Clean Cities Coalitions

2016 Activity Report

Caley Johnson and Mark Singer

National Renewable Energy Laboratory

NREL is a national laboratory of the U.S. Department of Energy
Office of Energy Efficiency & Renewable Energy
Operated by the Alliance for Sustainable Energy, LLC

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Technical Report
NREL/TP-5400-70109
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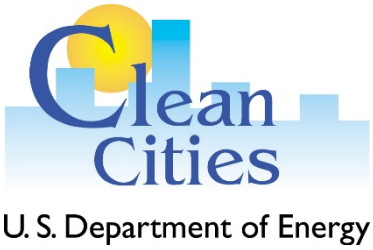
List of Acronyms

AFDC	Alternative Fuels Data Center
AFV	alternative fuel vehicle
CNG	compressed natural gas
DOE	U.S. Department of Energy
E85	high-level ethanol blend
EPA	U.S. Environmental Protection Agency
EUI	energy use impact
EV	all-electric vehicles
EVSE	electric vehicle supply equipment
GGE	gasoline gallon equivalent
GHG	greenhouse gas
GREET	Greenhouse Gas, Regulated Emissions, and Energy Use in Transportation tool
HDV	heavy-duty vehicle
HEV	hybrid electric vehicle
IR	idle reduction
kWh	kilowatt hour
LDV	light-duty vehicle
LNG	liquefied natural gas
MGGE	million GGE
NCFP	National Clean Fleets Partnership
NREL	National Renewable Energy Laboratory
ORNL	Oak Ridge National Laboratory
PEV	plug-in electric vehicle
PIM	Petroleum Impact Model
RNG	renewable natural gas
VMT	vehicle miles traveled
WPCC	Workplace Charging Challenge

Acknowledgements



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This publication is part of a series. Past Clean Cities Coalitions Activity Reports and multi-year data compilations can be found at *www.afdc.energy.gov*.

Introduction

The U.S. Department of Energy's Vehicle Technologies Office (VTO) works with local Clean Cities coalitions across the country as part of its Technology Integration Program. These efforts help businesses and consumers make smarter/more-informed transportation energy choices which can save energy, lower costs, reduce reliance on imported oil, and reduce emissions. This report summarizes the success and impact of coalition activities based on data and information provided in their annual progress reports.

A national network of nearly 100 Clean Cities coalitions, whose territory covers 80% of the U.S. population, brings together stakeholders in the public and private sectors to use alternative and renewable fuels, idle-reduction (IR) measures, fuel economy improvements, and new transportation technologies as they emerge. To ensure success, coalitions leverage a robust set of expert resources and tools provided by national laboratories and DOE. From technical assistance and handbooks, to websites and targeted analysis, these resources complement every facet of coalition success. This strong national framework of resources, which facilitate consistent vision and informed coalitions, is a hallmark of the program.

Each year, Clean Cities coordinators submit annual reports of their activities and accomplishments for the previous calendar year. Data and information are submitted via an online tool that is maintained as part of the Alternative Fuels Data Center (AFDC) at the National Renewable Energy Laboratory (NREL). Coordinators submit a range of data that characterize the membership, funding, projects, and activities of their coalitions. They also submit data about sales of alternative fuels; use of alternative fuel vehicles (AFVs), plug-in electric vehicles (PEVs), and hybrid electric vehicles (HEVs); IR initiatives; fuel economy improvement activities; and programs to reduce vehicle miles traveled (VMT).

Clean Cities Coalitions use an online tool to report advanced vehicle tech activity, infrastructure development, and relevant energy/fuel use information for their region.

This report compiles the accomplishments of all coalitions in calendar year 2016. During this year, all active coalitions (as listed in Appendix A) completed reports, representing a response rate of 100%. Coalition coordinators assembled the data based on voluntary reports from their stakeholders—the private and public entities that are members of the coalitions. As such, each of these reports represents a subset of Clean Cities coalition activities throughout the nation, and taken together, they are an important indicator of how data, information, and resources can be effectively leveraged through the national network of Clean Cities coalitions and stakeholders to achieve significant results. Accomplishments from the National Clean Fleets Partnership (NCFP) are also reported directly from the partners.

NREL analyzes the submitted data to determine how broadly energy use in the U.S. has shifted due to coalition activities. The two main components of energy use tracked by NREL are (1) energy savings from efficiency projects measured in gasoline gallon equivalents (GGEs), and (2) alternative fuel use. The alternative fuel use numbers in this report have been adjusted to account for any gasoline or diesel content (e.g.; with biodiesel or ethanol blends) as well as for any conventional fuels used upstream to produce, distribute, or deliver alternative fuels. Efficiency

differences between AFVs and conventional vehicles are also taken into account[1]. Ultimately, these two components are combined and reported as Energy Use Impact (EUI) in GGEs. The EUI is a metric that measures combined progress in both reduced fuel use and increased fuel diversity. Reduced fuel use makes our transportation system more energy efficient, and increased diversity through domestic alternative fuels provides consumers and businesses more energy choices. When achieved at-scale, both strategies support DOE's mission of more secure energy. This report summarizes the EUI as well as the related emission reduction impacts of coalition activities.

A compilation of data from this report, along with reports from previous years, can be accessed on the AFDC's Maps and Data page (*afdc.energy.gov/data/categories/clean-cities*). Previous years' reports can be downloaded in their entirety at *www.afdc.energy.gov*.

Summary of Key Findings

Clean Cities coalitions activities resulted in an EUI of nearly 1 billion GGEs comprised of net alternative fuels used and conserved energy in 2016. Table 1 represents the combined results of all strategies to increase fuel diversity and energy efficiency in the nation's fleet. The EUI from coalition activities increased 9% in 2016[2], increasing over the previous year across all project types. Participation in vehicle and infrastructure development projects remained strong, as did alternative fuel use and resulting overall energy use impact.

Table 1. Energy Use Impact of Each Portfolio Element

Project Type	Program Impact (MGGEs)	Percent of Total Coalition Impact [a]	Increase from Last Year
Alt. Fuels and Vehicles	**736.5**	**75%**	**15%**
HEVs, PHEVs, & EVs	**100.3**	**10%**	**9%**
Fuel Economy	**42.8**	**4%**	**24%**
Idle Reduction	**38.9**	**4%**	**6%**
VMT Reduction	**28.5**	**3%**	**10%**
Off-Road	**16.7**	**2%**	**52%**
Estimated Outreach Impact	**14.4**	**1%**	**-74%**
Total Energy Use Impact [3]	**978.2**	**100%**	**9%**

[a] Totals and subtotals may differ from the sums due to rounding.

[1] Net alternative fuel used, and energy conserved in this report are expressed in gasoline gallon equivalents (GGEs), using the lower heating value ratio of the fuels.
[2] The impact from coalition-reported projects would have been greater, but beginning in 2014, VMT-reduction projects were capped at 10% of any coalition's total reported impact.
[3] The *2016 Clean Cities Coalitions Activity Report* is focused on the impacts of coalition activities and projects and excludes related DOE-led efforts that were included in this report in previous years.

Clean Cities coalition activities reduce emissions as energy use is impacted. Table 2 shows coalition-reported activities prevented 4.5 million carbon dioxide-equivalent tons of emissions (only greenhouse gas [GHG] emissions are reported here; criteria pollutants and other emissions are not included in this report).

Coalitions increased their energy impact in all project areas, and overall energy impact rose to nearly 1 billion GGEs, despite historically low gasoline prices.

Table 2. Emissions Reduced by Clean Cities Coalitions in 2016

Project Type	Tons of GHG Emissions Averted	Equivalent of Conventional Cars Removed [a]	Percent of Coalition Total
Alternative Fuels and Vehicles	2,012,531	457,894	45%
HEVs	734,310	167,072	16%
Fuel Economy Improvements	530,818	120,773	12%
Idle Reduction	476,464	108,406	11%
VMT Reduction	351,077	79,878	8%
EVs and PHEVs	188,812	42,959	4%
Off-Road Vehicles	111,111	25,280	2%
Outreach Events Estimate	89,064	20,264	2%
Coalition Total	4,494,185	1,022,526	100%

[a] Calculated as total passenger car GHG emissions (Table 2–13 in the U.S. Environmental Protection Agency's (EPA's) *Inventory of GHG Emissions and Sinks:1990-2015*) divided by total short wheelbase light-duty vehicles (Table VM-1 in the Federal Highway Administration's *Highway Statistics*, 2015).

Coalitions were successful in securing project awards from numerous (non-DOE) outside sources (for other Federal, State, and local agencies and private sector foundations; see project funding section on p.25). The 103 project awards in 2016 led to another $31 million in additional funds from coalition members and project partners. In macro terms, this supplemental funding represents nearly a 3:1 leveraging of the $24 million DOE Clean Cities program budget in Fiscal Year 2016.

Clean Cities coordinators spent nearly 133,000 hours pursuing their coalitions' goals in 2016. The average coordinator is quite experienced, and on average has held their position for at least 8 years. Coordinators logged more than 3,600 outreach, education, and training activities in 2016, which reached an estimated 5 million people. This amount of activity is equivalent to an estimated 14.4 million GGEs in net alternative fuel use and energy savings.

Changes to the 2016 Report

The program's 2016 Clean Cities Coalitions Activity Report differs from its predecessors in several ways. Some of these indicate a change in the technologies now available, some indicate a change in the reporting process, and some indicate a change in the way the report was written. These changes include:

- Criteria pollutants were calculated and added to the annual reporting tool this year. However, criteria pollutants are very dependent on local conditions and context. Therefore, they are included in the local coalition-specific progress reports but not in this aggregated national roll-up report.
- **The common metric tying all technologies together is now Energy Use Impact (EUI)**. The EUI combines multiple metrics into a universal, easier to understand, unit where a positive (larger number) is always better. This helps to eliminate confusion from metrics that seem to conflict (e.g.; a smaller or lower 'energy use' number is generally better, but it can also be reported as 'energy savings,' where a bigger number is better – very confusing). EUI is a combined measure of lifecycle petroleum displaced by alternative fuels and petroleum saved from IR, Fuel Economy, and VMT reduction projects.

