Iris, Washington, Gunn Christian, Tarrant Elementary, Hueytown Middle, South Hampton, Avondale, Oxmoor Valley, Fultondale, Midfield, Hayes, Jones Valley, Norwood, Wenonah, Inglenook, Robinson, Glen Oaks, Jackson-Olin, Green Acres, Parker, Tuggle, CF Hard, Cornerstone High, Gresham, i3 Academy, Pinson Valley, Ramsay, Center Point Elementary, Center Point High School, Midfield, Bryant, Bumpus, Berry, Dupuy, EPIC, Oliver, Deer Valley, Holy Family, Rudd, Parker, and Hoover Christian. The audits yielded 4,446 pieces of APCA literature being handed out and a total of 1,224 cars shutting off because of the message of turn the key and be idle free.

The following graphs summarize the vehicle audits for Birmingham City Schools. For the period October 2021 through December 2021, (Figure 3 and Figure 4) reflect that JMG conducted 11 audits. Total outreach was 947 with 268 parents in compliance at 11 schools.

FIGURE 3
JMG Vehical Audits and Compliance October 2021 – December 2021

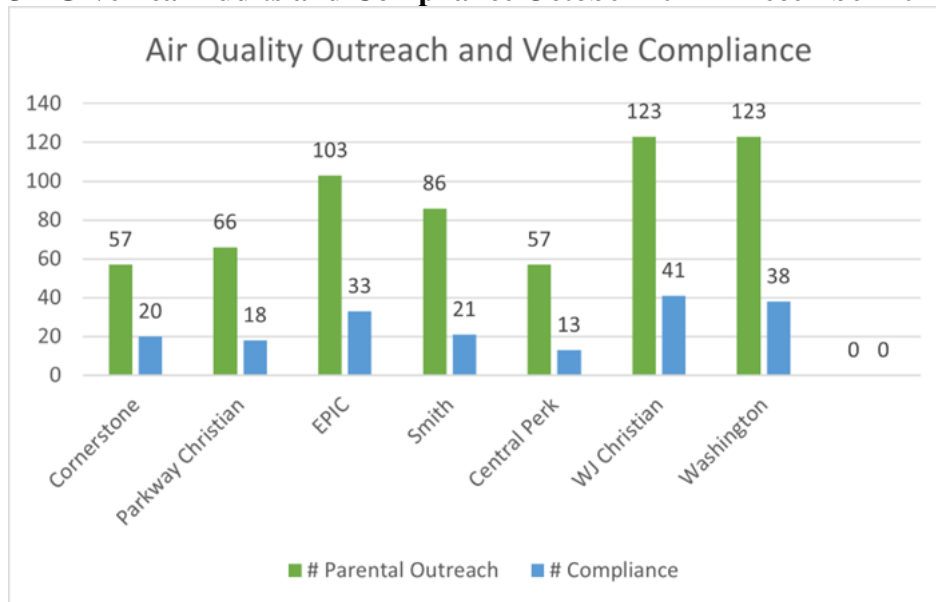
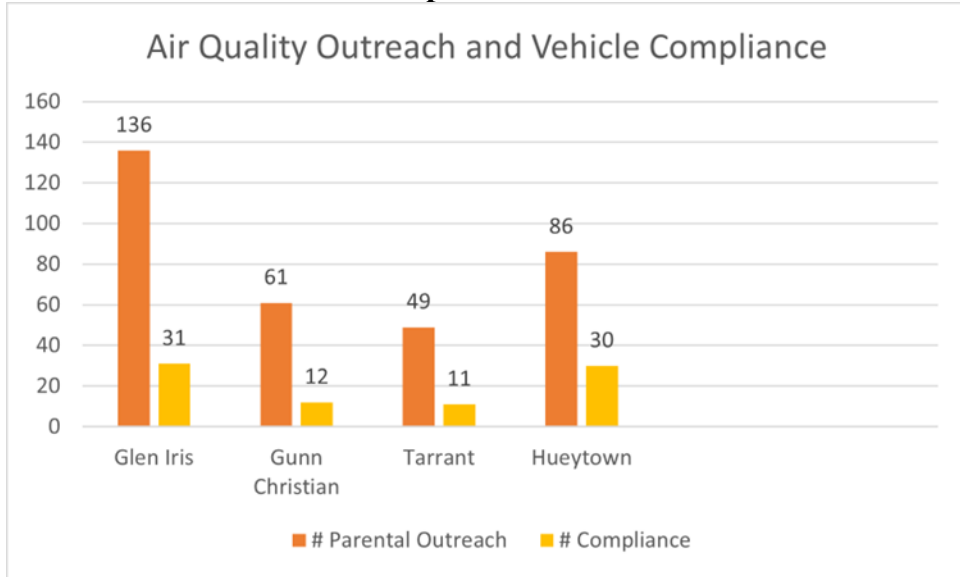


FIGURE 4
JMG Vehical Audits and Compliance October 2021 – December 2021



The following graphs summarize the vehicle audits for Birmingham City Schools (see Figure 5 through Figure 10). For the period January 2022 through June 2022, and September 2022. JMG conducted 44 audits. Total outreach was 3,138 with 890 parents in compliance at 44 schools.