  Energy Use Impact (EUI) is the common metric tying all technologies together. EUI combines lifecycle petroleum displaced by alternative fuels and energy saved from IR, Fuel Economy, and other projects.

- Accomplishments from the National Clean Fleets Partnership were fully integrated with the rest of the Clean Cities coalition accomplishments. Some were reported through coalitions, while some were reported to NREL and attributed to coalitions, and others were reported to NREL and not attributed to coalitions.
- DOE's Workplace Charging Challenge initiative has concluded. Data from that activity is no longer included in this report.
- Progress and accomplishments highlighted in this report are primarily focused on activities undertaken by local Clean Cities coalitions and participating stakeholders. Impacts resulting from national lab efforts and DOE Vehicle Technologies Office (VTO) program-wide initiatives like *www.fueleconomy.gov* and *www.afdc.energy.gov* are not included in this report.

Attribution and Fuel Use Factors

To clarify the link between coalition activities and end results, this coalition annual report includes an attribution factor that accounts for the percentage of a project's outcome that may be due to coalition activities rather than to the activities of other project participants. This attribution factor was used in the estimates of impacts for fuel economy, VMT reduction, IR, alternative fuel use, and outreach projects. Coordinators estimated the percentage of the project's outcome that their coalition was responsible for, then the project's overall outcome was multiplied by that percentage to determine the individual coalition's impact. Although subjective, this method attempts to address the issue of attribution where a coalition is one of

several partners involved in a project. To reduce the subjectivity of this factor, NREL provides a tool to help a coalition estimate its contribution to a given project.

Coalition-Reported Data

Coordinators submitted information about their stakeholders' alternative fuel use and energy savings, broken down according to the technologies in the Technology Integration portfolio. NREL analyzed the data, converted it into an equivalent net quantity of gasoline for each element of the portfolio, and reported the data in units of GGEs—the amount of energy contained in a gallon of gasoline. As shown in Table 1, about 978 million GGEs (MGGEs) of energy were impacted through Clean Cities coalition efforts in 2016. This is 9% higher than the total impact of 897 MGGEs reported in 2015.

Clean Cities coalitions work with local fleets led to a substantial reduction in harmful emissions. To estimate the GHG reductions resulting from Clean Cities coalition activities, NREL used a variation of the GREET model[4]. This model accounts for the fuel life-cycle, or "well-to-wheels" factor of GHG emissions for transportation fuels, which includes fuel production, transport, and usage in the vehicle. It does not consider the emissions from indirect land use changes or vehicle manufacturing.

Alternative Fuels and Vehicles

As shown in Table 1, alternative fuels (used in AFVs and in biodiesel blends) and fuel savings from HEVs collectively accounted for approximately 837 MGGEs, or 87% of the coalition-reported net alternative fuel use and energy savings. This is an increase of 14% more than was reported in 2015.

8 out of 10 alternative fuel technologies saw an increase in numbers of vehicles in 2016, with renewable diesel and renewable natural gas growing the fastest.

In 2016, coalitions reported a total inventory of more than 1.1 million AFVs, split among 10 fuel and technology types. This represents a 41% increase from last year. The data indicates a significant growth in the use of renewable diesel (RD) and renewable natural gas (RNG, or bio-methane). In the case of renewable diesel, most of the usage resulted from recent California mandates requiring its use in all diesel fleets operating in the state. To comply, a number of fleets that were formerly using biodiesel have made the switch. Similarly, numerous compressed natural gas (CNG) fleets that were previously using fuel supplied from conventional pipeline gas have been switching to RNG when it is available (primarily due to tax incentives and new sustainability policies and goals). The reported number of vehicles using renewable diesel showed more than a 2,000% increase. The number of vehicles using RNG grew by 216% from a baseline of 366 vehicles.

PEVs and flexible fuel vehicles (FFVs) that can operate on E85 (a high-level ethanol blend) grew by 76% and 68% respectively. HEVs and liquefied natural gas (LNG) vehicles increased significantly (38% and 24%, respectively). Propane vehicles and hydrogen vehicles remained

[4] Argonne National Laboratory. 2015. The Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET) Model.

stable with a 4% and 2% growth, respectively. CNG and vehicles operating on biodiesel showed declines of 8% and 15%, respectively. Some of this decline can be attributed to a change in how the number of biodiesel vehicles is estimated when coalitions reported refueling station projects. New data indicates that each vehicle uses more biodiesel annually than originally thought, so the calculator now reflects fewer vehicles per quantity of biodiesel sold. Additionally, as noted above, some of the decline has resulted from the shift to renewables and are now being reported in those new (RD and RNG) categories.

The EUI from alternative fuel use in capable vehicles or fuel efficiency from HEVs increased from 2015 to 2016 for all vehicle types except hydrogen and LNG (with decreases of 30% and 15%, respectively). Renewable diesel and RNG use increased drastically by more than 3,000% and 495%, respectively. Use of biodiesel, propane, and electricity used in PEVs increased by more than 20% (31%, 23%, and 22%, respectively). The EUI from use of CNG, E85, and HEVs showed slower growth at 7%, 5%, and 2%, respectively.

Figure 1 shows the percentage of EUI according to fuel type. CNG remains at the top of the list, accounting for 51% of the EUI, even though only 9% of the total AFVs use CNG. This is in stark contrast to E85, which accounts for only 9% of the alternative fuel vehicle EUI, although 41% of reported AFVs can use E85.

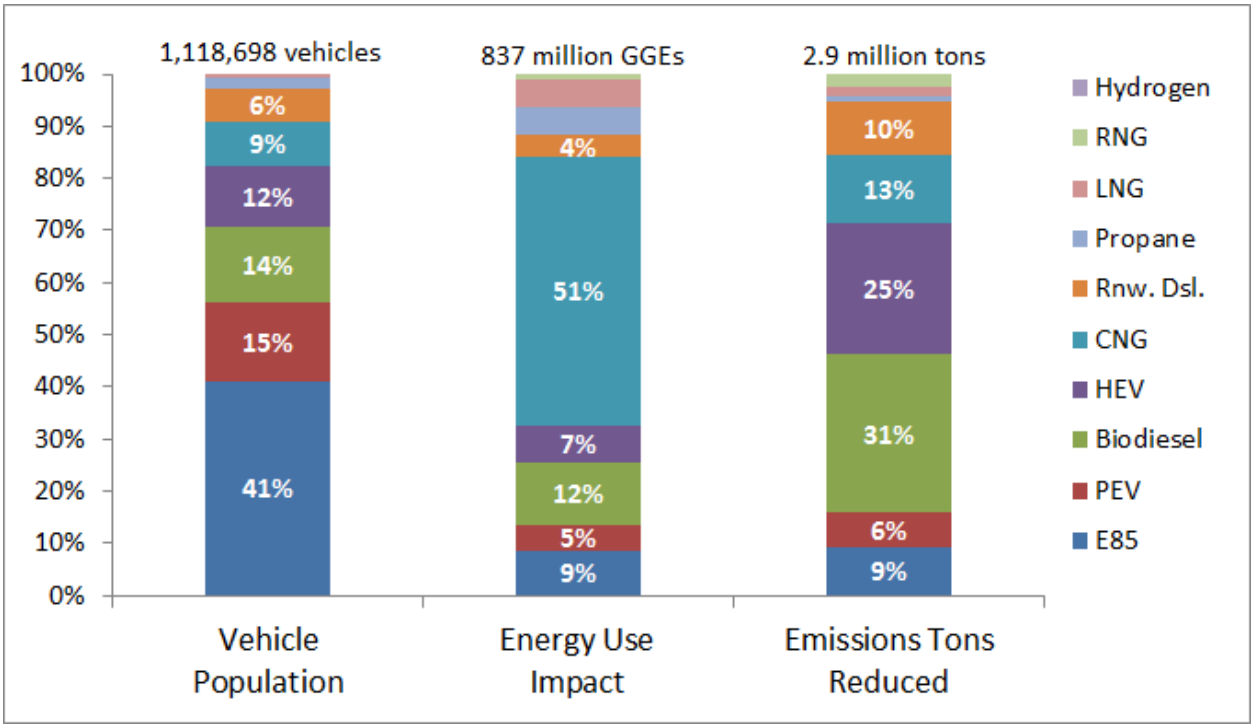

Figure 1. 2016 percentage of AFVs, EUI, and emissions reductions by fuel type

Supporting data can be downloaded from www.afdc.energy.gov/data/

The average EUI per vehicle, shown in Table 3, reveals some interesting trends. For a given vehicle, this number is influenced by four factors:

1. Dedicated alternative fuel vehicles (those that can only operate on alternative fuel) have a higher EUI than flex-fuel, dual-fuel, or bi-fuel vehicles that can switch between fuels. Simply stated, dedicated AFVs use alternative fuel 100% of the time, while those with interchangeable fuel systems may only use alternative fuel some of the time or at lower levels.
2. The number of miles per year that the AFV travels (higher mileage uses more alternative fuel).
3. The AFV's fuel consumption. Large vehicles that are doing more work tend to consume more fuel. Therefore, Table 3 shows light-duty vehicles (LDVs) and heavy-duty vehicles (HDVs) separated to increase fidelity.
4. The amount of conventional fuel contained in the alternative fuel (e.g.; E85 still contains 15% gasoline and B20 still contains 80% conventional diesel. Therefore, only a portion of the fuel consumed counts toward the alternative fuel usage).

Table 3. Average Annual EUI per Vehicle

Fuel	GGEs per HDV	# of HDVs	GGEs per LDV	# of LDVs
LNG	9,179	4,924	none reported	0
CNG	7,408	51,802	992	46,586
RNG	6,829	961	4,576	196
Hydrogen	6,153	67	830	30
HEV	3,145	7,615	292	122,212
PEV	3,140	6,078	131	164,933
Propane	2,407	13,803	1,247	9,845
Biodiesel	728	117,356	373	43,407
Renewable Diesel	483	69,504	978	1,562
E85	259	8,692	153	449,125

Alternative fuels and AFVs were responsible for more GHG emissions reductions than any other coalition-reported activity. These reductions were calculated by subtracting the life-cycle GHG emissions resulting from the use of an alternative fuel in a vehicle from the life-cycle GHG emissions resulting from the use of gasoline or diesel fuel in an equivalent vehicle. For these calculations, gasoline is considered the baseline fuel for all LDVs, except in the case of biodiesel, for which conventional diesel fuel is used as the baseline fuel. Gasoline is considered the baseline fuel for HDVs using E85, CNG, LNG, and propane, because these vehicles are equipped with spark-ignition (gasoline-like) engines. For all other alternative fuel HDVs, we used conventional diesel fuel as the baseline.