FIGURE 5
JMG Vehicle Audits and Compliance January 2022

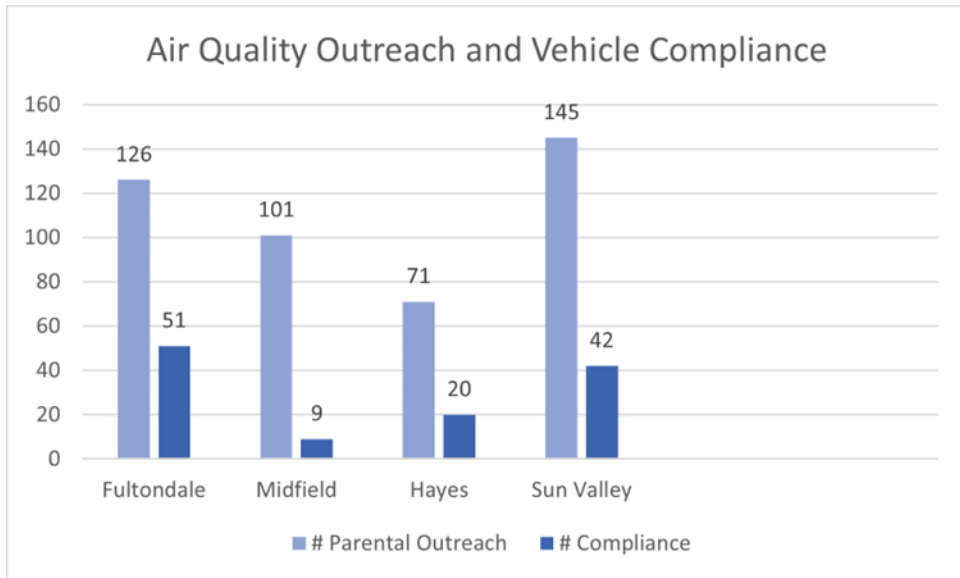


FIGURE 6
JMG Vehicle Audits and Compliance February 2022

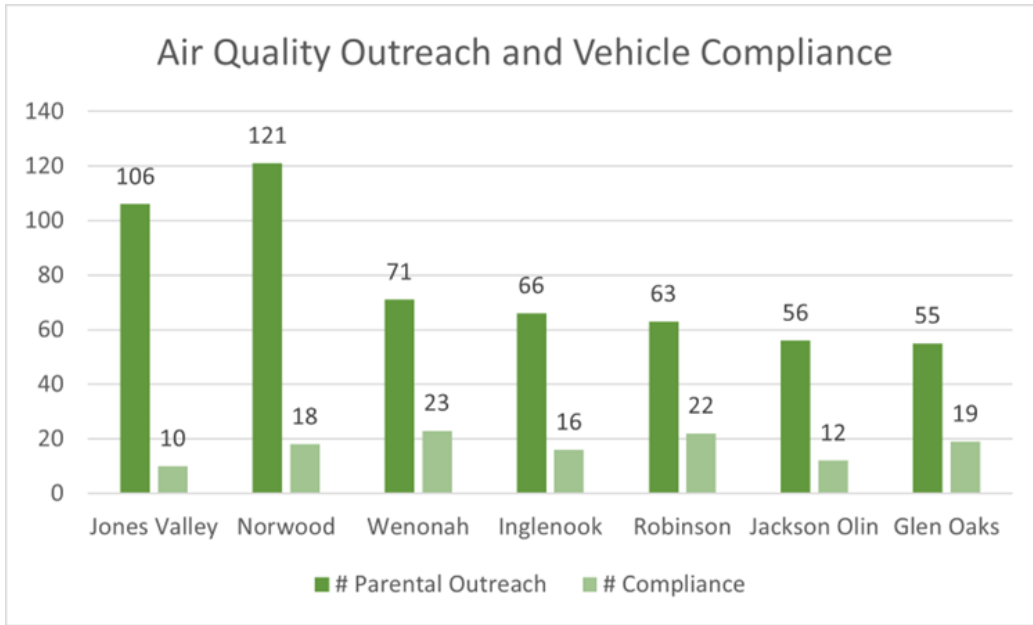


FIGURE 7
JMG Vehicle Audits and Compliance March 2022

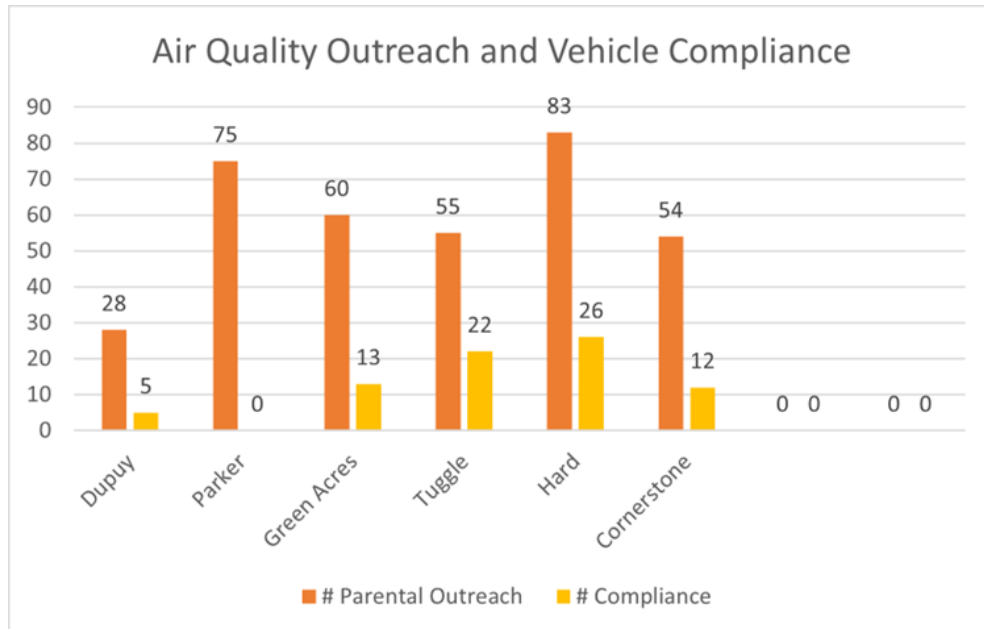


FIGURE 8
JMG Vehicle Audits and Compliance April 2022

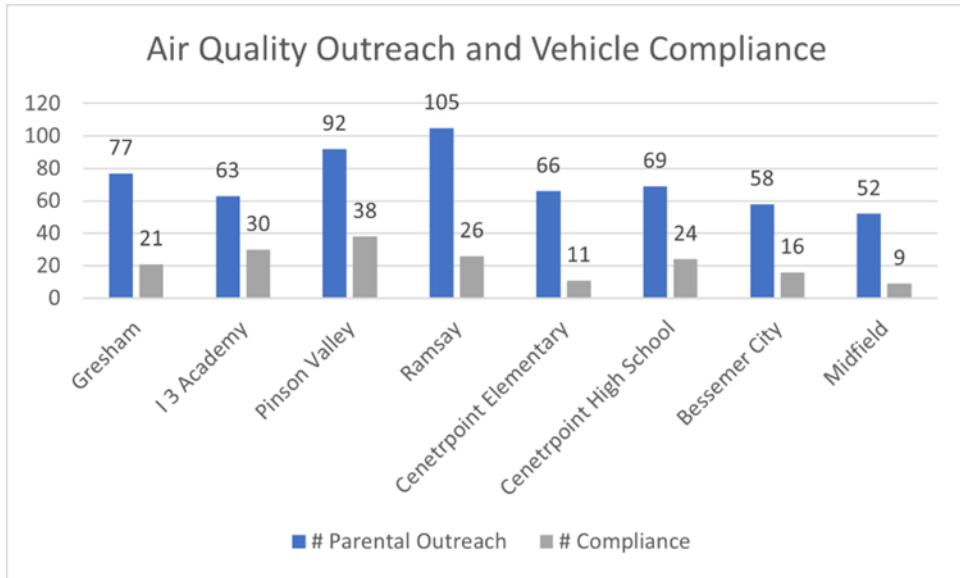


FIGURE 9
JMG Vehicle Audits and Compliance May 2022

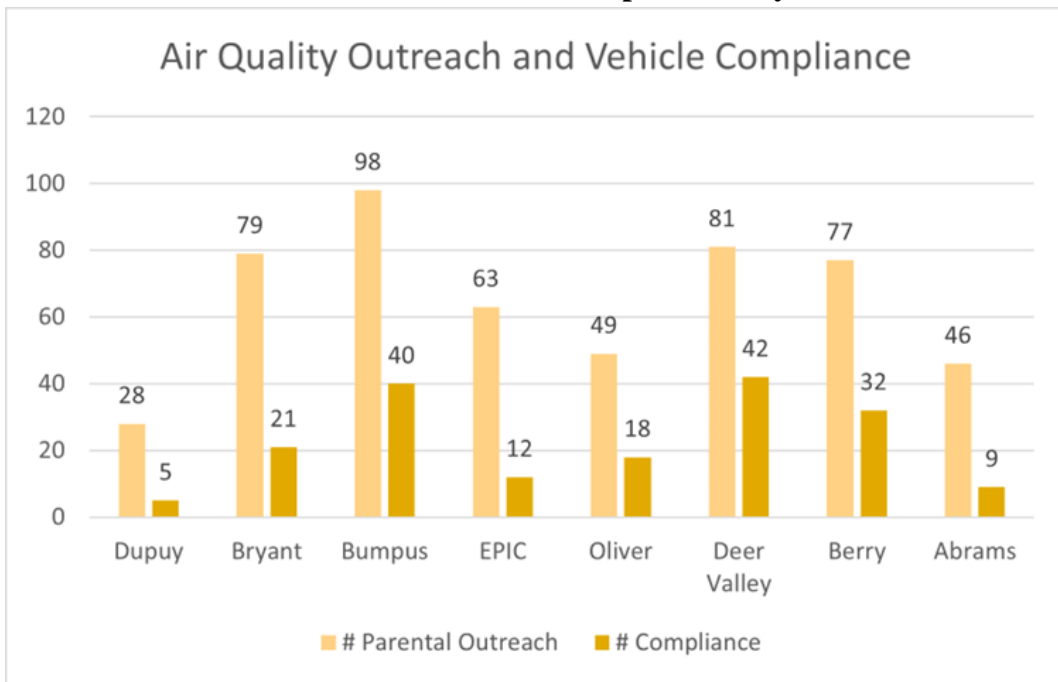


FIGURE 10
JMG Vehicle Audits and Compliance June 2022

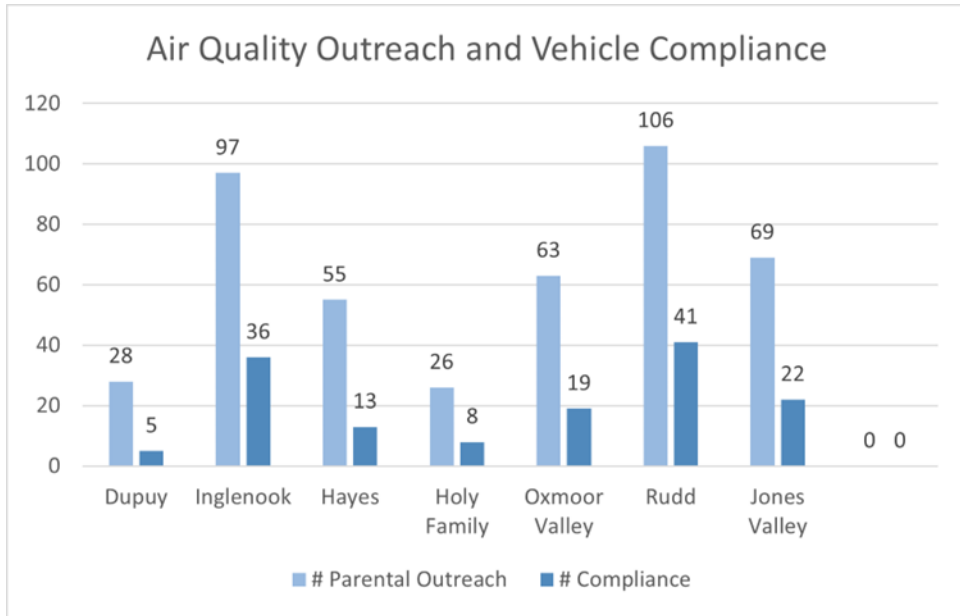
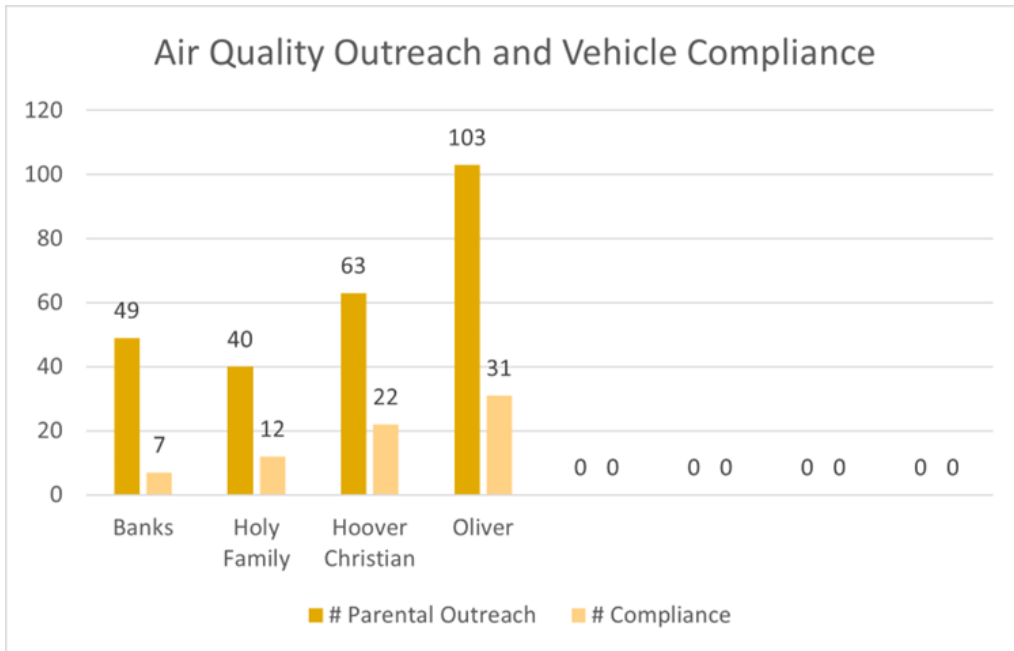


FIGURE 11
JMG Vehicle Audits and Compliance September 2022



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SECTION 7

CLEAN CITIES/ALTERNATIVE FUELS

This report summarizes the activities and accomplishments of the Alabama Clean Fuels Coalition, Inc. (ACFC) as a participating partner in the Alabama Partners for Clean Air (APCA) Voluntary Air Quality Program (the Program). The report includes ACFC activities and accomplishments related to alternative fuel, diesel retrofit, and APCA Program support activities during the reporting period for the following program areas:

1. Promoting and facilitating the use of alternative fuels and the installation of alternative fuel infrastructure in Jefferson and Shelby Counties.
2. Managing a regional diesel retrofit program in Jefferson and Shelby Counties.
3. Creating “Clean Corridors” that traverse the Birmingham Region.
4. Participating in the U.S. Department of Energy Clean Cities Program as a designated coalition for the region.
5. Providing the RPC/MPO technical assistance and review of APCA program monitoring and evaluation, compiling data on allocation of CMAQ funds and expected air quality benefits.
6. Assisting the APCA partnership in the implementation of program goals and objectives, promotions, and activities in various community sectors in Jefferson and Shelby Counties.

During FY2022 alternative fuel usage in Jefferson and Shelby Counties totaled 2,951,540 gallons or GGE’s (gasoline gallon equivalent). This included approximately 147,655 gallons of E85 Ethanol; 96,428 GGE’s of Propane, 1,405,489 GGE’s of CNG, 1,301,968 GGE’s of electricity representing approximately 27.2 million electric miles driven (BEV and PHEV), and approximately 1,000 GGE’s of electricity from the use of Alabama based Zero RPM idle reduction technologies. These cleaner burning fuels and idle reduction technologies provided emission reduction benefits to the region. In addition, previously completed ACFC diesel retrofit projects provided ongoing emissions reduction benefits for Jefferson and Shelby Counties during this reporting period.

Transportation related alternative fuel usage in the region increased approximately 40.16% from FY2021, primarily attributable to an increase in the use of electricity and propane for transportation fuel. Local fleets using alternative fuels during this reporting period included: the City of Birmingham (E85, Propane, & Idle Reduction Technology), the Alabama Department of Transportation East Central District (E85 Ethanol), the Birmingham-Jefferson County Transit Authority (CNG), Alabama Power Company (Electricity & Idle Reduction Technologies), Veal Convention Services (Propane), Evergreen Transportation (CNG), Melton Automotive), Lawson State Community College (CNG), Birmingham City Schools (Propane), Waste Management (CNG), and Spire Alabama - formerly Alabama Gas Corporation (CNG).

During the reporting period ACFC remained active in promoting the use of public retail stations in Jefferson and Shelby counties that offer alternative fuels for sale to the public. E85 Ethanol is

available in Jefferson County at the Dogwood Shell in Vestavia and in Shelby County at the Highway 280 Shell near Valleydale Road. CNG also continued to be available at the Birmingham-Jefferson County Transit Authority's public access CNG refueling station in Birmingham, and at Evergreen Transportation in Calera, LNG continued to be available throughout the reporting period at the Clean Energy Fuels station on Daniel Payne Drive, however the company, as a matter of corporate policy, would not provide fuel usage information for this station, which has exceeded 50,000 GGEs in previous years. Although we estimate usage at this station in FY2022 to be consistent with previous years, no LNG volumes have been included in the alternative fuel usage totals reported herein for Jefferson and Shelby Counties. EV charging is available at a growing number of public and private charging stations located in the region.

The vehicle emissions testing program, "Car Care Program," was discontinued after a strategic evaluation revealed the service was no longer delivering significant benefits as it had in the past. The final two car repairs were completed in December 2021. The decision to discontinue this program was primarily due to the fact there aren't as many cars on the road with significant emissions problems as there used to be.

ACFC has been working to evaluate and develop alternative fuel infrastructure projects in Jefferson and Shelby Counties under the CMAQ program three EV charging projects expected to be fully operational by the end of FY23. Two projects are anticipated in the downtown Birmingham area and one project is underway in Montevallo. ACFC is taking great care to ensure projects are administered effectively and in compliance with all program requirements.

ACFC actively assisted the APCA partnership in promoting the program goals and objectives by conducting outreach efforts to community sectors and organizations in Jefferson and Shelby Counties. This includes participation in APCA's Good Day Alabama National Air Quality Awareness Week TV interviews at railroad park on May 6. ACFC brought on Sara Franklin as social media manager which enhanced our coordination on joint promotion of alternative fuels with APCA. ACFC outreach efforts included organizing, planning, and conducting: a National Drive Electric Week Event in Birmingham on October 2, 2021; propane Autogas webinars on January 19, 2022 and a paratransit webinar on July 21; an electric vehicle showcase Event at The Worship Center Christian Church on March 19; an Earth Day Event at Pepper Place on May 14th, and a training session for first responders about interacting with ethanol fueled vehicles on August 30; Michael Staley gave a presentation on EV initiatives to each of the four MPO Committees on April 20, April 27, April 28, and May 11; Michael Staley gave a presentation to the City of Birmingham City Council Transportation Committee on June 13; A Drive Electric Alabama EV Summit was held at the BJCC in Birmingham and attended by 428 people on September 21-22. These efforts also included responding to numerous media and consumer inquiries on alternative fuels and advanced technology vehicles.

ACFC also attended all APCA Steering Committee meetings during the reporting period and reported on all ACFC projects and activities.

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SECTION 9

DOCUMENTED EMISSIONS REDUCTIONS

Documenting emissions reductions from a voluntary program depends on voluntary reporting or a proxy measurement tool such as a scientific survey. To gauge the emissions impact of the program for 2021 - 2022, RPCGB staff used both methodologies. First, staff calculated emissions reductions based on voluntary reporting of the following activities:

- Decreases in vehicle emission rates due to the different alternative fuel programs.
- Decrease in vehicle miles traveled due to carpooling/vanpooling.

Emissions reductions were also calculated for the public outreach/marketing program based on the results of Air Quality Alert Day surveys. The staff took a very conservative approach to this estimate, calculating only emissions reductions associated with people carpooling in response to an alert day notification.

TABLE 11
- Emission Reductions by Program from October 1, 2021, to September 30, 2022

TIP FY2022 CMAQ Ozone Program Project Potential Emissions Reductions						
#	Project	Emissions, lbs./Day			# of	Note
		VOC	NOx	PM _{2.5}	Days	
1	Marketing/Public Outreach/Surveys including Employer/Employee Outreach, the Policy Exchange Foundation, and Jefferson County Department of Health Air Quality Alert	0.67	0.78	1.65	260	FY 2022
2	Clean Cities/Alternative Fuels-Hoover, Birmingham, Alabaster, Tarrant, BJCTA, ALDOT, Trussville, Alabama Power Company, Alagasco, and other Alternative Fuel Stations	60.98	53.13	1.07	365	Ethanol(E85), Biodiesel B20 &B100, Compressed Natural Gas (CNG), Propane, and Electric
3	Idle Free Zone-UWCA/Johnson Group	0.95	0.31	0.03	180	weekdays
Maximum Daily Emissions Reductions		62.61	54.22	2.75	365	lbs./day

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Appendix A
Alabama Clean Fuel
Coalition Annual Report

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**ALABAMA PARTNERS FOR CLEAN AIR
VOLUNTARY AIR QUALITY PROGRAM
CMAQ-NR19, PROJECT # 100070047**

**ALABAMA CLEAN FUELS COALITION, INC.
FY 2022 ANNUAL REPORT
OCTOBER 1, 2021 – SEPTEMBER 30, 2022**

This report summarizes the activities and accomplishments of the Alabama Clean Fuels Coalition, Inc. (ACFC) as a participating partner in the Alabama Partners for Clean Air (APCA) Voluntary Air Quality Program (the Program). The report includes ACFC activities and accomplishments related to alternative fuel, diesel retrofit, and APCA Program support activities during the reporting period for the following program areas:

1. Promoting and facilitating the use of alternative fuels and the installation of alternative fuel infrastructure in Jefferson and Shelby Counties.
2. Managing a regional diesel retrofit program in Jefferson and Shelby Counties.
3. Creating “Clean Corridors” that traverse the Birmingham Region.
4. Participating in the U.S. Department of Energy Clean Cities Program as a designated coalition for the region.
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State Community College (CNG), Birmingham City Schools (Propane), Waste Management (CNG), and Spire Alabama - formerly Alabama Gas Corporation (CNG).

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The vehicle emissions testing program, "Car Care Program," was discontinued after a strategic evaluation revealed the service was no longer delivering significant benefits as it had in the past. The final two car repairs were completed in December 2021. The decision to discontinue this program was primarily due to the fact there aren't as many cars on the road with significant emissions problems as there used to be.

ACFC has been working to evaluate and develop alternative fuel infrastructure projects in Jefferson and Shelby Counties under the CMAQ program three EV charging projects expected to be fully operational by the end of FY23. Two projects are anticipated in the downtown Birmingham area and one project is underway in Montevallo. ACFC is taking great care to ensure projects are administered effectively and in compliance with all program requirements.

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ACFC also attended all APCA Steering Committee meetings during the reporting period and reported on all ACFC projects and activities.

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Appendix B
Jefferson County Department of Health
Annual Report

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ALABAMA PARTNERS FOR CLEAN AIR ANNUAL PARTNER ACTIVITY REPORT:

JEFFERSON COUNTY DEPARTMENT OF HEALTH



OCTOBER 2021– SEPTEMBER 2022

Introduction

The Jefferson County Department of Health (JCDH) is a contributing partner of the Alabama Partners for Clean Air (APCA). JCDH also actively participates as a member of the APCA Steering Committee. Matt Lacke, Meteorologist, serves on the Steering Committee, with Dr. Corey Masuca, Principal Air Pollution Engineer, acting as proxy. This report serves as an annual composition of activities and actions carried out by JCDH to be included in APCA's annual partner activity report.

JCDH's Air Quality Action Program

The "Air Quality Action Program" at JCDH promotes reducing pollution every day of the year, especially on air quality alert days, and how to obtain daily air quality forecasts. The program entails outreach in the local community, as well as, encouraging emission reducing activities internally.

An important goal of JCDH has been to promote air quality action throughout the Birmingham area. Education about air quality to the public is essential because the Birmingham area has historically been designated as non-attainment for one or more of the criteria air pollutants. JCDH does outreach in the local community at various venues and sometimes in conjunction with APCA. Topics included the state of Birmingham's air quality over time, the Air Quality Index, the different types of pollutants, the health effects of pollution, how weather affects pollution, and what actions to take to reduce pollution.

Air Quality Alerts

"Air Quality Alerts" are forecast one to two days before the date of the alert. JCDH provides PM_{2.5} forecasts year-round and the Alabama Department of Environmental Management provides O₃ forecasts during the warm season (approximately mid-April to mid-October) every year. For the period of October 2021 – September 2022, no air quality alerts were issued for either fine particulate matter (PM_{2.5}) or ozone (O₃).

Contracts

As part of the larger Memorandum of Agreement between the RPC and JCDH for FY2022 (October 2021 – September 2022), JCDH had two subcontracts as a participating partner of APCA. The Environmental Monitoring for Public Access and Community Tracking (EMPACT) website, which was re-launched in FY2014 as the "Birmingham Air Quality" website, is maintained by the University of Alabama in Huntsville (UAH). The website provides JCDH, the

Alabama Department of Environmental Management (ADEM), and the public with near real-time air quality monitoring data for the Birmingham area. Baron Advanced Meteorological Systems (BAMS) provides air quality forecast model data to JCDH and ADEM. Outreach materials were also a part of the FY2022 budget. The details of JCDH’s budget are shown in the table below.

	OCT 2021 – SEP 2022
Birmingham Air Quality Website Maintenance by UAH	\$18,200
BAMS Subscription Meteorological Service	\$48,000
Outreach Giveaways	\$5,800
Total	\$72,000

Air Quality Status

The 8-hour ozone standard (0.070 ppm) was effective on December 28, 2015. EPA designated Jefferson and Shelby Counties as attainment of the 8-hour standard and was effective January 16, 2018. The EPA also has the Birmingham area (Jefferson and Shelby Counties and a portion of Walker County) designated as attainment for the 2006 24-hour PM_{2.5} standard (35 µg/m³). Effective April 15, 2015, the EPA designated the Birmingham area as attainment of the 2013 annual PM_{2.5} standard (12 µg/m³). The Birmingham area is currently designated as attainment of all of EPA’s National Ambient Air Quality Standards through calendar year 2021.

Monitoring Data

Air quality reports were sent out to members of APCA on a monthly basis. These reports include daily AQI information for all monitored criteria air pollutants in the Birmingham area, a listing of alerts that were issued, and daily meteorological data. It should be noted that information in these monthly reports were preliminary and were not put through QA/QC procedures.

Below is detailed ozone and fine particulate matter monitoring data that is used to determine compliance with the Environmental Protection Agency’s (EPA) National Ambient Air Quality Standards. Air monitoring data shown in this report is only through 2021. This is because air monitoring data is on a calendar year basis (i.e., January 1, 2021 – December 31, 2021) and this report is based on a fiscal year basis (i.e., October 1, 2021 – September 30, 2022).

Ozone

Effective December 28, 2015, EPA lowered the 8-hour ozone standard to 70 parts per billion (ppb). Compliance with the 8-hour standard at each site is determined by a design value that is an average of the 4th highest daily 8-hour ozone value at each site over a 3-year period. The most recent 3-year monitoring period was 2019-2021. The ozone monitoring network consists of 6 monitors in Jefferson County and 1 monitor in Shelby County. The table below displays the design values for ozone at each monitoring site throughout the Birmingham area. For the monitoring period of 2019-2021, no monitors violated the standard.

8-Hour Ozone Design Values (2019-2021)	
Monitor	Design Value (ppb)
Corner	60
Fairfield	66
Helena	63
Leeds	62*
McAdory	65
North Birmingham	65
Tarrant	62

*Due to not meeting data completeness criteria, the design value is not valid

Fine Particulate Matter (PM_{2.5})

Effective March 18, 2013, the EPA lowered the annual PM_{2.5} standard to 12 µg/m³. A 3-year average of annual means is compared to the annual standard to determine compliance. The 24-hour PM_{2.5} standard is a 3-year average concentration, based on the 98th percentile for each year, and is set at 35 µg/m³. The most recent 3-year monitoring period was 2019-2021. The fine particulate matter (PM_{2.5}) monitoring network consists of 5 monitors throughout Jefferson County. The tables below display the annual and 24-hour design values for PM_{2.5} at each monitor throughout Jefferson County. There were no violations of the annual and 24-hour PM_{2.5} standards for 2019-2021.

Annual PM_{2.5} Design Values (2019-2021)	
Monitor	Design Value (µg/m³)
Arkadelphia	9.6
Leeds	8.2
McAdory	8.4
North Birmingham	10.1
Wylam	8.5

24-Hour PM_{2.5} Design Values (2019-2021)	
Monitor	Design Value (µg/m³)
Arkadelphia	22
Leeds	16
McAdory	17

North Birmingham	21
Wylam	18

Air Quality Exceedances

Below are tables showing the exceedances of the 8-hour ozone standard from 2012 through 2021 and exceedances of the 24-hour PM_{2.5} standard from 2012 through 2021. Note that the EPA lowered the 8-hour ozone standard in 2015 so there was a lower threshold to violate the standard. The 2 exceedances of the 24-hour PM_{2.5} standard in 2020 were due to the influence of Saharan dust.