As shown in Figure 1, the emissions reductions are not necessarily proportional to the alternative fuel used because the various alternative fuels emit different levels of life-cycle emissions. RNG is a prime example of a fuel that has extremely low life-cycle emissions because it has the net effect of reducing methane (a potent GHG) emissions from landfills, wastewater treatment facilities, and farms. It is also worth noting that VMT reduction, HEVs, IR, and fuel economy improvement projects have a disproportionately high emissions reduction compared to their EUI because these conservation measures "eliminate" 100% of the emissions that would have resulted from the fuel they save. Alternative fuel vehicles generally demonstrate a net "reduction" in emissions compared to vehicles that use conventional fuels.

The average Energy Use Impact of a heavy-duty vehicle in the Technology Integration program is more than nine times as much as a light-duty vehicle.

Heavy-duty vehicles represented 25% of the reported AFVs. These HDVs are responsible for 76% of the alternative fuel use. The average HDV that operates on alternative fuels uses 9.3 times as much fuel as the average LDV. The use of LNG is confined exclusively to HDVs. Likewise, the overwhelming majority of renewable diesel, hydrogen, CNG, RNG, and biodiesel is used by HDVs (96%, 94%, 89%, 88%, and 84%, respectively). HDVs accounted for 73% of all propane use. Contributions from PEVs were evenly split between LDVs and HDVs (53% and 47%, respectively). The only technologies whose contributions were dominated by LDVs were E85 (with only 3% from HDVs) and HEVs (60% from LDVs).

Fuel Economy

Coalitions complete a range of fuel economy projects aimed at using energy more efficiently. Figure 2 includes the range of fuel economy technologies advanced by coalitions. Non-HEV coalition-reported fuel economy projects increased 24% in 2016, resulting in a savings of close to 43 MGGEs, making it the second fastest-growing technology category. There were more than 104,000 vehicles in the non-HEV technology category, equating to an average energy savings of 411 GGEs per vehicle. Figure 2 shows that some fuel economy improvement projects were much more effective than others. The "hydraulic hybrid vehicles" category showed a significant opportunity for additional growth, as it provides such high energy-use savings per vehicle and is not widely utilized by Clean Cities coalitions at this time.

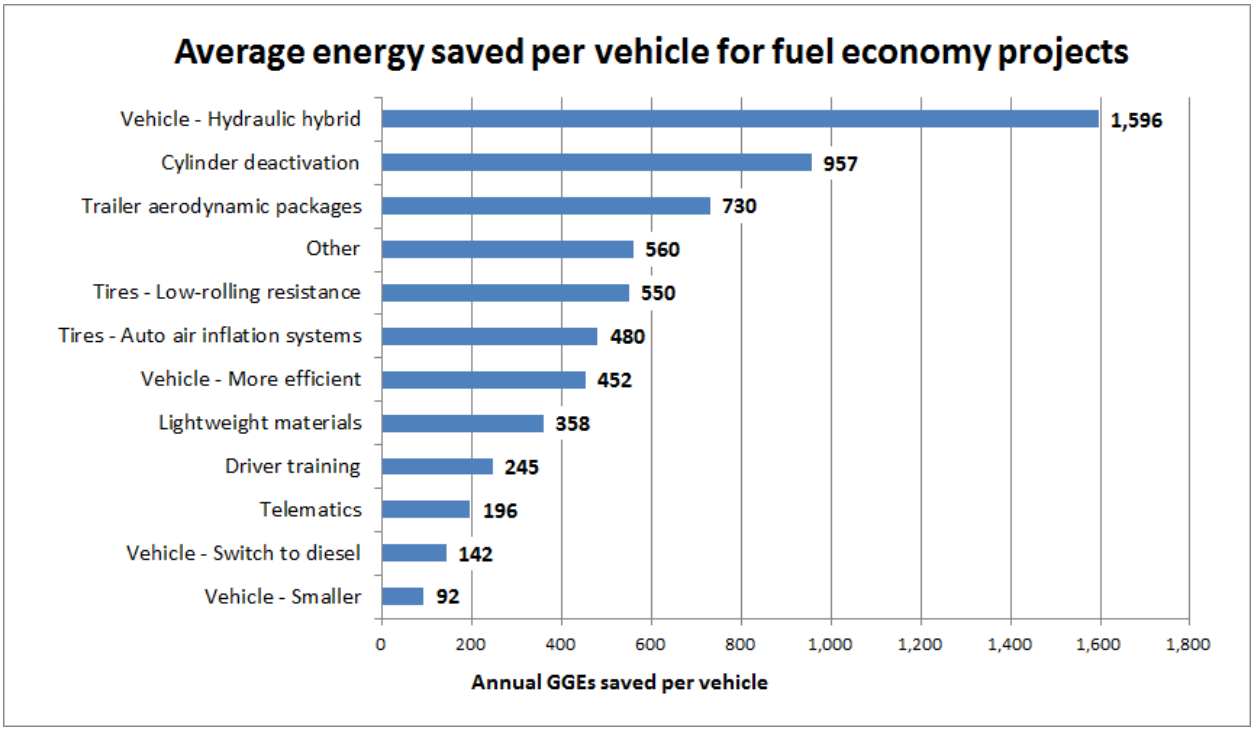

Figure 2. Average energy saved per vehicle for 2016 Clean Cities coalition fuel economy projects

Vehicle Miles Traveled Reduction

VMT-reduction projects save fuel and therefore money, while simultaneously curbing emissions by way of reducing the miles that vehicles travel. These types of projects include strategies such as carpooling, biking, teleworking, and public transportation. Sixty-seven of the 84 (80%) reporting coalitions reported at least one VMT-reduction project in 2016. The total number of these types of projects reported by coalitions increased in 2016 to 399. VMT projects are generally outside the scope of advanced vehicle, fuel, and systems research addressed by VTO. Since the primary purpose of this report is to analyze and document the impact of Clean Cities coalition efforts related to VTO technologies the contribution of VMT projects are limited to 10% of any given coalition's total contribution. This cap affected 25 coalitions; however, even with this limit in place, coalitions saved 28.5 MGGEs of fuel. The project types, numbers, and sizes of the VMT projects are shown in Table 4.

Table 4. VMT-Reduction Project Types, Number, and Energy Savings

Project Type	Number of Projects	Increase in # of Projects	GGEs Saved per Project [a]	DOE-claimed GGEs Saved per Project
Carpooling	76	2	206,704	84,728
Mass Transit	69	-1	497,247	210,419
Non-Motorized Locomotion (e.g., bicycles)	66	-6	16,005	14,741
Route Optimization	63	32	35,589	26,310
Other	54	-22	67,428	26,457
Telecommute	26	-7	28,063	18,277

Project Type	Number of Projects	Increase in # of Projects	GGEs Saved per Project [a]	DOE-claimed GGEs Saved per Project
Car Sharing (e.g., Zipcar)	23	1	21,533	15,651
Compressed Work Week	12	2	4,277	3,791
Vanpooling	10	10	348,516	260,013
Total	**399**	**11**	**154,688[a]**	**71,424**

[a] GGEs per project calculated before the 10% limit of coalition overall energy savings was implemented.

Idle Reduction

The average Idle Reduction project saved more energy in 2016 than in 2015.

The estimated energy savings in 2016 for IR technologies and policies was 39 MGGEs. The number of IR projects decreased 10% in 2016, yet the quantity of energy that these projects saved increased 6%. As shown in Figure 3, auxiliary power units were responsible for the greatest percentage (31%) of energy savings. IR policies, automatic engine shutoff, and direct-fire heaters followed with significant percentages (16%, 15%, and 11%, respectively). The other category and truck-stop electrification contributed 9% each. The remaining methods combined to represent 9% of the total savings.

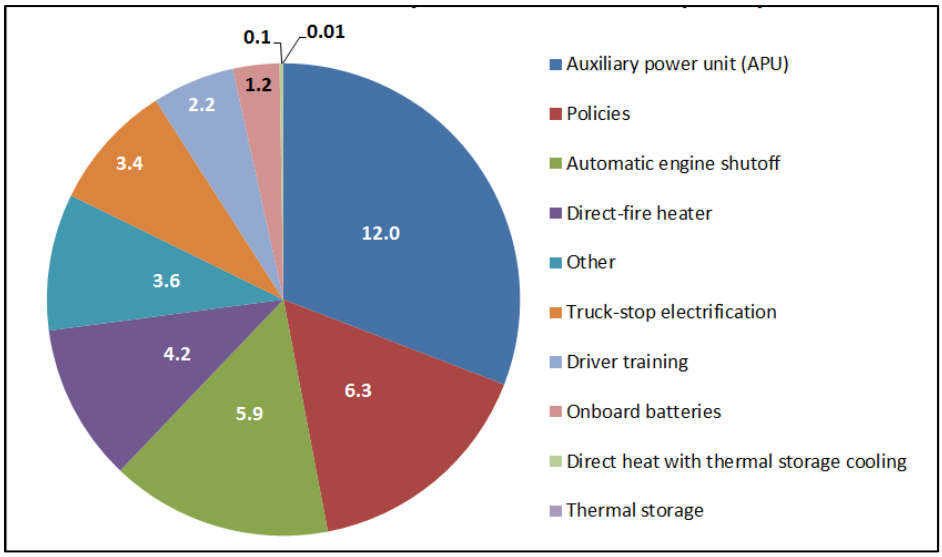

Figure 3. Energy savings measured in MGGEs from IR projects

Off-Road Vehicles

Coalition impact extends beyond the road. Off-road project energy use impact grew by 52% in 2016.

Vehicles used in off-road applications contributed to the overall accomplishments reported by coalitions. Many of these projects were born out of synergy with on-road projects, utilizing many of the same alternative fuels, technologies, and strategies. Table 5 shows the number of off-road vehicles (or pieces of equipment) reported by coalitions in 2016. These categories are self-descriptive, except for "construction equipment," which includes cranes, earth movers, and similar equipment. The "recreation equipment" application includes jet skis, snowmobiles, and all-terrain vehicles.

The number of off-road vehicles increased 57% from 2015 to 2016, and their overall EUI increased 52%. Railroads represented the largest growth in number of vehicles since 2015, with a 236% increase. The largest EUI contribution came from ships, with an impact of more than 6 MGGEs.

Table 5. Number of Off-Road Vehicles or Equipment and EUI

Application	Number of Vehicles	Energy Use Impact (GGEs)	GGE saved per Vehicle
Construction Equipment	13,966	2,136,893	153
Other	7,611	2,749,362	361
Forklifts	3,762	1,720,581	457
Landscaping and Lawn Equipment	2,991	561,076	188
Mining Equipment	2,285	2,068,937	905
Recreational Equipment	616	108,146	176
Railroads	168	1,015,914	6,047
Street Sweeper	101	171,652	1,700
Ships	85	6,043,673	71,102
Farm Equipment	66	158,961	2,409
Planes	3	3,243	1,081
Total	**31,654**	**16,738,440**	**529**

Overall EUI contributions from off-road vehicles totaled 16.7 MGGE. Vehicles using biodiesel accounted for 68% of the AFVs included in this category. Vehicles using other fuels in off-road applications included propane (19%) and electric vehicles (9%). The other six fuels and technologies together accounted for just 4% of the total vehicles. Biodiesel use was focused in the mining equipment, ships, other equipment, and construction equipment applications. EVs were primarily used in railroads, forklifts, other equipment, and recreational equipment. Propane vehicles were primarily reported as forklifts, landscaping equipment, construction equipment, farm equipment, and other equipment. Applications varied widely in the number of GGEs saved per vehicle, as shown in Table 5.

National Partner Contributions

Nineteen national fleets have partnered with Clean Cities coalitions, sharing data reflecting efforts that span geographic areas larger than those of any single

In April 2011, DOE began partnering with national fleets that operate in more expansive geographic areas than any one coalition covers. The NCFP currently has 27 partners, who lead by example and are pace-setters for local stakeholder fleets to follow. Nineteen of them reported their fuel use data directly to NREL. NREL then allocated NCFP data to 79 individual coalitions based on fleet garage locations, refueling locations, and partner estimates. The coordinators then verified that they did assist the NCFP fleets operating in their region and claimed full, partial, or no credit for the partner's alternative fuel use that was attributed to them. The average partner worked with 11 coalitions as they implemented new technologies across the country. Table 6 shows the contributions (already reported as part of the overall EUI summary in Table 1) that national partners are responsible for.

Table 6. Vehicles, EUI, and Emissions Reduction from National Partners

Fuel	Vehicles	Energy Use Impact (GGEs)	GHG Emissions Reduced (tons)
CNG	21,083	105,798,862	91,429
LNG	1,755	32,042,363	32,138
Fuel Economy	30,406	20,851,711	258,560
Renewable Diesel	61,430	15,265,885	133,714
Propane	4,732	12,534,723	5,063
Biodiesel	2,170	9,357,085	81,958
EV and PHEV	5,457	8,635,895	35,007
HEV	2,155	1,097,118	13,514
Idle Reduction	4,949	612,735	7,598
Off-Road	334	399,178	2,538
Hydrogen	41	274,941	1,100
VMT Reduction	650	113,198	1,404
E85	2,072	56,673	213
Total	**137,234**	**207,040,367**	**664,235**

Estimated Contributions from Indirect Activities

This category measures impact from behavior changes such as vehicle purchases, fuel choice, driving habits, vehicle maintenance, and transportation patterns that were influenced by coalition outreach activities. Calculating these contributions involves a fair degree of uncertainty, but it is nevertheless important to quantify the impacts of educational and outreach activities as precisely as possible. Not doing so would imply that these activities had no impact, which is inaccurate. This section outlines our approach and provides the results.

Methods Used to Estimate Energy Use Impact from Outreach Activities

To estimate net alternative fuel use and emission reductions from outreach events, NREL and ORNL developed the Behavioral Impact Model (BIM) and added related functionality to the Clean Cities coalition annual reporting tool to make it compatible with the BIM. Note that the BIM is the same as the Petroleum Impact Model used in previous years but has simply been re-named to better specify what it is estimating.

Clean Cities coordinators reported the type of outreach event, the number of people reached by each event (not to be confused with the total people attending the event), the technologies presented, and the percent that should be attributed to the coalition. To determine the number of people reached by a given event, the audience number is multiplied by the percent attributed to the coalition. When multiple technologies were presented at a given event, the annual report assumed the number of people reached to be divided evenly among the

Impacts from coalition outreach events are estimated using standard analytical methods derived from advertising and marketing industries.

technologies. These data are then entered into the BIM as "persons reached by the coalition about a given technology."

The BIM multiplies this persons-reached number by the probability a person will take an action as a result of the outreach (defined as purchasing an AFV or more efficient vehicle, or as changing driving or fueling behavior). This probability is derived by comparing the outreach event and technology to comparable marketing media and products. Eleven of these media-product combinations have a "customer conversion ratio" that is recorded by various marketing firms, as shown in Table 7. The customer conversion ratio is the ratio of purchases made (desired action) divided by the total number of people contacted through the outreach activity. The code in Table 7 is provided for continuity through the calculation process.

Table 7. Benchmark Customer Conversion Rates and Their Sources

Code	Benchmark Conversion Rate	Reference
1	0.6% for electronics (expensive, complicated) websites	Fireclick.com, accessed June 16, 2011
2	1.3% for environmentally related, incremental cost purchase	Bird, Lori. 2004. *Utility Green Pricing Programs: Design, Implementation, and Consumer Response*
3	2% for common websites and website ads	Nielsen and Facebook, 2010. *Advertising Effectiveness: Understanding the Value of a Social Media Impression*. And Fireclick.com, accessed June 16, 2011
4	2.5% for industry-specific mail	Direct Marketing Association (DMA). 2011
5	3.2% for email	Fireclick.com, accessed June 16, 2011
6	7% for affiliates and 8% for "social ads" that are endorsed by peers	Fireclick.com, accessed June 16, 2011. Nielsen and Facebook, 2010. *Advertising Effectiveness: Understanding the Value of a Social Media Impression*.
7	0.6% AdMeasure product: LDVs	GfK Mediamark Research & Intelligence, LLC. 2011
8	5.5% AdMeasure product: Gasoline	GfK Mediamark Research & Intelligence, LLC. 2011
9	17% AdMeasure smoking cessation "actions taken"	GfK Mediamark Research & Intelligence, LLC. 2011
10	2% for direct mail to current customers	Eisenberg, B. "The Average Conversion Rate: Is it a Myth?" ClickZ. February 1, 2008

For activity-type/audience-action combinations that were not directly addressed by research, NREL adjusted the customer conversion ratios based on the Ostrow Model of Effective Frequency, Krugman's Three Exposure Theory, and the authors' assumptions. Table 8 lists a set of relationships that increase or decrease the impact of advertisements.

Table 8. Relationships for Media Effectiveness and Their Sources

Code	Relationships	Source
A	Degree of media interactivity increases impact	Ostrow Model of Effective Frequency
B	Brand recognition increases impact	Ostrow Model of Effective Frequency
C	Long purchase cycle increases impact	Ostrow Model of Effective Frequency
D	Less frequent usage of item increases impact	Ostrow Model of Effective Frequency
E	Affordability of item increases impact	Ostrow Model of Effective Frequency
F	Simple message increases impact	Ostrow Model of Effective Frequency
G	Media clarity (not cluttered) increases impact	Ostrow Model of Effective Frequency
H	Message in relevant environment increases impact	Ostrow Model of Effective Frequency
I	Audience attentiveness increases impact	Ostrow Model of Effective Frequency
J	More steps in processing the media increases impact	Krugman's Three Exposure Theory
K	Availability of item increases impact	Author's Assumption
L	Length of vigilance required decreases impact	Author's Assumption

We adjusted the benchmark conversion rates shown in Table 7 by the relationships for media effectiveness shown in Table 8. The direct application of these rates and relationships is shown in Table 9, where the number relates to the code in Table 7 and the letters relate to the code in Table 8. The final customer conversion ratios used are displayed in Table 10.

Table 9. Combination of Benchmarks and Relationships

Activity Type	Purchase New AFV	Use Alt. Fuel in Existing Vehicle	Use Biodiesel Blends in Diesel Vehicle	Purchase More Efficient Car	Operate Vehicle More Efficiently	Purchase HEV	Reduce Idling	IR HDV (Equipment Purchase)	Reduce VMT
Advancing the Choice	6+H+I +J-E	6+H+I+ J	6+H+I+J	6+H+I +J	6+H+I+J	6+H+I +J-E	6+H+I +J	6+H+I+J-E	6+H+I+J
Advertisement	7-K	8-K-L	8-K-L	7+E	9-G-L	7-K	9-L	7+E	9-L
Conference	6+H+J-E	6+H+J	6+H+J	6+H+J	6+H+J	6+H+J -E	6+H+ J	6+H+J-E	6+H+J
Literature Distribution	4+B+H -E	4+B+H	4+B+H	4+B+H	4+B+H	4+B+H -E	4+B+ H	4+B+H-E	4+B+H
Media Event	7-E-G-H-K	8-G-H-K	8-G-H-K	7-G-H+E-K	9-G-H-K	7-E-G-H+B-K	9-G-H-K	7-E-G-H-K	9-G-H-K
Meeting	6+A+B +I-E	6+A+B+ I	6+A+B+I	6+A+B +I	6+A+B+I	6+A+B +I-E	6+A+ B+I	6+A+B+I-E	6+A+B+ I
Website	1+B+J	3+B+J	3+B+J	3+B+J	3+B+J	1+B+J	3+B+ J	1+B+J	3+B+J

Table 10. Customer Conversion Ratios Used in the BIM

Activity Type	Purchase New AFV	Use Alternative Fuel in Existing Vehicle	Use Biodiesel Blends in Diesel Vehicle	Purchase More Efficient Car	Operate Vehicle More Efficiently	Purchase HEV	Reduce Idling	HDV IR Equipment Purchase	Reduce VMT
Advancing the Choice	2.0%	6.0%	6.0%	5.0%	7.0%	2.0%	5.0%	4.0%	8.0%
Advertisement	0.6%	5.5%	5.5%	2.0%	10.0%	2.0%	10.0%	3.0%	4.0%
Conference	2.0%	6.0%	6.0%	5.0%	7.0%	2.0%	5.0%	4.0%	8.0%
Literature Distribution	2.0%	3.0%	3.0%	2.5%	3.0%	2.5%	3.0%	2.5%	5.0%
Media Event	0.6%	2.5%	3.0%	1.2%	3.0%	1.2%	4.0%	2.0%	2.0%
Meeting—Other	2.0%	7.0%	6.0%	5.0%	7.0%	2.0%	5.0%	4.0%	8.0%
Website	2.0%	4.0%	3.0%	3.0%	4.0%	3.0%	3.0%	3.0%	3.0%

The number of people reached multiplied by the appropriate customer conversion ratio (from Table 10) results in the number of people assumed to take the intended action. After the conversion factors have been applied, the BIM is like the Clean Cities coalition annual reporting tool, as it converts the estimated number of vehicles purchased or number of people changing their driving habits into an EUI. We make downward adjustments of 30%–40% to the estimates to account for probable overlaps between audiences attending outreach events and entities reporting their own petroleum savings via a Clean Cities coalition. We apply the estimated petroleum savings only to the reporting year in question, even though many of the vehicle purchases and behavioral changes will likely last beyond that year.