Exceedances of the 8-Hour Ozone Standard for 2012-2021

Station	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Corner	1	1	0	0	1	0	0	1	0	0
Fairfield	5	0	0	2	2	0	1	7	0	0
Helena	4	0	1	2	4	0	1	3	0	0
Hoover	3	0	0	2	2	0				
Leeds	4	0	0	0	1	0	1	1	0	0
McAdory	4	0	0	0	2	0	1	5	0	0
N. Birmingham	6	0	0	4	3	1	2	4	0	1
Pinson	3									
Providence	2									
Tarrant	6	1	0	4	3	1	3	2	1	0
Total	38	2	1	14	18	2	9	23	1	1

Exceedances of the 24-Hour Fine Particulate Matter (PM_{2.5}) Standard for 2012-2021

Station	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Arkadelphia			0	0	0	0	0	0	1	0
Leeds	0	0	0	0	0	0	0	0	0	0
McAdory	0	0		0	0	0	0	0	0	0
N. Birmingham	0	0	0	0	0	0	0	0	1	0
Wylam	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	2	0

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Appendix C

Advance Consulting, LLC. Annual Report

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Advanced Consulting Annual Report

October 1, 2021 – September 30, 2022

Total Community Events: 93

Total Pledge Cards from Community Events: 6037

Community Events

	Event	Attendees	Pledge Cards
October 2021			
Oct 2	Oktoberfest/ Leeds	700	86
Oct 2	Whistle Stop	700	113
Oct 3	Pepper Place Pop Up	200	46
Oct 8	Bessemer Food Connection	100	43
Oct 9	Shelby Iron Works Festival	500	61
Oct 9	Trussville Farmer's Market	200	38
Oct 16	Off the Beaten Path Pop Up	200	54
Oct 16	Zion Star Health Fair	200	51
Oct 17	Pepper Place Pop Up	200	48
Oct 19	Center Point Night Out	300	51
Oct 23	Montevallo Art Stalk	500	118
Oct 24	Barking at the Moon Festival	500	84
Oct 29	Hoover Hay Day	500	64
November 2021			
Nov 6	Bark in the Park	300	72

Nov 7	Moss Rock Festival	750	88
Nov 13	Gopher Hole/ Hueytown	300	74
Nov 13	Harpersville Day	700	91
Nov 16	Shelby County National Night Out	400	101
Nov 20	Heavenly Handmade Trussville	200	61
Nov 21	Rocky Ridge Market	200	68

December 2021

Dec 4	Winter Festival/AL 4H Center	400	73
Dec 5	Craig's Pop Up at Back Forty	200	77
Dec 11	Cahabazaar Christmas Fest	500	102
Dec 12	Woodlawn Street Festival	300	82
Dec 18	Trussville Christmas Farmer's Market	200	64
Dec 18	Calera Christmas Bazaar	300	49

January 2022

No Events in January.

February 2022

Feb 7	Hoopersville Senior Citizen Party	100	33
Feb 16	Senior Health Fair Fountain Heights	100	61

March 2022

March 12	March Madness/ Calera	200	33
March 12	Hammerfest/ Pepper Place	500	84
March 15	Edgewater Fitness & Health Fair	200	56

March 20	Paws in the Park/ Pelham	200	48
March 26	Calera Spring Pop UP	300	77
April 2022			
April 1	Warrior Regional Library Arts Council Spring Show	150	53
April 2	Warrior Regional Library Arts Council Spring Show	200	72
April 2	Be Well Shelby	200	41
April 9	Helena Spring Festival	200	47
April 9	Bessemer Train Station	300	83
April 16	Pepper Place FM	600	98
April 16	Lakeview Market	300	92
April 21	Earth Day Montevallo University	300	47
April 23	Strawberry Festival	300	69
April 23	Earth Day Botanical Gardens	400	102
April 26	Free Will Health Fair/Midfield	100	51
April 30	Hoover Day	900	86
May 2022			
May 7	Cahaba Brewery Mother's Day Event.	500	112
May 10	Alwin Health Fair	100	29
May 14	Creekbank Festival Leeds	300	53
May 19	Glenwood Farmer's Market	100	42
May 20	Pinson Farmer's Market	200	43

May 21	Off The Beaten Path Pop Up	200	61
May 22	Pop Up on the Green/Railroad Park	200	48
June 2022			
June 2	Titusville Library Com Awareness Day	200	52
June 4	Lee Branch	200	51
June 5	Vulcan Birthday Bash	500	172
June 7	West Homewood	200	44
June 8	Shelby County Senior Picnic	200	60
June 11	East Lake Farmer Market	200	38
June 11	Eastlake Fishing Rodeo	500	104
June 12	Lake Wilborn	200	32
June 15	World Elder Abuse Awareness	200	70
June 17	Ross Bridge	200	38
June 18	Montevallo Art Festival	500	103
June 23	I Love America Night	500	101
July 2022			
July 6	Titusville Senior Resource Fair	200	68
July 10	Lake Wilbon Farmer's Market	200	46
July 12	West Homewood	200	43
July 15	Ross Bridge Market	300	67
July 16	Trussville Farmer's Market	200	62
July 23	Bessemer Farmer's Market	200	81
July 25	Montevallo Farmer's Market	200	39

July 30	Fairfield Health Fair	200	79
July 30	Lee Branch	200	73

August 2022

August 2	Titusville Back to School	200	40
August 2	West Homewood	200	58
August 6	Vestavia City Center Pop Up	200	61
August 13	Columbiana Farmer's Market	200	39
August 14	Lake Wilborn Market	100	51
August 15	Montevallo Farmer's Market	100	29
August 27	Fountain Heights Health Fair	100	82
August 31	Bham Health & Wellness Expo	200	62

September 2022

Sept 3	Bessemer Farmer's Market	200	54
Sept 7	Titusville Senior Expo	100	21
Sept 8	Titusville Community Resource	100	38
Sept 9	Jefferson County Senior Expo	200	111
Sept 10	Paw Palooza	300	78
Sept 10	Alabaster Health Fair	200	60
Sept 17	Pepper Place	500	97
Sept 17	East Lake Farmer's Market	200	39
Sept 23	Pinson Farmer's Market	200	38

Sept 23	TSAC Shred Learn Wellness Fair	200	59
Sept 24	Lee Branch Farmer's Market	200	49
Sept 29	Complete Health Fair Comm Fair	200	68

Appendix D

Alabama Clean Fuels Coalition Car Care Annual Report

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Appendix E

Emissions Reductions Worksheets

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Emission Reductions by Ozone Awareness Program from October 1, 2021, to September 30, 2022

TIP FY2022 CMAQ Ozone Program Project Potential Emissions Reductions						
#	Project	Emissions, lbs./Day			# of Days	Note
		VOC	NOx	PM _{2.5}		
1	Marketing/Public Outreach/Surveys including Employer/Employee Outreach, the Policy Exchange Foundation, and Jefferson County Department of Health Air Quality Alert	0.67	0.78	1.65	260	FY 2022
2	Clean Cities/Alternative Fuels-Hoover, Birmingham, Alabaster, Tarrant, BJCTA, ALDOT, Trussville, Alabama Power Company, Alagasco, and other Alternative Fuel Stations	60.98	53.13	1.07	365	Ethanol(E85), Biodiesel B20 & B100, Compressed Natural Gas (CNG), Propane, and Electric
3	Idle Free Zone-UWCA/Johnson Group	0.95	0.31	0.03	180	weekdays
Maximum Daily Emissions Reductions		62.61	54.22	2.75	365	lbs./day

#1 - VOC, NOx, and PM 2.5 Potential Emission Reduction Worksheet for Project 241, Marketing/Public Outreach/Survey

on Alert Days for October 1, 2021 - September 30, 2022		2/14/2023	
Description	Assumption	Units	
Jefferson County			
Estimated commuters to work[1]	288,229	persons	
Assuming at least two trip reductions per person	2	trips per day	
Number Affected days by Air Quality Campaign/Alert days for FY 2022 season [2]	5	days (weekdays)	
Average trip length for Jefferson County	24.2	miles per trip	
Percentage of people knowing Ozone Alert days[3]	35.29%	%	
Percentage of taking actions among people knowing Out Reach Campaign/Ozone Alert days	57.02%	%	
Percentage out of the 57.02% people taking carpool/bus/telecommuting due to Ozone Awareness	4.62%	%	
Shelby County			
Estimated commuters to work	98,986	persons	
Assuming at least two trip reductions per person	2	trips per day	
Average trip length for Shelby county	15.9	miles per trip	
Percentage of people knowing Ozone Alert day[3]	25.71%	%	
Percentage of taking actions among people knowing Out Reach Campaign/Ozone Alert days	51.85%	%	
Percentage out of the 51.85% people taking carpool/telecommuting due to Ozone Awareness	7.14%	%	
Vehicle trips reduced in Jefferson County per day during Ozone Season [4]	26,795	Vehicle trips/Ozone Season	
Vehicle trips reduced in Shelby County per day during Ozone Season	9,422	Vehicle trips/Ozone Season	
Weekdays per year (D)	260	days/year	
Average daily vehicles in Jefferson County participating	103	vehicles/day	
Average daily vehicles in Shelby County participating	36	vehicles/day	
VOC reduced in Jefferson County[5]	0.235	kg/day	
NOx reduced in Jefferson County	0.178	kg/day	
PM 2.5 reduced in Jefferson County	0.707	kg/day	
VOC reduced in Shelby County[5]	0.070	kg/day	
NOx reduced in Shelby County	0.175	kg/day	
PM 2.5 reduced in Shelby County	0.041	kg/day	
Total VOC reduced (VOCd)[6]	0.305	kg/day	
Total NOx reduced (NOxd)	0.353	kg/day	
Total PM 2.5 Direct emission reduced (PM2.5d)	0.748	kg/day	
Total VOC reduced [6]	0.672	lbs./day	
Total NOx reduced	0.778	lbs./day	
Total PM 2.5 Direct emission reduced	1.649	lbs./day	
Cost Effectiveness = (Annualized Cost) / (Annual Emissions Reduction)---the lower number, the better			
Project life expectancy (n)	1	years	
Discount rate (i)	1%	used by ALDOT	
Capital recover factor (CRF) = $(1+i)^n * i / ((1+i)^n - 1)$	1.01000	capital recovery factor	
Project funding amount, C	\$243,130	capital cost	
Project annual cost (AC) = (C)*(CRF)	\$245,561	\$ per year	
Cost Effectiveness for VOC = (AC) / ((VOCd)*(D))	\$3,097	\$ per kilogram per year	
Cost Effectiveness for NOx = (AC) / ((NOxd)*(D))	\$2,676	\$ per kilogram per year	
Cost Effectiveness for VOC & NOx = (AC) / (((VOCd)+(NOxd))*(D))	\$1,435	\$ per kilogram per year	
Cost Effectiveness for PM 2.5 Direct = (AC)/((PM2.5d)*(D))	\$1,263	\$ per kilogram per year	
Note: For benefit of emission reductions, Marketing/public outreach, Jefferson County Department of Health EMPACT/Forecast, and the Advanced Consulting/United Way Employer/Employee Outreach are considered as one program.			
[1] 2018 5-year American Community Survey (ACS) Report - Commuters			
[2] There is five days of out reach campaign for air quality awareness.			
[3] A Survey of Jefferson and Shelby County Resident Attitudes and Actions, submitted by Connections, Inc.			
[4] Emission reductions due to vehicle trips reduced based on carpool emissions reductions of FHWA CMAQ Emissions Calculator Toolkit for 2021, see below for details.			
[5] Emissions calculated for Jefferson county and Shelby County separately.			

In Jefferson County



Carpooling

This calculator will estimate the reduction in emissions resulting from carpooling.

INPUT
User Guide

(1) What is your project evaluation year? Reset to Default

(2) Are the pick-up/drop-off locations centralized? Yes No *Enter as roundtrip mileage*

(2a) What is the average round-trip distance participants drive to the central location? *Enter as roundtrip mileage*

(3) Please choose one of the following questions to answer:

(3a) What is the population of commuting workers? *Default values based on national averages*

(3b) What is the number of vehicles participating in the carpool program? *Input as a percentage*

(4) What share of commuters participate in pool? *Driver not included*

(5) On average, how many passengers are there per carpool vehicle? *Enter as roundtrip mileage*

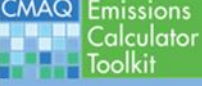
(6) What is the average commute distance? *Enter as roundtrip mileage*

OUTPUT
Calculate Output

EMISSION REDUCTIONS

Pollutant	Total (kg/day)
Carbon Monoxide (CO)	10.457
Nitrogen Oxide (NO _x)	0.178
Particulate Matter <10 μm (PM ₁₀)	0.042
Particulate Matter <2.5 μm (PM _{2.5})	0.707
Volatile Organic Compounds (VOC)	0.235
Carbon Dioxide Equivalence (CO₂e)	1610.506
Total Energy Consumption (MMBTU)	21.174

In Shelby County



Carpooling

This calculator will estimate the reduction in emissions resulting from carpooling.