Estimated Outreach Accomplishments

Coalitions' outreach, education, and training activities were classified into nine categories, as shown in Table 11. A total of 3,608 activity days were reported, which were estimated to have reached more than 5 million people. Compared to 2015, the number of event days increased by 21%. The average size of events decreased from last year—from 8,408 persons per event to 1,413. This reduction was driven by a significant drop in persons reached through media events from 2015 to 2016. This decline was due in part to a 2015 series of news releases that reached a total of 19 million viewers. If it had not been for this project, overall people reached from media events would have only decreased by 15%. Persons reached through coalition workshops also dropped significantly in 2016, but this was due to a single event in 2015 that was mentioned in a state newspaper Op-Ed, which reached a much larger audience than actual attendance of the event. Without this single anomalous event in 2015, persons reached through coalition workshops would have increased in 2016.

Table 11. Outreach, Education, and Training Activities

Activity Type	Number of Activities	Share of Total Activities	Activity Increases Since 2015	Persons Reached	Share of Total Persons Reached	Persons increase since 2015
Meeting – Other	1,028	28.5%	14%	135,970	2.7%	0%
Meeting – Stakeholder	622	17.2%	62%	13,457	0.3%	-7%
Literature Distribution	534	14.8%	35%	440,036	8.6%	-5%
Conference Participation	519	14.4%	-5%	576,451	11.3%	2%
Workshop Held by Coalition	327	9.1%	14%	94,705	1.9%	-82%
Media Event	284	7.9%	-1%	3,035,108	59.5%	-87%
Social Media	148	4.1%	37%	110,306	2.2%	34%
Advertisement	114	3.2%	418%	580,002	11.4%	14%
Website	32	0.9%	-27%	111,731	2.2%	-8%
Total	**3,608**	**100.0%**	**21%**	**5,097,766**	**100.0%**	**-80%**

Figure 4 illustrates the types of audiences reached through the 3,608 outreach activities. Each activity could be aimed at multiple audiences; in fact, each activity targeted an average of 3.4 different audiences. Government fleets were the most-cited target audience, followed by the general public and private fleets. Entities with specialized applications—such as utility trucks, mass transit, delivery trucks, waste management, and airports—were identified as audiences in 43% of the outreach activities. The composition of outreach activities was consistent 2015.

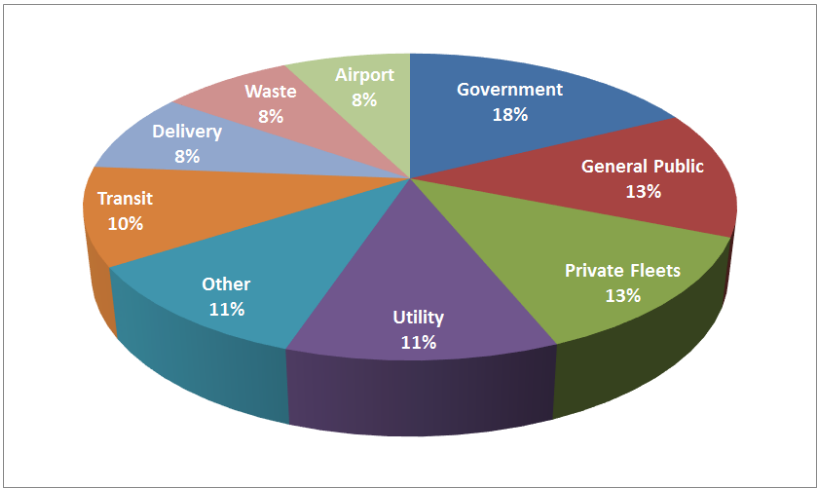

Figure 4. Percentage of outreach activities by audience type

Coalitions' outreach events featured a relatively even mix of technologies, as illustrated in Figure 5. No single technology dominated, but EVs were covered more than any of the other technology types. Just as with audience types, any one activity could address more than one technology; each activity featured an average of 4.2 different technologies.

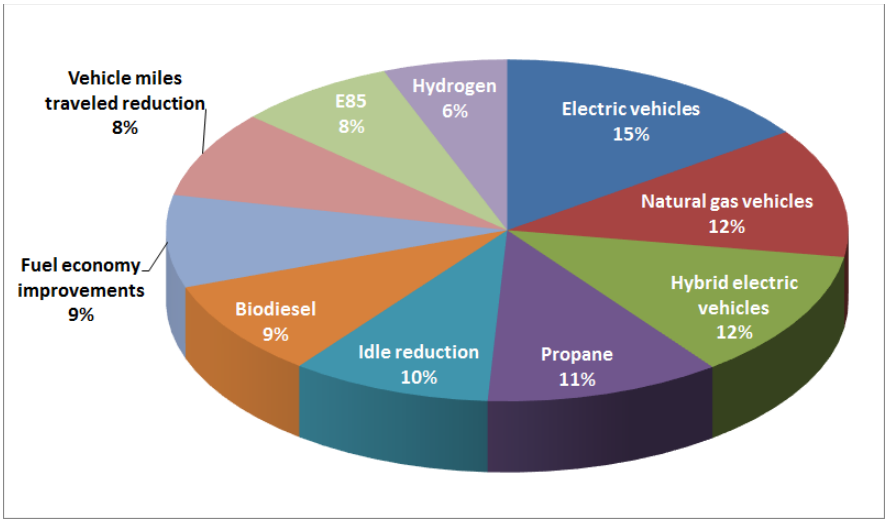

Figure 5. Percentage of outreach activities by technology type

Electric vehicles were the most common topic of coalition outreach events.

Using the BIM, NREL estimates that Clean Cities coalition outreach events prompted and enabled actions that impacted 14 MGGEs of energy use in 2016, after accounting for a substantial overlap with reported impacts. This is a 74% reduction from 2015, which is slightly less than the 80% reduction in overall people reached (as examined in the first paragraph of this section). The difference in these two numbers is likely due to some attendance transferring toward events that focused on higher energy-impact technologies.

Cumulative Energy Use Impact

Clean Cities coalitions have steadily increased their energy impact as projects are expanded and built upon each year. Figure 6 shows coalitions are increasing the rate at which they are increasing their impact. During the first ten years of tracking (1994-2003) coalitions increased the annual energy use impact by an average 15.6 MGGEs per year. In the last four years of tracking (2013-2016) coalitions have increased their annual energy use impact by an average of 79.2 MGGEs per year. As coalition projects continue to evolve and new technologies are added, coalitions are accelerating their energy impact.

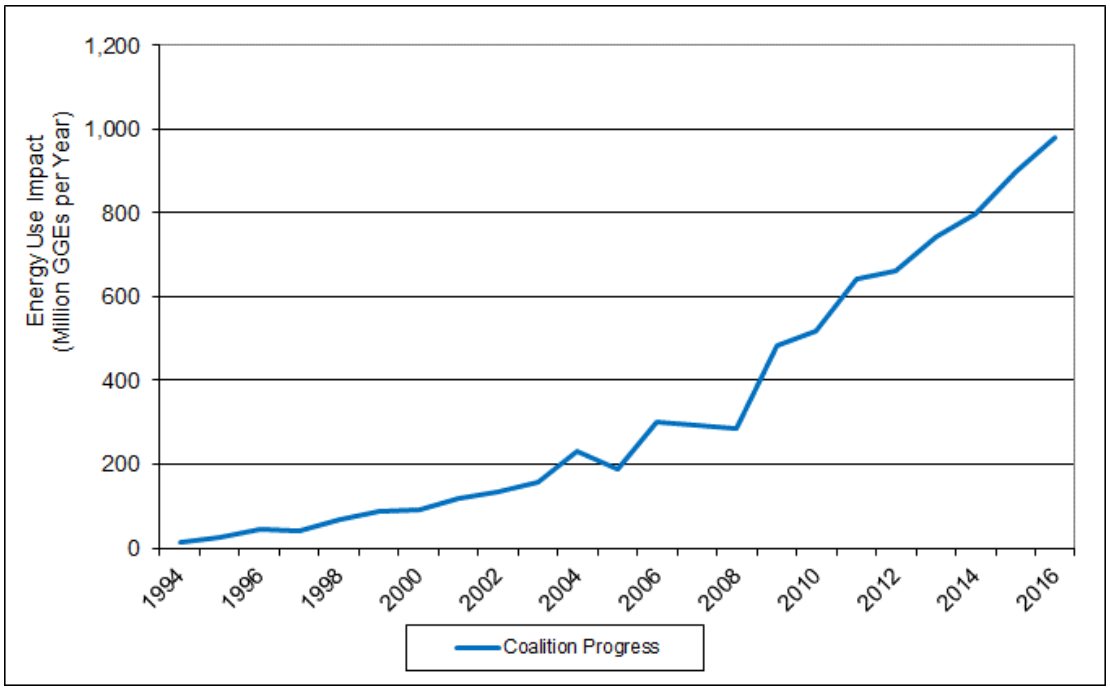

Figure 6. Increasing energy use impact from coalitions

The impact of Clean Cities coalition efforts has added up considerably over the years. The full extent of the program's effect can be seen when the annual EUIs shown in Figure 6 are aggregated to a cumulative EUI. This cumulative measure, shown in Figure 7, is now more than 7.8 billion GGEs.

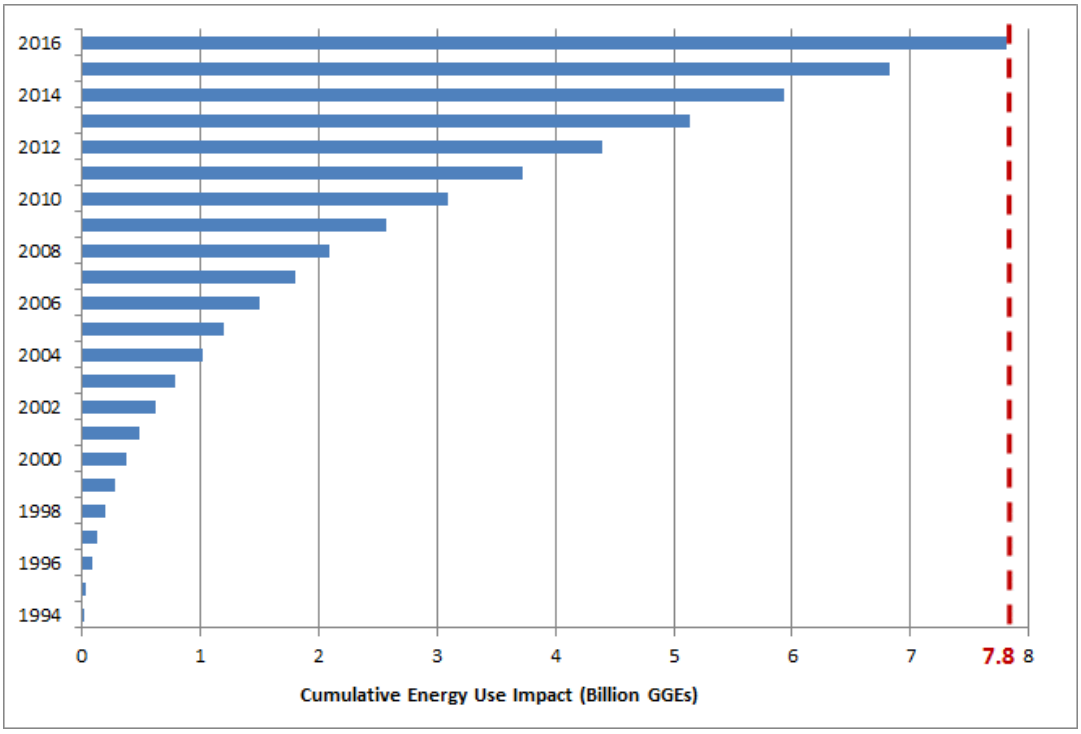

Figure 7. Cumulative accomplishments of all Clean Cities coalition activities

These efforts have also led to a cumulative emissions reduction of 42 million tons over the years, as shown in Figure 8. The relationship between the two has not always been consistent, since different technologies can be more effective at either increasing energy impact or reducing emissions (see Figure 2), and the Technology Integration portfolio continues to stay relevant by evolving over time. Furthermore, there was a shift in the emissions calculations in 2015 as the process updated the 2015 GREET model. Therefore, Figures 7 and 8 do not reflect one another exactly.

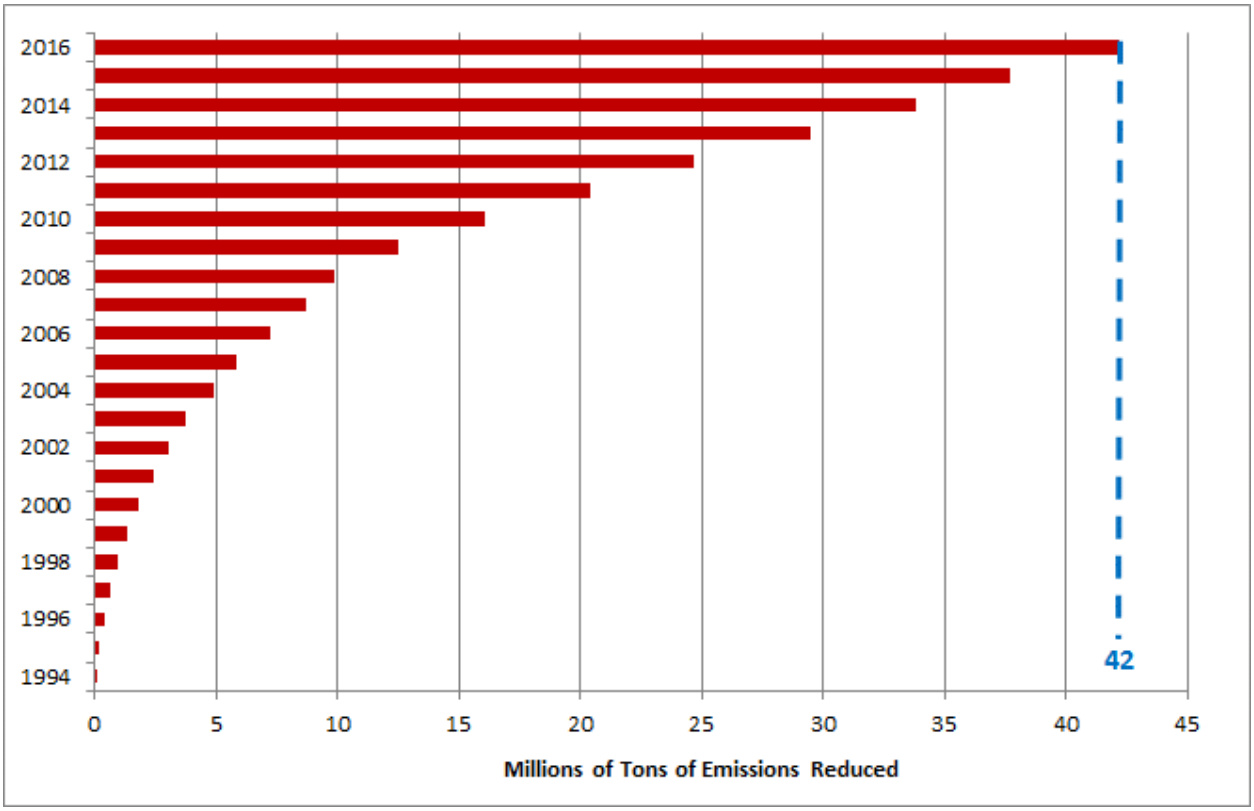

Figure 8. Cumulative emissions reductions from all Clean Cities coalition activities

Alternative Fuel Vehicle Types and Applications

The online reporting tool requests coordinators categorize their AFVs into key vehicle types and fleet applications. Figure 9 shows that the largest portion (35%) of AFVs was "Unknown/other" LDVs. These are usually vehicles reported in conjunction with a Clean Cities coalition-supported fueling station. Cars were the second most common AFV (at 29% of total). Heavy trucks without trailers accounted for 11% of vehicles. Light trucks/vans/sport utility vehicles represented 9% of vehicles. "Unknown" or "other" HDVs, which were mostly reported in conjunction with biodiesel and E85 public fueling stations, accounted for 6% of vehicles. All remaining categories accounted for 2% or less of the vehicle population.

E85 LDVs were the most frequently reported fuel/vehicle combination. E85 vehicles in the "unknown/other" light-duty segment (313,000 vehicles), the car segment (65,000 vehicles), the

light trucks/vans/sport utility vehicles segment (60,000 vehicles), and the patrol car segment (10,000 vehicles) together comprised 40% of all vehicles.

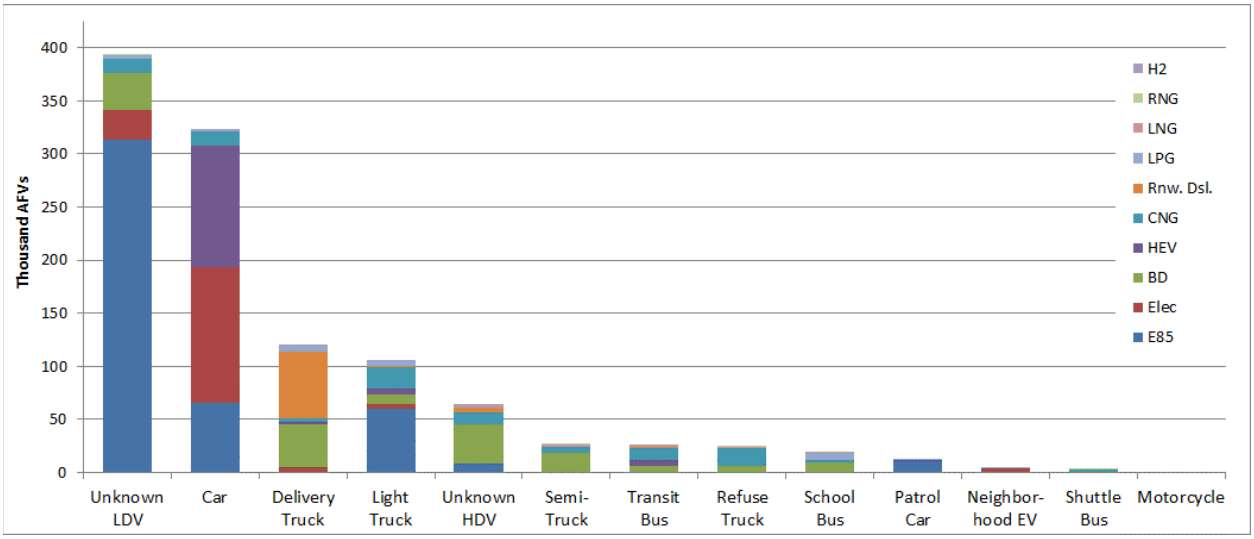

Figure 9. AFVs by vehicle and fuel type

**Neighborhood EVs are small EVs only allowed on low-speed roads.*

In addition to reporting vehicle types, coordinators also provided information about vehicle ownership and the end use applications served by reported vehicles. As shown in Figure 10, more than half of the reported vehicles (58%) were owned by the general public or an unknown entity. Many of these vehicles were reported through fuel retailers to the coordinator, often based on an assumption for how much fuel the average car uses per year. The next largest ownership groups of AFVs are local government fleets, corporate fleets, and state government fleets at 14%, 11%, and 11%, respectively.