INPUT
User Guide

(1) What is your project evaluation year? Reset to Default

(2) Are the pick-up/drop-off locations centralized? Yes No *Enter as roundtrip mileage*

(2a) What is the average round-trip distance participants drive to the central location? *Enter as roundtrip mileage*

(3) Please choose one of the following questions to answer:

(3a) What is the population of commuting workers? *Default values based on national averages*

(3b) What is the number of vehicles participating in the carpool program? *Input as a percentage*

(4) What share of commuters participate in pool? *Driver not included*

(5) On average, how many passengers are there per carpool vehicle? *Enter as roundtrip mileage*

(6) What is the average commute distance? *Enter as roundtrip mileage*

OUTPUT
Calculate Output


EMISSION REDUCTIONS

Pollutant	Total (kg/day)
Carbon Monoxide (CO)	2.551
Nitrogen Oxide (NO _x)	0.041
Particulate Matter <10 μm (PM ₁₀)	0.010
Particulate Matter <2.5 μm (PM _{2.5})	0.175
Volatile Organic Compounds (VOC)	0.070
Carbon Dioxide Equivalence (CO₂e)	372.400
Total Energy Consumption (MMBTU)	4.892

#2 - VOC, NOx, and PM 2.5 Potential Reduction Worksheet for Project #241: Clean Cities/Alternative Fuels			
Jefferson and Shelby Counties Alternative Fuels from October 1, 2021 to September 30, 2022		2/14/2023	
Description	Assumption	Note	
(1) Gasoline gallon equivalent of ethanol E85 [1]	147,655	gallons for fiscal year 2022	
Gasoline gallon equivalent of biodiesel B20	0	gallons for fiscal year 2022	
Gasoline gallon equivalent of biodiesel B100	0	gallons for fiscal year 2022	
Gasoline gallon equivalent of Hydrogen	0	gallons for fiscal year 2022	
Gasoline gallon equivalent of LNG	0	gallons for fiscal year 2022	
Gasoline gallon equivalent of Compressed Natural Gas (CNG) for Transit bus	755,127	gallons for fiscal year 2022	
Gasoline gallon equivalent of CNG for other bus/truck	650,362	gallons for fiscal year 2022	
Gasoline gallon equivalent of Liquefied petroleum gas (LPG)	96,428	gallons for fiscal year 2022	
Gasoline gallon equivalent of all Electric Car, Plug in Hybrid, & ZeroRPM (see VMT below)	1,301,968	gallons for fiscal year 2022	
Where, Gasoline gallon equivalent of Fire truck and Ambulance from ZeroRPM	4,463	gallons for fiscal year 2022	
(2) Estimated vehicle miles traveled and vehicle trips			
Assuming average vehicle miles per gallon for Transit bus	6.0	miles per gallon	
Assuming average vehicle miles per gallon for truck	7.8	miles per gallon	
Assuming average vehicle miles per gallon for passenger vehicles	23.6	miles per gallon	
Average trips distance for Transit Bus	10.0	miles per trip	
Average travel distance for passenger vehicle trip	19.1	miles per trip	
Average trip distance for truck in the MPO area (for one-way trip)	38.1	miles per trip	
Estimated bus miles traveled (VMT _{cngbus}) based on CNG [2]	4,530,762	vehicle miles per year	
Estimated vehicle (truck) miles traveled (VMT _{cngv}) based on CNG	5,072,824	vehicle miles per year	
Estimated vehicle (truck) miles traveled (VMT _{lpgv}) based on LPG	752,138	vehicle miles per year	
Estimated passenger vehicle miles traveled (VMT _{e85}) based on ethanol (E85)	3,484,658	vehicle miles per year	
Estimated passenger vehicle miles traveled (VMT _{electric}) based on electric cars and plug in Hybrid [1]	27,194,112	vehicle miles per year	
Operating days per year	365	days/year	
Vehicle trips of Transit Buses (301 days per year including Saturday services)	1,505	trips/working day	
Bus service hours per day	15	hours/day	
Numbers of Transit Buses in operation (CNG)	101	buses	
Vehicle trips of trucks (CNG, 260 working days)	512	trips/working day	
Equivalent numbers of Trucks (CNG), 2 trips per day per vehicle	256	trucks	
Vehicle trips of trucks (LPG, 260 working days)	76	trips/working day	
Equivalent numbers of Trucks (LPG), 2 trips per day per vehicle	38	trucks	
Vehicle trips of ethanol vehicles	500	trips/day	
Equivalent numbers of Vehicles (Ethanol), 2 trips per day per vehicle	250	vehicles	
Total vehicle trips of electric cars	3,901	trips/day	
Equivalent numbers of Electric cars, 2 trips per day per vehicle	2,361	vehicles	
Fire truck idling hour reduction be ZeroRPM	5.44	hours/day	
Fire truck restarting numbers during idling hour reduction be ZeroRPM	3	times/day	
Fire truck average mileage per gallon diesel	4.0	miles/gallon	
Average mileage of a fire truck per year	4,500	miles/year	
Equivalent number of fire trucks	4	vehicles	
(3) Total daily Vehicle Mile Traveled reductions	0	vehicle miles per year	
(4) Potential Emission Reductions: alternative fuel			
(a) Diesel & CNG bus emissions [3]			
Bus VOC emission reductions for CNG buses, VOC _{bus}	7.620	kilograms/day (2022)	
Bus NOx emission reductions for CNG buses, Nox _{bus}	3.852	kilograms/day (2022)	
Bus PM 2.5 emission reductions for CNG buses, PM2.5 _{bus}	0.052	kilograms/day (2022)	
(b) Estimated emissions reduction for CNG trucks			
Truck VOC emission deference using CNG, VOC _t	0.087	kilograms/day (2022)	
Truck NOx emission difference using CNG, Nox _t	0.951	kilograms/day (2022)	
Truck PM 2.5 emission difference using CNG, PM2.5 _t	0.034	kilograms/day (2022)	
(c) Estimated emissions reduction for LPG trucks			
Truck VOC emission deference using LPG, VOC _t	0.000	kilograms/day (2022)	
Truck NOx emission difference using LPG, Nox _t	0.000	kilograms/day (2022)	
Truck PM 2.5 emission difference using LPG, PM2.5 _t	0.000	kilograms/day (2022)	
(d) E85 emissions of passenger vehicles [4]			
VOC Emissions reductions from E85 over gasoline passenger vehicles, VOC _e	0.652	kilograms/day (2022)	
NOx Emissions reductions from E85 over gasoline passenger vehicles, Nox _e	1.167	kilograms/day (2022)	
PM 2.5 Emissions reductions from E85 over gasoline passenger vehicles, PM2.5 _e	0.010	kilograms/day (2022)	
(e) Electric car emissions and regular gas passenger vehicles [5]			
VOC Emissions reductions from electric car over gasoline passenger vehicles, VOC _{ae}	19.204	kilograms/day (2022)	
NOx Emissions reductions from electric car over gasoline passenger vehicles, Nox _{ae}	17.562	kilograms/day (2022)	
PM 2.5 Emissions reductions from electric car over gasoline passenger vehicles, PM2.5 _{ae}	0.351	kilograms/day (2022)	

(f) Reduced Idling			
VOC Emissions due to Fire Truck idling 1 hour, VOCe	0.021	kilograms/day (2022)	
NOx Emissions due to Fire Truck idling 1 hour, Noxe	0.113	kilograms/day (2022)	
PM 2.5 Emissions due to Fire Truck idling 1 hour, PM2.5e	0.007	kilograms/day (2022)	
VOC Emissions due to Fire Truck restart one time, VOCe	0.003	kilograms/day (2022)	
NOx Emissions due to Fire Truck restart one time, Noxe	0.009	kilograms/day (2022)	
PM 2.5 Emissions due to Fire Truck restart one time, PM2.5e	0.000	kilograms/day (2022)	
VOC Emissions Reductions due to Fire Truck Reduced Idling by ZeroRPM, VOCe	0.098	kilograms/day (2022)	
NOx Emissions Reductions due to Fire Truck Reduced Idling by ZeroRPM, Noxe	0.566	kilograms/day (2022)	
PM 2.5 Emissions Reductions due to Fire Truck Reduced Idling by ZeroRPM, PM2.5e	0.038	kilograms/day (2022)	
(5) VOC emissions reduced	27.661	kilograms per day	
NOx emissions reduced	24.098	kilograms per day	
PM 2.5 Direct emissions reduced	0.485	kilograms per day	
VOC emissions reduced in lbs. per day, 1 kilogram = 2.2046 lbs.	60.76	lbs. per day	
NOx emissions reduced in lbs. per day	51.88	lbs. per day	
PM 2.5 Direct emissions reduced in lbs. per day	0.98	lbs. per day	
(4) Cost Effectiveness = (Annualized Cost) / (Annual Emission Reduction)---the lower number, the better			
Project life expectancy (n)	1	years	
Discount rate (i)	1%	used by ALDOT	
Capital recover factor (CRF) = $(1+i)^n * i / ((1+i)^n - 1)$	1.01000	capital recovery factor	
Project funding amount [6]	\$260,000	capital cost	
Project annual cost (AC) = (C)*(CRF)	\$262,600	\$ per year	
Number of days project affected (D)	365	days for 1 year	
Cost Effectiveness for VOC = (AC) / ((VOC)*(D))	\$26.10	\$ per kilogram per year	
Cost Effectiveness for NOx = (AC) / ((NOx)*(D))	\$30.57	\$ per kilogram per year	
Cost Effectiveness for VOC & NOx = (AC) / (((VOC)+(NOx))*(D))	\$14.08	\$ per kilogram per year	
Cost Effectiveness for PM 2.5 = (AC) / ((PM2.5)*(D))	\$1,611.31	\$ per kilogram per year	
Source: Alabama Partners for Clean Air (APCA), Annual Activity report October 1, 2021 to September 30, 2022.			
[1] APCA Alternative Fuel Summary 2021			
[2] (Estimated Vehicle Miles Traveled) = (Gasoline gallon equivalent) x (Miles per gallon)			
[3] FHWA CMAQ Emissions Calculator Toolkit			
[4] & [5] The emission inventory of each fuel group based on MOVES3 project level runs.			
[6] Total project cost = Federal funds + local matches if needed			

Emissions Reductions of Alternative Fuel for CNG Buses based on FHWA CMAQ Emissions Calculator Toolkit



Non-EV Transit Bus Replacement and Fueling Infrastructure

This calculator will estimate the reduction in emissions resulting from the replacement of a diesel or CNG transit bus with an alternative fuel transit bus and/or the change in mileage to new restricted access charging infrastructure, if applicable.

Navigator
INPUT
User Guide

(1) What is your project evaluation year? Reset to Default Values

(2) Which components does your project incorporate? Only answer questions specific to project components. If both components are chosen, answer Questions 1-7 and 9-11.

Project Components

Non-EV Transit Bus Replacement Questions 1-7

Restricted Access Infrastructure Questions 1-7 & 9-11

(3) What is the model year of the current transit buses?

(4) What conventional fuel do the current transit buses use?

(5a) What activity data do you have? Note: You must enter at least one value for transit bus activity.

Vehicle Miles Traveled (VMT)

Vehicle Population

(5b) Input the annual activity for the total number of transit buses to be replaced.

Annual Total Vehicle Miles Traveled

Annual Transit Bus Population

(6) What is the model year of the replacement transit buses?

(7) What fuel will the replacement transit buses use?

INFRASTRUCTURE

(10) How will the distance to your primary fueling facility change after developing new infrastructure?

(11) Please enter the anticipated change in annual VMT to fuel your vehicle fleet at the new fueling infrastructure. **Change in Vehicle Miles Tr**

OUTPUT
Calculate

FLEET PERFORMANCE

Last Updated: 2/20/2023 9:25:25 AM


	BEFORE	AFTER
Annual Activity for Replacement Transit Buses		
Annual Total Vehicle Miles Traveled	4,530,762	4,530,762
Annual Transit Bus Population	101	101
Annual Miles Traveled per Vehicle	44,959	44,959

EMISSION REDUCTIONS

Pollutant	Total
Carbon Monoxide (CO)	308.2198
Particulate Matter <2.5 μm (PM _{2.5})	0.0455
Particulate Matter <10 μm (PM ₁₀)	0.0515
Nitrogen Oxide (NO _x)	3.8524
Volatile Organic Compounds (VOC)	7.6198
Carbon Dioxide (CO ₂)	1,906.373
Carbon Dioxide Equivalence (CO ₂ e)	6,609.920
Total Energy Consumption (TEC)	30.608

Note: this module only calculates CO₂, CO₂e and TEC reductions for diesel and CNG bus replacements. See user guide for more details.