58% of coalition-reported vehicles are owned by the general public and now have access to alternative fuel infrastructure because of Clean Cities coalition projects.

Vehicles reported as being used for commuting grew the most (133%) of any market in 2016, but this started from a very low base number (the first reporting year was in 2015). Entries for general public vehicles (or unknown category), state government vehicles, and corporate fleets all grew significantly (69%, 32%, and 17%, respectively). Data reported for general public and state government vehicles were comprised mostly of FFVs or E85 "capable" vehicles (although it is always difficult to determine how much of the time they were operated using the alternative fuel). Renewable diesel and CNG options were the most prevalent among corporate fleets. The number of AFVs purchased for the purpose of being used as local government vehicles, taxis, and national parks vehicles grew slower (10%, 7%, and 2% respectively). Numbers of utility, United States Postal Service (USPS), and airport vehicles all decreased (15%, 15%, and 37%, respectively).

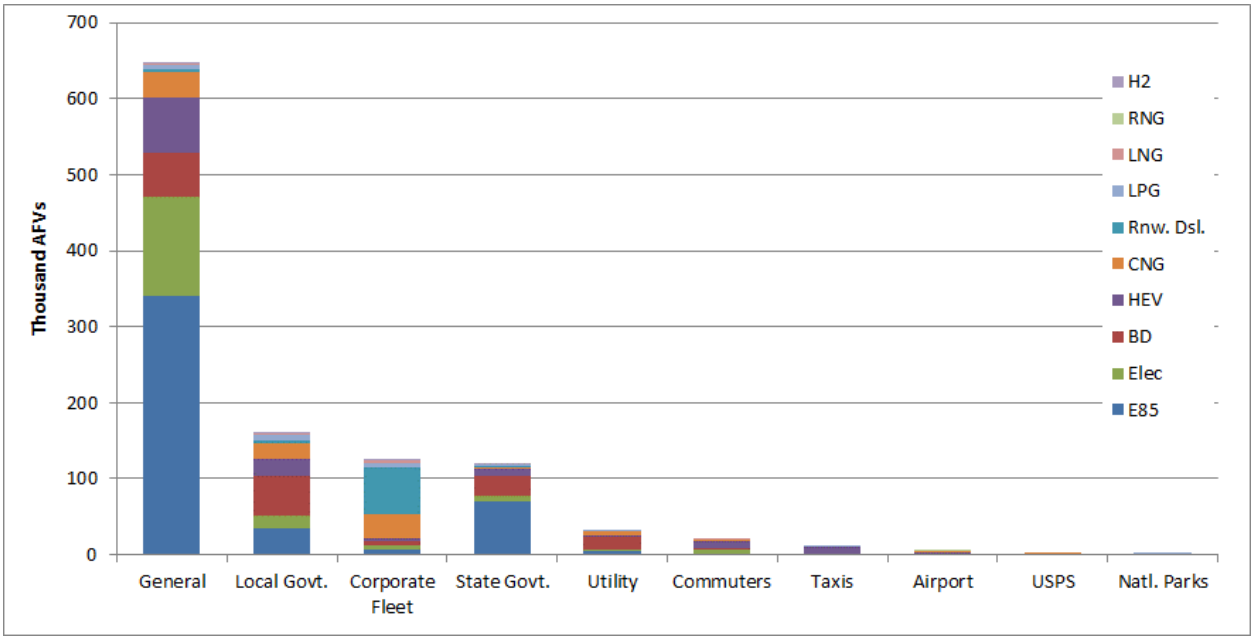

Figure 10. AFVs by application and fuel type

Emerging Technologies—Experimental, Prototype, and Demonstration Vehicle Projects

A small number of Clean Cities coalitions have worked with fleets and stakeholders who have an interest in field-testing advanced vehicle technologies (e.g., hydrogen and fuel cell vehicles). This subset of vehicles represents just 0.01% of the total number of alternative fuel or advanced technology vehicles reported by coalitions. Some of these projects involve limited production, experimental, or prototype/demonstration models that are made available from vehicle manufacturers under special lease arrangements. This is a way for the manufacturers to gather in-use performance data, evaluate durability, and refine engineering designs for future vehicle models that may be under development. Data reported to Clean Cities coalitions for some of these vehicles show the noteworthy potential these have for both energy and environmental benefits, but no significant market trends could be drawn from this limited data set.

Coordinators and Coalition Types

The average Clean Cities coordinator has 8 years of experience.

Collectively, coordinators reported spending a total of 2,653 hours per week on Clean Cities coalition tasks, which is equivalent to more than 132,000 total hours during the year.[5] This translates into 66 full-time, experienced technical professionals working to increase the use of domestic alternative fuels and reduce wasted energy. For an individual coalition, the average amount of time spent coordinating Clean Cities coalition business per week was 32 hours, and the median was 30 hours. The average decreased from 33 hours in 2015, while the median remained consistent. The reporting website also gathered information on coordinator experience. Coordinators have been on the job for an

[5] Assuming 50 work weeks per year.

average of 8 years. Forty percent of coordinators have 5 years or less of experience. Thirty-six percent, or 30 coordinators, have 10 years or more of experience.

Coalition types were tracked, and the relationships between coalition type and general metrics were analyzed. The coalition types correspond to their host organization (which generally pays the coordinator's salary) and are listed in the first column in Table 12 and defined in Appendix B. Standalone nonprofits are coalition types that are self-sustaining and do not operate as part of a larger host organization.

The number of coalitions in each grouping is listed in the second column of Table 12, followed by metrics such as the average number of stakeholders, average funds (including grants and dues) received in 2016, the average GGEs of energy impacted, and the average number of persons reached through outreach events. The range of all metrics overlaps heavily between groups, and the low sample size precludes statistical significance. Furthermore, many variables affecting the metrics in this table were not controlled for, so no cause/effect relationships can be inferred between coalition type and specific metrics.

Coalitions based in city or county government offices were the most successful in terms of energy impact and raising funds, but those based in regional governing bodies were the most successful at outreach.

Coalitions that reported the highest number of stakeholders tended to be standalone nonprofits, while those reporting the fewest stakeholders were hosted by city and county governments. Coalitions that raised the most funds on average were hosted by city or county governments. This same category of coalitions also impacted the most energy use on average. Coalitions that reached the most people in outreach events were generally from regional governing coalitions. Coalitions that brought in the least amount of funding were generally standalone nonprofits. Coalitions hosted by state governments impacted the least amount of energy use, and coalitions hosted by universities reached the fewest people.

Table 12. Coalition Metrics by Coalition Type

Coalition Type [a]	Total # of Coalitions	Average # of Stakeholders	Average Funds Raised	Average Program Impact (GGEs)	Average Persons Reached
Nonprofit - Standalone	31	181	$1,340,317	12,119,130	51,353
Regional Governing Body	16	110	$1,676,463	9,697,978	138,209
Nonprofit - Hosted	16	155	$2,176,789	8,644,013	56,565
Government - City or County	8	87	$11,931,852	12,903,963	33,276
Government - State	8	169	$4,420,861	5,096,556	12,679
University	5	168	$1,480,237	5,810,948	4,365
Total/Overall Weighted Average	**84**	**152**	**$2,874,104**	**10,026,473**	**60,688**

[a] Coalition types are defined in Appendix B.

Project Funding

In 2016, 52 coalitions reported receiving 103 new project awards (project-specific grants) worth a total of $30 million. These coalitions also reported garnering $31 million in leveraged or matching funds for a combined total of $62 million. This funding represents nearly a 3:1 leveraging of the $24 million Clean Cities program base budget in Fiscal Year 2016. The value of six of the 103 awards met or exceeded $1 million each. Table 13 presents a breakdown of the number and value of awards reported by the coalitions.

Table 13. Breakdown of 2016 Project Awards by Number and Value

Grant Range	Number of Grants	Share of Total Number	Total Value	Share of Grand Total Value
< $50,000	56	54%	$1,195,072	4%
$50,000 - $99,999	7	7%	$469,000	2%
$100,000 - $499,999	20	19%	$5,163,649	17%
$500,000 - $999,999	14	14%	$9,895,761	33%
$1,000,000 +	6	6%	$13,681,795	45%
Grand Total	**103**	**100%**	**$30,405,276**	**100%**

Of the $62 million in project awards and leveraged funds awarded to coalitions in 2016, $30.7 million (50%) came from state governments, $10.4 million (17%) came from the Congestion Mitigation and Air Quality (CMAQ) Program, $8.3 million (13%) came from the EPA, and $5.6 million (9%) came from DOE. DOE funds (not including matching funds) distributed in 2016 and previous years totaled less than $2 million of the $56 million (3%) spent on projects in 2016. Funding from Clean Cities coalition support contracts was not included among the project awards because those funds are intended to enable certain coalition operations rather than specific projects.

Coalitions leveraged $3 of project funding for every $1 in the Clean Cities program budget.

In addition to new 2016 awards, coordinators reported the portions of previous multiyear awards spent during the calendar year. If a coordinator failed to report the amount spent during 2016, the total amount of the award divided by the number of years of award duration was assumed. Coalitions reported spending 62% of the funds they were awarded in 2016, suggesting that projects start quickly. In 2016, coalitions helped utilize a total of $56 million in project funds that were awarded and matched between 2008 and 2016.

About the Stakeholders

Coalitions included 12,744 stakeholders in 2016, with more than half of them from the private sector.