Emissions Reductions of Alternative Fuel for CNG Trucks based on FHWA CMAQ Emissions Calculator Toolkit



Unrestricted Access Alternative Fuel Infrastructure

This calculator will estimate the reduction in emissions resulting from developing alternative fuel infrastructure with unrestricted access. The calculator does not consider lifecycle emissions, particularly it refrains from estimating any emissions that may occur outside of vehicle operations. Note that this calculator does not apply to transit buses, which are included in a separate tool.

Navigator
INPUT
User Guide

(1) What is your project evaluation year? Reset inputs

(2) Please input the estimate of number of vehicles in your study area.

(3) Which alternative fuel will be supplied at this new infrastructure?

(4) Please enter the projected market share of replacement alternative fuel vehicles after construction of the new infrastructure. % Fill Table

(5) Please select below any vehicle source type(s) that will not have alternative fuel vehicle purchases and then click the button to fill the table with default estimates for population and activity per vehicle.

Vehicle Source Type	Average Annual Miles Traveled Per	Number of Existing Conventional Fuel Vehicles	Number of Replacement Alternative Fuel
<input type="checkbox"/> Passenger Car	0	0	0
<input type="checkbox"/> Passenger Truck	0	0	0
<input checked="" type="checkbox"/> Light Commercial Truck	12,542	8,704	247
<input checked="" type="checkbox"/> School Bus	10,325	290	8
<input checked="" type="checkbox"/> Refuse Truck	16,232	37	1
<input type="checkbox"/> Single Unit Short-Haul Truck	0	0	0
<input type="checkbox"/> Single Unit Long-Haul Truck	0	0	0
<input type="checkbox"/> Combination Short-Haul Truck	0	0	0
<input type="checkbox"/> Combination Long-Haul Truck	0	0	0
TOTAL		3,061	256

Note: users may overwrite default values in the table with local estimates where applicable.

OUTPUT
Calculate Output

EMISSION REDUCTIONS

Pollutant	Total (kg/day unless noted)
Carbon Monoxide (CO)	0.433
Nitrogen Oxide (NO _x)	0.391
Particulate Matter <2.5 μm (PM _{2.5})	0.034
Particulate Matter <10 μm (PM ₁₀)	0.062
Volatile Organic Compounds (VOC)	0.087
Carbon Dioxide (CO ₂)	376.115
Carbon Dioxide Equivalent (CO ₂ e)	376.553
Total Energy Consumption (MMBTU/day)	4.846

Note: emissions models have limited CO₂, CO₂e and energy estimates for alternative fuel vehicles; they only exist for E15 light-duty vehicles, CNG heavy-duty vehicles, and all FCV vehicles.

Emissions Reductions of Alternative Fuel for LPG Passenger Vehicles/Trucks based on FHWA CMAQ Emissions Calculator Toolkit

Unrestricted Access Alternative Fuel Infrastructure

This calculator will estimate the reduction in emissions resulting from developing alternative fuel infrastructure with unrestricted access. The calculator does not consider lifecycle emissions, particularly it refrains from estimating any emissions that may occur outside of vehicle operations. Note that this calculator does not apply to transit buses, which are included in a separate tool.

[User Guide](#)

INPUT

(1) What is your project evaluation year?

(2) Please input the estimated number of vehicles in your study area

(3) Which alternative fuel will be supplied at this new infrastructure?

(4) Please enter the projected market share of replacement alternative fuel vehicles after construction of the new infrastructure

(5) Please unselect below any vehicle source type(s) that will not have alternative fuel vehicle purchases and then click the button to fill the table with default estimates for populations and activity per vehicle

Vehicle Source Type	Average Annual Miles Traveled Per	Number of Existing Conventional Fuel Vehicles	Number of Replacement Alternative Fuel
<input checked="" type="checkbox"/> Passenger Car	11,154	4,051	17
<input checked="" type="checkbox"/> Passenger Truck	12,193	4,463	19
<input checked="" type="checkbox"/> Light Commercial Truck	12,542	523	2
<input checked="" type="checkbox"/> School Bus	10,325	17	0
<input type="checkbox"/> Refuse Truck	0	0	0
<input type="checkbox"/> Single Unit Short-Haul Truck	0	0	0
<input type="checkbox"/> Single Unit Long-Haul Truck	0	0	0
<input type="checkbox"/> Combination Short-Haul Truck	0	0	0
<input type="checkbox"/> Combination Long-Haul Truck	0	0	0
TOTAL		3,061	38

Note: users may overwrite default values in the table with local estimates where applicable.

OUTPUT

[Calculate Output](#)

EMISSION REDUCTIONS

Pollutant	Total (lb/day unless noted)
Carbon Monoxide (CO)	0.000
Nitrogen Oxide (NOx)	0.003
Particulate Matter <2.5 um (PM _{2.5})	0.000
Particulate Matter <10 um (PM ₁₀)	0.000
Volatile Organic Compounds (VOC)	0.000
Carbon Dioxide (CO ₂)	N/A
Carbon Dioxide Equivalent (CO ₂ e)	N/A
Total Energy Consumption (MMBTU/day)	N/A

Note: emissions models have limited CO₂, CO₂e and energy estimates for alternative fuel vehicles; they only exist for E85 light-duty vehicles, CNG heavy-duty vehicles, and all FCV vehicles.

Emissions Reductions of Alternative Fuel for E85 vehicles based on FHWA CMAQ Emissions Calculator Toolkit

Unrestricted Access Alternative Fuel Infrastructure

This calculator will estimate the reduction in emissions resulting from developing alternative fuel infrastructure with unrestricted access. The calculator does not consider lifecycle emissions, particularly it refrains from estimating any emissions that may occur outside of vehicle operations. Note that this calculator does not apply to transit buses, which are included in a separate tool.

[User Guide](#)

INPUT

(1) What is your project evaluation year?

(2) Please input the estimated number of vehicles in your study area

(3) Which alternative fuel will be supplied at this new infrastructure?

(4) Please enter the projected market share of replacement alternative fuel vehicles after construction of the new infrastructure

(5) Please unselect below any vehicle source type(s) that will not have alternative fuel vehicle purchases and then click the button to fill the table with default estimates for populations and activity per vehicle

Vehicle Source Type	Average Annual Miles Traveled Per	Number of Existing Conventional Fuel Vehicles	Number of Replacement Alternative Fuel
<input checked="" type="checkbox"/> Passenger Car	11,154	4,308	113
<input checked="" type="checkbox"/> Passenger Truck	12,193	4,753	131
<input type="checkbox"/> Light Commercial Truck	0	0	0
<input type="checkbox"/> School Bus	0	0	0
<input type="checkbox"/> Refuse Truck	0	0	0
<input type="checkbox"/> Single Unit Short-Haul Truck	0	0	0
<input type="checkbox"/> Single Unit Long-Haul Truck	0	0	0
<input type="checkbox"/> Combination Short-Haul Truck	0	0	0
<input type="checkbox"/> Combination Long-Haul Truck	0	0	0
TOTAL		3,061	250

Note: users may overwrite default values in the table with local estimates where applicable.

OUTPUT

[Calculate Output](#)

EMISSION REDUCTIONS

Pollutant	Total (lb/day unless noted)
Carbon Monoxide (CO)	6.524
Nitrogen Oxide (NOx)	1.167
Particulate Matter <2.5 um (PM _{2.5})	0.010
Particulate Matter <10 um (PM ₁₀)	0.011
Volatile Organic Compounds (VOC)	0.652
Carbon Dioxide (CO ₂)	63.816
Carbon Dioxide Equivalent (CO ₂ e)	66.218
Total Energy Consumption (MMBTU/day)	0.454

Note: emissions models have limited CO₂, CO₂e and energy estimates for alternative fuel vehicles; they only exist for E85 light-duty vehicles, CNG heavy-duty vehicles, and all FCV vehicles.

Emissions Reductions for all electric vehicles and plug in hybrid based on FHWA CMAQ Emissions Calculator Toolkit

CMAQ Emissions Calculator Toolkit

Unrestricted Access EV Charging Infrastructure

This calculator will estimate the reduction in emissions resulting from developing electric vehicle charging infrastructure with unrestricted access. The calculator does not consider lifecycle emissions, particularly it refrains from estimating any emissions that may occur outside of vehicle operations. Electric transit buses and transit bus charging infrastructure are included in the Transit Bus Upgrades & System Improvements tool.

Navigator

INPUT

User Guide

(1) What is your project evaluation year?

(2) Please input the estimated number of vehicles in your study area

(3) Please enter the projected market share of replacement electric vehicles after construction of the new infrastructure
 %

(4) Please unselect below any vehicle source type(s) that will not have electric vehicle purchases and then click the button to fill the table with default estimates for populations and activity per vehicle

Select All
 Unselect All

Vehicle Source Type	Annual Miles Traveled Per Vehicle	Number of Existing Conventional Fuel Vehicles	Number of Replacement Electric Vehicles Projected
<input checked="" type="checkbox"/> Passenger Car	11,154	1,122	1,122
<input checked="" type="checkbox"/> Passenger Truck	12,193	1,239	1,239
<input type="checkbox"/> Light Commercial Truck	0	0	0
<input type="checkbox"/> School Bus	0	0	0
<input type="checkbox"/> Refuse Truck	0	0	0
<input type="checkbox"/> Single Unit Short-Haul Truck	0	0	0
<input type="checkbox"/> Single Unit Long-Haul Truck	0	0	0
<input type="checkbox"/> Combination Short-Haul Truck	0	0	0
<input type="checkbox"/> Combination Long-Haul Truck	0	0	0
TOTAL	0	0	0

Note: users may overwrite default values in the table with local estimates where applicable.

OUTPUT

Calculate Output

EMISSION REDUCTIONS

Pollutant	Total (kg/dsy unless noted)
Carbon Monoxide (CO)	298.392
Nitrogen Oxide (NOx)	17.562
Particulate Matter <2.5 μm (PM _{2.5})	0.351
Particulate Matter <10 μm (PM ₁₀)	0.397
Volatile Organic Compounds (VOC)	19.204
Carbon Dioxide (CO ₂)	27,891,892
Carbon Dioxide Equivalent (CO ₂ e)	28,082,271
Total Energy Consumption (MMBTU/day)	376.841

ZeroRPM reduced idling hours for Fire Trucks.

The following table is from MOVES3 project model run for Fire trucks idling. Where, emissions in Road 1 are due to restart and due to idling in Road 5.