In 2016, 84 coalitions reported a total of 12,744 stakeholders, for an average of 152 stakeholders per coalition, which is consistent with 2015. Participation as a Clean Cities coalition is voluntary, and coalitions draw local stakeholders from the public and private sectors. Stakeholders include local, state, and federal government agencies, large and small businesses, auto manufacturers, car dealers, fuel suppliers, public utilities, nonprofits, and professional

associations. Coalitions reported that 54% of the total stakeholders were from the private sector. This composition is a 1% increase from 2015 and shows a steady balance between public and private stakeholders in 2016.

Data Sources and Quality

Gathering data is often challenging for coordinators because they rely on voluntary reporting from their numerous stakeholders. Therefore, the annual report website contains some questions related to data sources and quality. In these questions, coordinators were asked to rate the quality of their data as excellent, good, fair, or poor. The "cumulative" bar in Figure 11 presents the response breakdown for the 84 coordinators who answered the question. Thirty percent of the respondents classified their data as excellent, 66% as good, 3% as fair, and 1% as poor. Relative to 2015, the poor category stayed the same, the fair category increased by less than a percentage point, the good category increased by five percentage points, and the percentage of coordinators who felt their data was excellent decreased six percentage points.

The reporting tool also asked coordinators how they obtained their data. They could choose one or more of the following: online questionnaires (e.g., Survey Monkey), written (paper or electronic) questions to stakeholders, phone interviews with stakeholders, coalition records, or coalition estimates. Phone interviews were the most used method of data gathering, accounting for 28%. The second most common method was written questions (26%), then estimates (16%), coalition records (16%), and finally online questionnaires (14%). There were only minor shifts in this breakdown since 2015. Figure 11 shows that all collection methods resulted in similar levels of reliability.

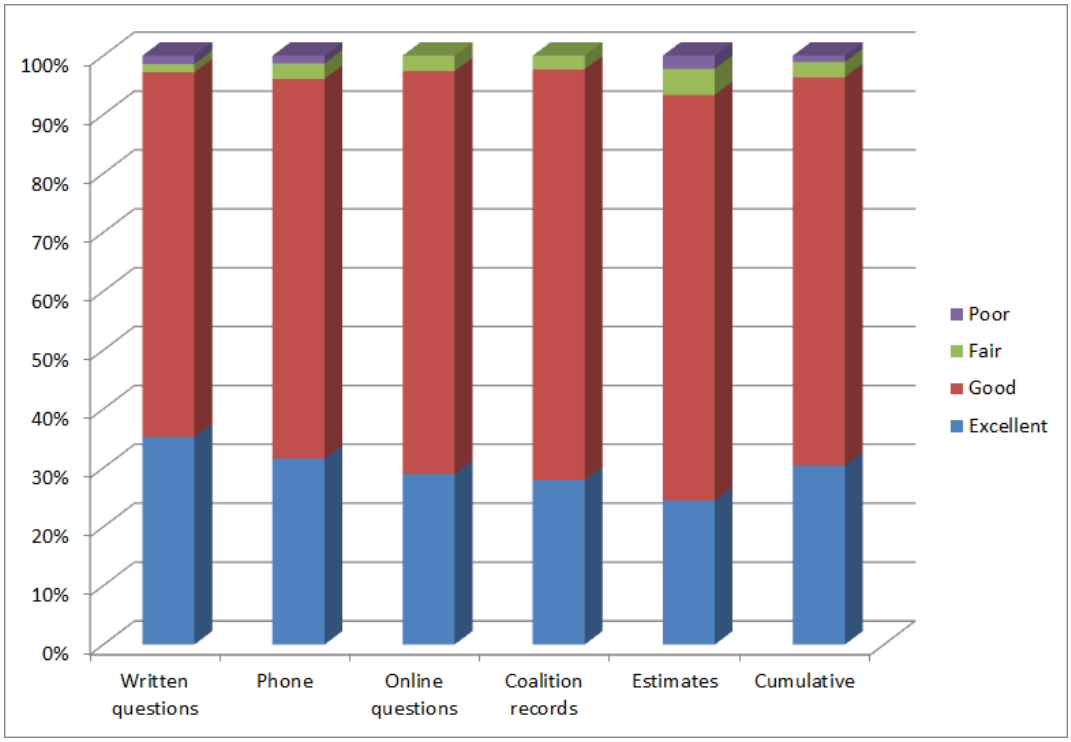

Figure 11. Data quality responses by data source

Conclusion

The 2016 *Clean Cities Coalitions Activity Report* helps quantify accomplishments and the impact of the coalitions. The report shows that Clean Cities coalitions had a year of many successful projects. The data that they reported showed a 15% increase in EUI from 2015. During this same period, however, benefits from outreach events were down.

Overall, Clean Cities coalition accomplishments increased from last year. Clean Cities coalition efforts continued to increase the number and diversity of AFVs and advanced vehicles on U.S. roads in 2016. The combined efforts of local Clean Cities coalitions, DOE, and its national laboratories bring together otherwise disparate groups to leverage people, funding, and resources to accelerate the nation's progress toward increasing domestic fuel use, improving energy security, and contributing to air quality improvement.

Appendix A: Clean Cities Coalitions that Completed 2016 Annual Reports

State	Coalition
AL	Alabama Clean Fuels Coalition
AR	Arkansas Clean Cities
AZ	Tucson Clean Cities
AZ	Valley of the Sun Clean Cities Coalition (Phoenix)
CA	Central Coast Clean Cities
CA	Clean Cities Coachella Valley Region
CA	East Bay Clean Cities Coalition (Oakland)
CA	Long Beach Clean Cities
CA	Los Angeles Clean Cities Coalition
CA	Sacramento Clean Cities Coalition
CA	San Diego Regional Clean Cities Coalition
CA	San Francisco Clean Cities Coalition
CA	San Joaquin Valley Clean Cities
CA	Silicon Valley Clean Cities (San Jose)
CA	Southern California Clean Cities Coalition
CA	Western Riverside County Clean Cities Coalition
CO	Denver Metro Clean Cities Coalition
CO	Northern Colorado Clean Cities Coalition
CO	Southern Colorado Clean Cities Coalition
CT	Capitol Clean Cities of Connecticut
CT	Connecticut Southwestern Area Clean Cities
CT	Greater New Haven Clean Cities Coalition
CT	Norwich Clean Cities
DC	Greater Washington Region Clean Cities Coalition
DE	State of Delaware Clean Cities
FL	Central Florida Clean Cities Coalition
FL	North Florida Clean Fuels Coalition
FL	Southeast Florida Clean Cities Coalition
FL	Tampa Bay Clean Cities Coalition
GA	Clean Cities-Georgia
HI	Sustainable Transportation Coalition of Hawaii

State	Coalition
IA	Iowa Clean Cities Coalition
ID	Treasure Valley Clean Cities
ID MT WY	Yellowstone-Teton Clean Cities Coalition
IL	Chicago Area Clean Cities
IN	Greater Indiana Clean Cities Coalition
IN	South Shore Clean Cities
KS MO	Kansas City Regional Clean Cities
KY	Kentucky Clean Cities Partnership
LA	Louisiana Clean Fuels
LA	Southeast Louisiana Clean Fuel Partnership
MA	Massachusetts Clean Cities
MD	State of Maryland Clean Cities
ME	Maine Clean Communities
MI	Ann Arbor Clean Cities Coalition
MI	Detroit Area Clean Cities
MI	Greater Lansing Area Clean Cities
MN	Twin Cities Clean Cities Coalition
MO	St. Louis Clean Cities
NC	Centralina Clean Fuels Coalition
NC	Land of Sky Clean Vehicles Coalition (Western North Carolina)
NC	Triangle Clean Cities (Raleigh, Durham, Chapel Hill)
ND	North Dakota Clean Cities
NH	Granite State Clean Cities Coalition
NJ	New Jersey Clean Cities Coalition
NM	Land of Enchantment Clean Cities (New Mexico)
NY	Capital District Clean Communities Coalition (Albany)
NY	Clean Communities of Central New York (Syracuse)
NY	Clean Communities of Western New York (Buffalo)
NY	Empire Clean Cities
NY	Genesee Region Clean Communities (Rochester)
NY	Greater Long Island Clean Cities
OH	Clean Fuels Ohio
OH	Northeast Ohio Clean Cities Coalition (Cleveland)
OK	Central Oklahoma Clean Cities (Oklahoma City)

State	Coalition
OK	Tulsa Clean Cities
OR	Columbia-Willamette Clean Cities
OR	Rogue Valley Clean Cities
PA	Eastern Pennsylvania Alliance for Clean Transportation
PA	Pittsburgh Region Clean Cities
RI	Ocean State Clean Cities
SC	Palmetto State Clean Fuels Coalition
TN	East Tennessee Clean Fuels Coalition
TN	Middle-West Tennessee Clean Fuels Coalition
TX	Alamo Area Clean Cities (San Antonio)
TX	Dallas-Fort Worth Clean Cities
TX	Houston-Galveston Clean Cities
TX	Lone Star Clean Fuels Alliance (Central Texas)
UT	Utah Clean Cities
VA	Virginia Clean Cities
VT	Vermont Clean Cities
WA	Western Washington Clean Cities
WI	Wisconsin Clean Cities
WV	State of West Virginia Clean Cities

Appendix B: Definition of Clean Cities Coalition Types

Coalitions have categorized themselves into six different types, depending on their organizational structures and relationship to hosts.[6] Some coalitions fit within multiple types. These types are as follows:

1. "Government—City or County" coalitions are hosted by a city or county government such as a city department of transportation or municipally owned utility.
2. "Government—State" coalitions are hosted by a state government. This is generally in the state department of energy or department of environment. Coalitions hosted by a state university are not included in this category.
3. "Hosted in a Nonprofit" coalitions are hosted within a larger nonprofit or community service organization with 501c3 status. The host organization's activities are broader in scope than the Clean Cities coalition, such as the American Lung Association.
4. "Standalone Nonprofit" coalitions are nonprofits typically with 501c3 status and operate with no or minimal oversight and management of a host organization.
5. "Regional Governing Coalition" coalitions are hosted in a multi-governmental body such as a council of governments, municipal planning organization, or regional planning commission.
6. "Hosted in a University" coalitions are hosted by a university (public or private).

[6] The relationship between a host organization and the coalition varies across the country. Typically, the coordinator of the coalition is an employee of the host organization, and the coalition benefits from the resources available at the host organization.