Header	Body	Decode				
Road	NOx	Total_PM25	Brake_PM25	Tire_PM25	VOC	
1	9	0	0	0	3	
5	113	7	0	0	21	

Header	Body	Decode
Run	Header Item:	Item Value
	Report Description:	Summary Report
	Report Date/Time:	2023-2-21 8:53:11
	MOVES Output Database:	Jeff2022Proj_24102firetruck_out_20230221
	Emission Process:	All
1	Run Date/Time:	2023-02-21 08:50:05.0
1	Run Specification:	C:\Workspace\MOVES3\MOVES3_Input\MOVES3_ProjectLevel_241_02CleanCity_
1	Run Spec File Date/Time:	2023-02-21 08:50:02.0
1	Run Spec Description:	Project level Jefferson county April 2022, 15:00-15:59 One hour Fire
1	Mass Units:	g
1	Energy Units:	J
1	Distance Units:	mi
1	Time Units:	hour

#3 - VOC, NOx, and PM 2.5 Potential Reduction Worksheet for Project 241: Idle Free Zones			
Encouraging parents sit in idling car in pick up waiting zone to turn off engines by UWCA/Johnson Group			2/10/2023
1. Criteria & Assumptions			
Description	Assumption	Note	
(1) Data collection and assumptions			
# of Schools involved	29		
Total # of Carpools (C) ^[1]	700	cars	
Target % of carpools will be switched to shutting off engine (P) ^[2]	88%	%	
Total # of cars whose engine shut off due to program (TV) = (C) x (P)	613	vehicles	
Average waiting time(T)	0.70	hour	
# of picking up per day (DP)	1	times per day per vehicle	
VOC idling emissions (Rvoc) ^[3]	960.0	grams/idle hour	
NOx idling emissions (Rnox)	733.0	grams/idle hour	
PM 2.5 idling emissions (PMf)	29.0	grams/idle hour	
VOC start up emissions (Svoc)	240.0	grams/starts	
NOx start up emissions (Snox)	371.0	grams/starts	
PM 2.5 start up emissions (PMs)	5.0	grams/starts	
(2) Emission reduction calculations			
VOC emissions reduced per day (VOC r) = ((T) x (Rvoc) - (Svoc)) x (DP)/1,000	0.432	kilograms/day	
NOx emissions reduced per day (NOx r) = ((T) x (Rnox) - (Snox)) x (DP)/1,000	0.142	kilograms/day	
PM 2.5 emissions reduced (PM) = (TV) x ((T) x (PMf) - (PMs)) x (DP)/1,000	0.015	kilograms/day	
VOC emissions reduced per day (VOC r) in lbs., 1kilogram = 2.2046lbs.	0.952	lbs./day	
NOx emissions reduced per day (NOx r) in lbs.	0.313	lbs./day	
PM 2.5 emissions reduced (PM) in lbs.	0.034	lbs./day	
(3) VMT reductions	0.00	vehicle miles/day	
(4) Cost Effectiveness = (annualized cost) / (annual emission reduction)-- the lower number, the better			
Project life expectancy (n)	1	years	
Discount rate (i)	1%	used by ALDOT	
Capital recover factor (CRF) = $(1+i)^n * (i) / ((1+i)^n - 1)$	1.01000	capital recovery factor	
Project funding amount (C)	\$56,203	capital cost	
Project annual cost (AC) = (C)*(CRF)	\$56,765	\$ per year	
Number of days project affected per year (Day)	180	days per year	
Cost Effectiveness for VOC = (AC) / ((VOC r)*(Day))	\$730	\$ per kilogram per year	
Cost Effectiveness for NOx = (AC) / ((NOx r)*(Day))	\$2,219	\$ per kilogram per year	
Cost Effectiveness for total of VOC & NOx = (AC) / (((VOCr)+(NOxr))*(Day))	\$549	\$ per kilogram per year	
Cost Effectiveness for PM 2.5 = (AC) / ((PM)*(Day))	\$20,612	\$ per kilogram per year	
Note:			
[1]: Source: estimates based on the participants			
[2]: Estimated target after program			
[3]: Estimated passenger vehicle idle emissions and start emissions for parking 60 minutes or less, based on project level emissions of MOVES3 (turn off engine, park car, pick up child from school, and restart car. Assume average time is about 42 minutes. Emissions is given for a weekday of April 2022)			

Emission Reductions in Grams from MOVES3 Project Level Emission Analysis								
Header	Body	Decode						
Road	NOx	Total_PM25	Brake_PM25	Tire_PM25	VOC			
1	371	5	0	0	240			
5	733	29	0	0	960			
Links input file for MOVES3 Project Level Emission Analysis								
linkID	countyID	zoneID	roadTypeID	linkLength	linkVolume	linkAvgSpeed	linkDescription	linkAvgGrade
1	1073	10730	5	0	613	0	Idle Link	0
2	1073	10730	1	0	613	0	off-network start	0
Link Source Types input file for MOVES3 Project Level Emission Analysis								
linkID	sourceTypeID	sourceType	HourFractio					
1	21		0.59					
1	31		0.41					
Off-Network input file for MOVES3 Project Level Emission Analysis								
zoneID	sourceTypeID	vehiclePopulation	startFraction	extended	parkedVehicleFraction			
10730	21	362	1	0	0			
10730	31	251	1	0	0			
Operating Mode Distribution input file for MOVES3 Project Level Emission Analysis								
sourceTyp	hourDayID	linkID	polProcessID	opModelID	opModeFrz			
21	165	2	302	103	1			
21	165	2	316	103	1			
21	165	2	8702	103	1			
21	165	2	8716	103	1			
21	165	2	11002	103	1			
21	165	2	11016	103	1			
31	165	2	302	103	1			
31	165	2	316	103	1			
31	165	2	8702	103	1			
31	165	2	8716	103	1			
31	165	2	11002	103	1			
31	165	2	11016	103	1			
Run Spec Summary input file for MOVES3 Project Level Emission Analysis								
Output Database Server Name: [using default]								
Output Database Name: Jeff202201_3to4_Idle_Proj_Out_20230210								
Time Spans:								
Aggregate By: Hour								
Years: 2022								
Months: April								
Days: Weekdays								
Hours: Begin Hour: 15:00 - 15:59 and End Hour: 15:00 - 15:59								
Geographic Bounds:								
LINK geography								
Selection: Jefferson County, AL (01073)								
On Road Vehicles:								
Passenger Car - Diesel Fuel								
Passenger Car - Electricity								
Passenger Car - Ethanol (E-85)								
Passenger Car - Gasoline								
Passenger Truck - Diesel Fuel								
Passenger Truck - Electricity								
Passenger Truck - Ethanol (E-85)								
Passenger Truck - Gasoline								
Road Types:								
Off-Network								
Urban Unrestricted Access								
Pollutants and Processes:								
Running Exhaust (Road 5)								
Start Emissions (Road 1)								

Appendix F

The Johnson Management Group Annual Report

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Johnson Management Group Vehicle Audit Report Birmingham City Schools Vehicle Audits Fall 2021 through September 2022

JMG conducted 55 audits between Fall 2021 and Fall 2022. The following schools were included: Cornerstone, Parkway Christian, EPIC, Smith, Central Park, WJ Christian, Glen Iris, Washington, Gunn Christian, Tarrant Elementary, Hueytown Middle, South Hampton, Avondale, Oxmoor Valley, Fultondale, Midfield, Hayes, Jones Valley, Norwood, Wenonah, Inglenook, Robinson, Glen Oaks, Jackson-Olin, Green Acres, Parker, Tuggle, CF Hard, Cornerstone High, Gresham, i3 Academy, Pinson Valley, Ramsay, Center Point Elementary, Center Point High School, Midfield, Bryant, Bumpus, Berry, Dupuy, EPIC, Oliver, Deer Valley, Holy Family, Rudd, Parker, and Hoover Christian. The audits yielded 4,446 pieces of APCA literature being handed out and a total of 1,224 cars shutting off because of the message of turn the key and be idle free.

The following graphs summarize the vehicle audits for Birmingham City Schools (see Figure 1, and 2). For the period October 2021 through December 2021, JMG conducted 11 audits. Total outreach was 947 with 268 parents in compliance at 11 schools. (See Figure 1 and 2).

The following graphs summarize the vehicle audits for Birmingham City Schools (see Figure 3 through Figure 9). For the period January 2022 through September 2022, JMG conducted 44 audits. Total outreach was 3,138 with 890 parents in compliance at 44 schools. (See Figure 3 through Figure 9).

**FIGURE 1
JMG Vehicle Audits and Compliance
Fall 2021**

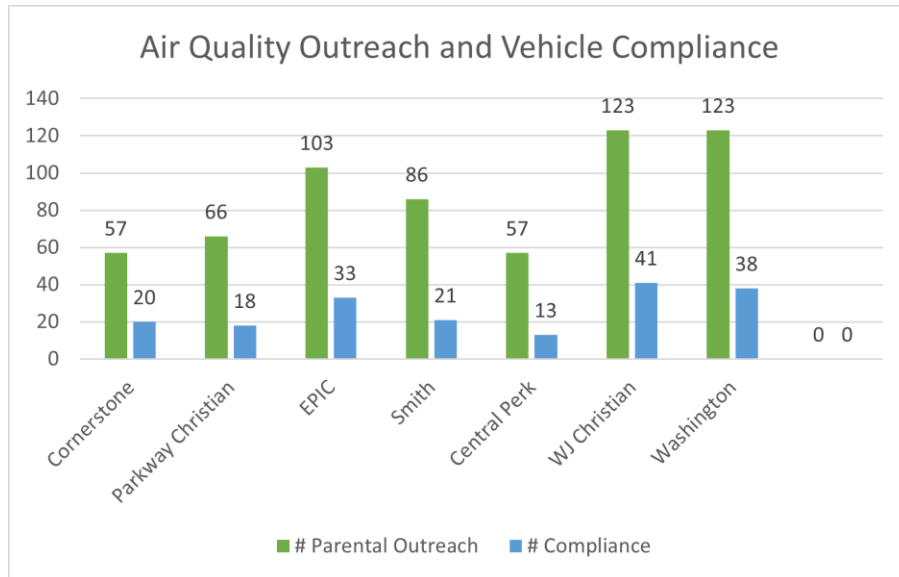


FIGURE 2
JMG Vehicle Audits and Compliance
Fall 2021

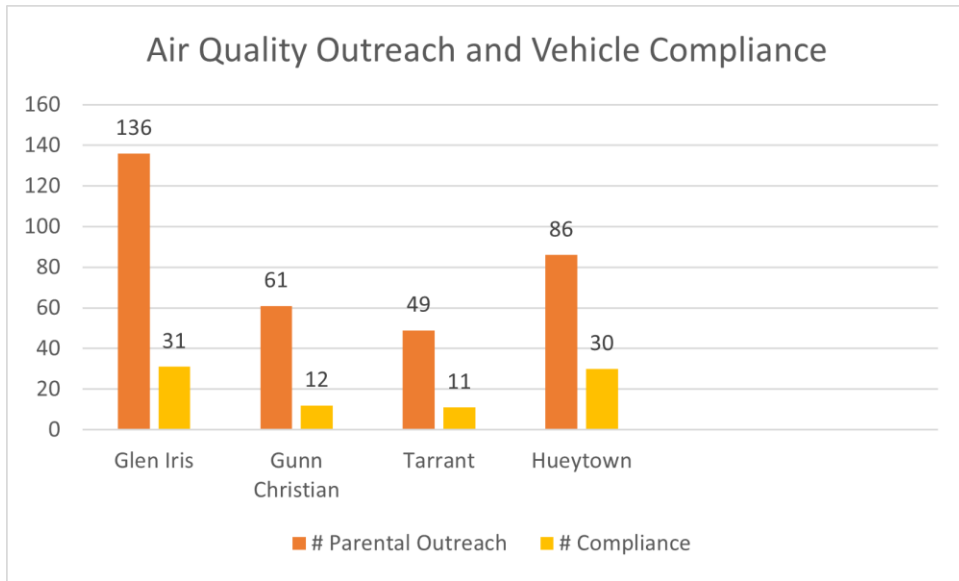


FIGURE 3
JMG Vehicle Audits and Compliance
January 2022

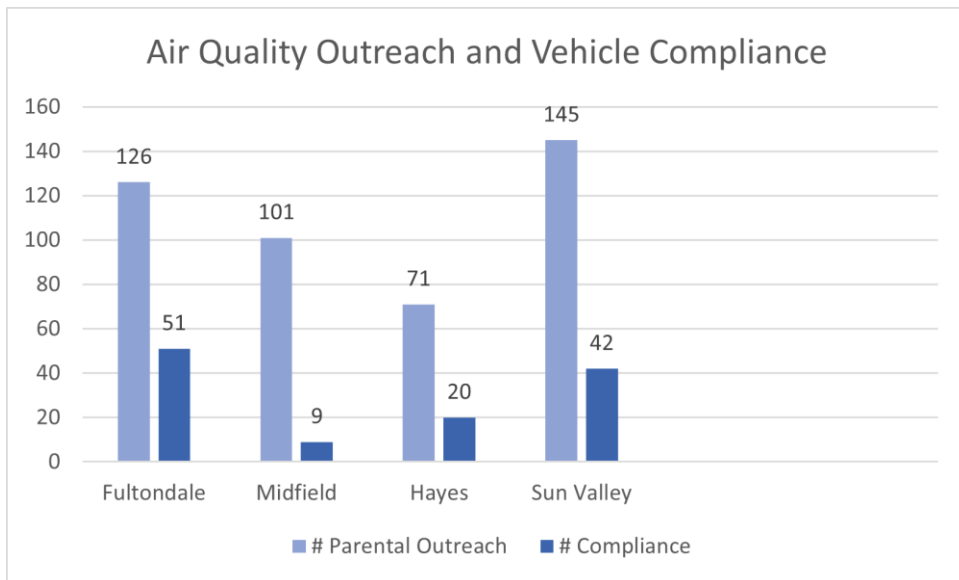


FIGURE 4
JMG Vehicle Audits and Compliance
February 2022

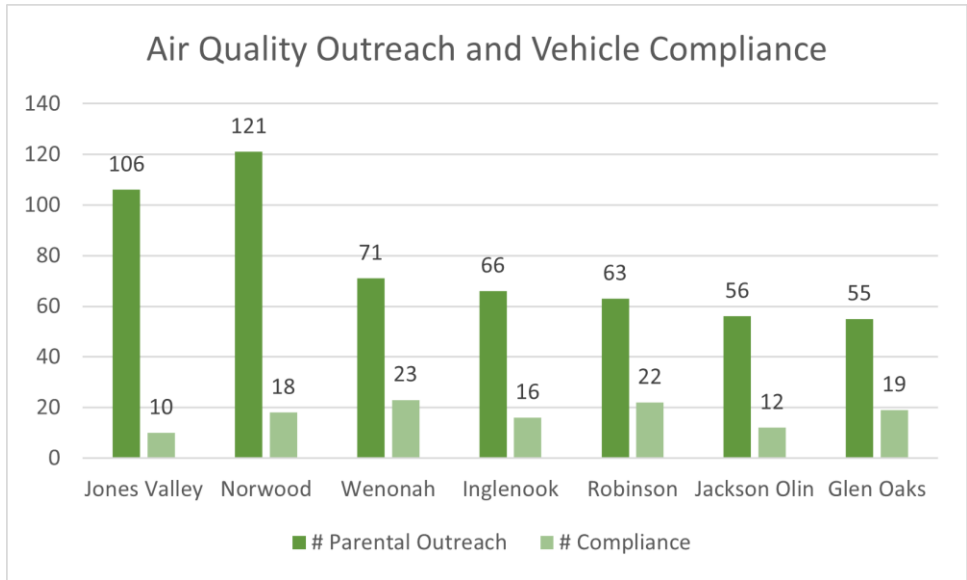


FIGURE 5
JMG Vehicle Audits and Compliance
March 2022

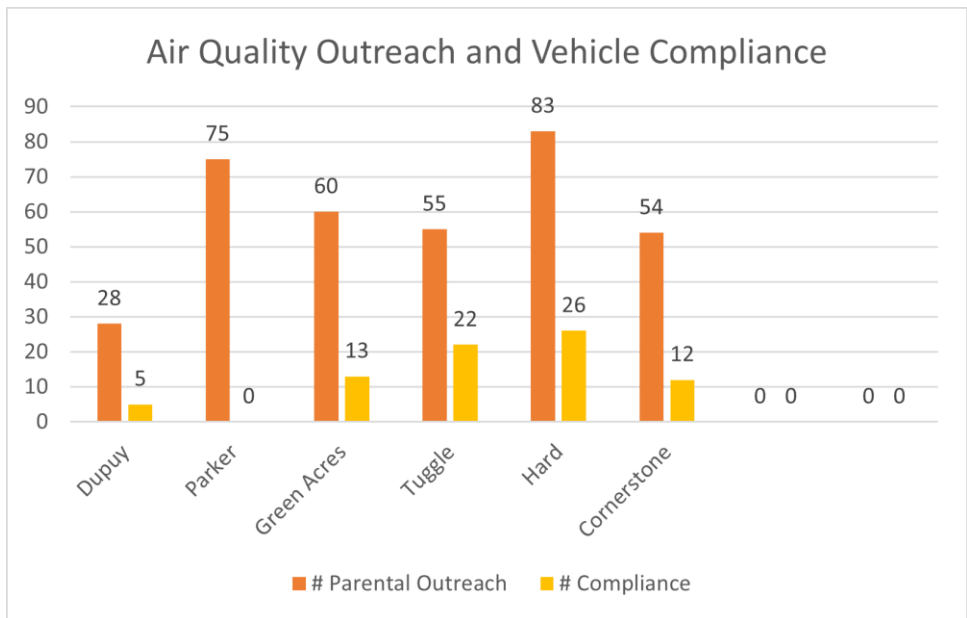


FIGURE 6
JMG Vehicle Audits and Compliance
April 2022

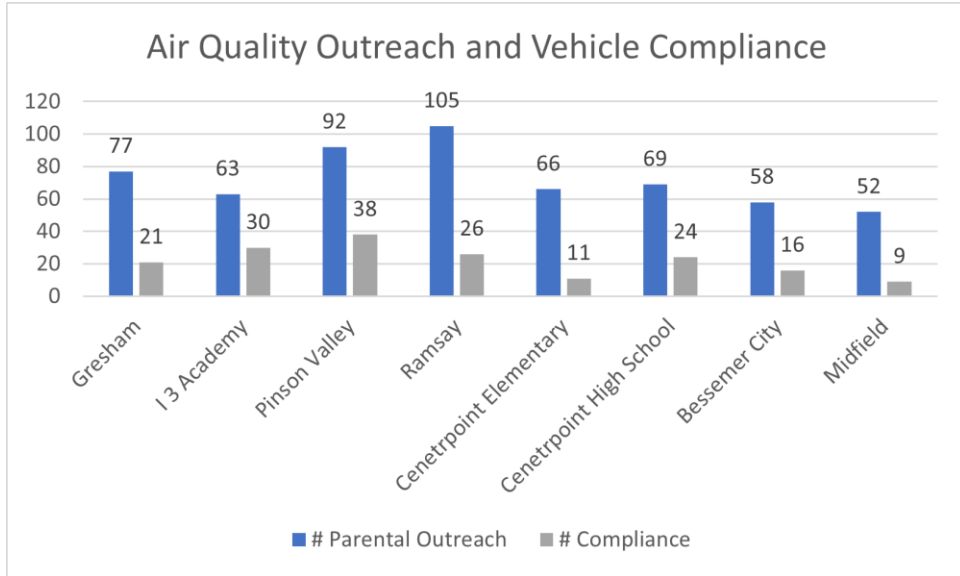


FIGURE 7
JMG Vehicle Audits and Compliance
May 2022

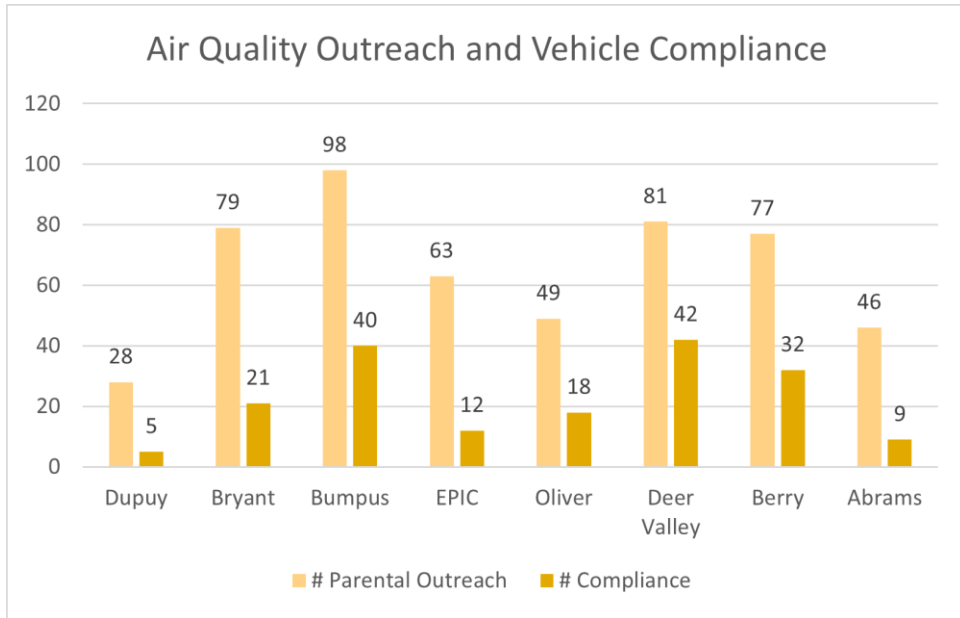


FIGURE 8
JMG Vehicle Audits and Compliance
June 2022

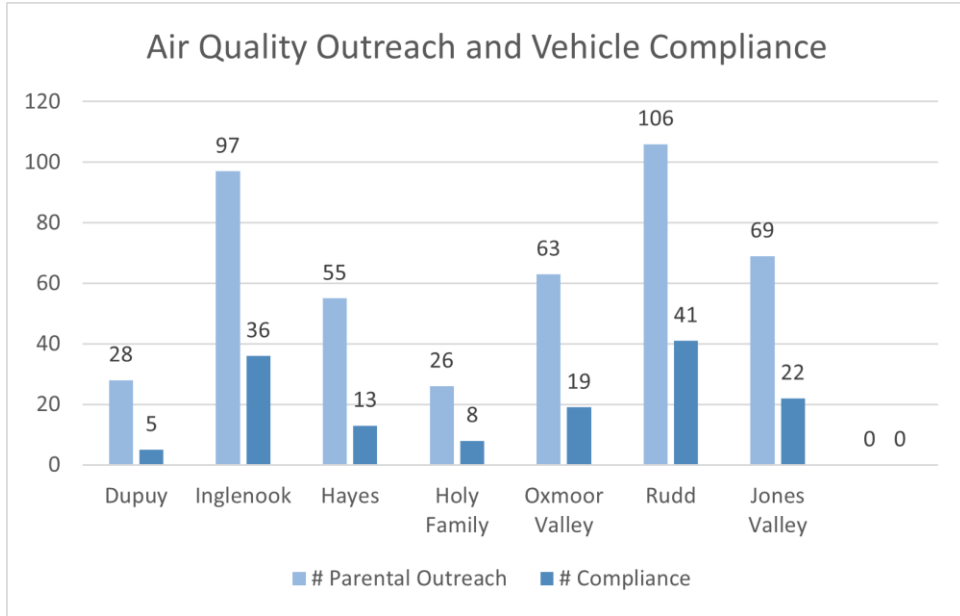
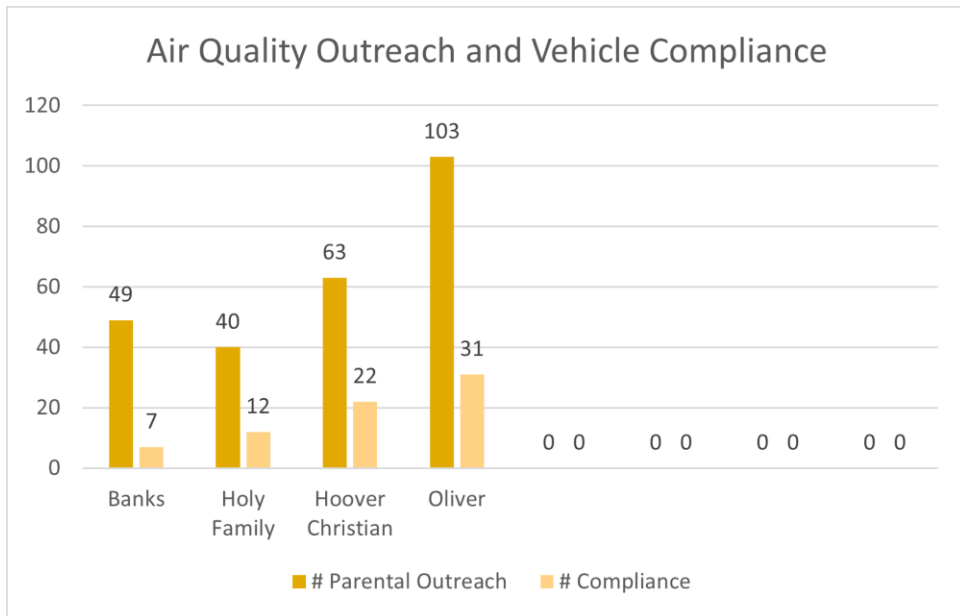


FIGURE 9
JMG Vehicle Audits and Compliance
September 2022



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