

Clean Cities Annual Metrics Report 2007

C. Johnson and P. Bergeron

Technical Report
NREL/TP-540-43858
September 2008

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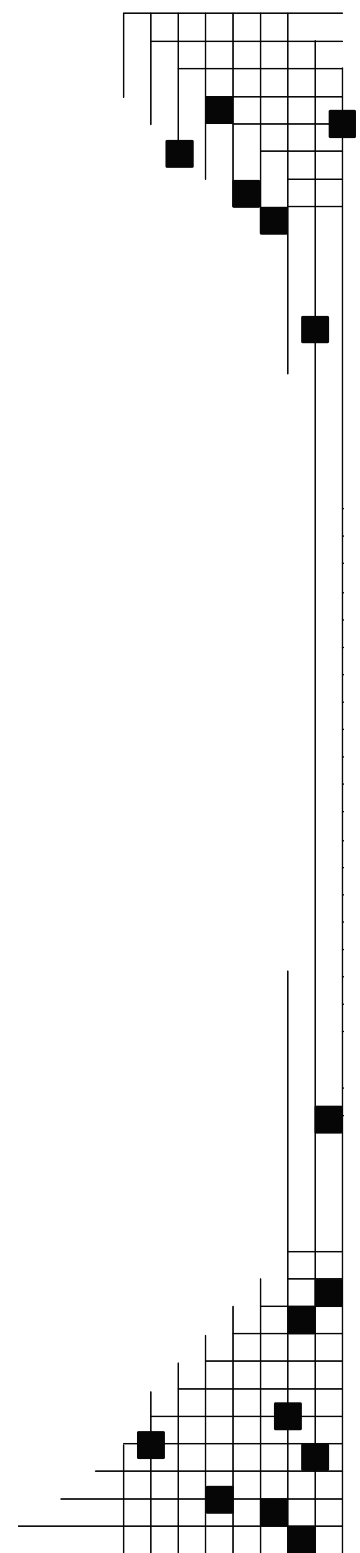


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C. Johnson and P. Bergeron

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Introduction

Each year, the U.S. Department of Energy (DOE) asks Clean Cities coordinators to submit an annual report of their activities and accomplishments for the previous calendar year. Data and information are submitted to an online database that is maintained as part of the Alternative Fuels and Advanced Vehicles 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 fuel blends, deployment of alternative fuel vehicles (AFVs), hybrid electric vehicles (HEVs), idle reduction initiatives, and fuel economy activities. NREL analyzes the data and translates them into gasoline reduction impacts, which are summarized in this report.

Eighty-six of the 87 coalitions that were active throughout 2007 submitted their reports—a response rate of 99%. This reflects an increase from the 2006 report response rate of 94%. The appendix to this report lists the coalitions that submitted their 2007 reports. 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, these reports represent just a subset of the activities going on throughout the nation, but they are an important indicator of the impact of the coalitions and petroleum-reducing technologies at the local level.

In addition to the coordinator reports, metrics are gathered about activities funded by the Clean Cities Program at NREL and Oak Ridge National Laboratory (ORNL). NREL provides a range of technical data, tools, and resources to support coalitions in their efforts to accelerate the use of alternative fuels and other technologies. ORNL produces the Fuel Economy Guide, the Web site fueleconomy.gov, and provides a range of public information related to fuel economy. Metrics of the use and impact of these resources are also presented in this report.

A detailed breakdown of the data used to produce this and previous reports can be accessed at www.eere.energy.gov/afdc/data/cleancities.html.

Summary of Important Findings

Approximately 375 million gallons of gasoline were displaced¹ through the Clean Cities efforts in 2007—4% more than in 2006. This displacement represents the combined results of the activities reported by coalitions (as analyzed by NREL) and the impacts of the Fuel Economy Guide and related activities (as estimated by ORNL).

Once again, AFVs accounted for the largest share (84%) of the total displacement. The use of biofuels (ethanol and biodiesel) as fuels for AFVs and in low-level blends displaced 118 million gallons, or 31% of the total 375 million. Fuel economy impacts were responsible for displacing 86 million gallons (combined impacts of coalition and ORNL activity), and idle reduction and HEV technologies combined to displace 23 million gallons of gasoline.

¹ The fuel displaced includes both gasoline and diesel. Fuel displacement in this report has been converted to gasoline gallon equivalents (GGE) using the lower heating value ratio of the fuels.

In addition to petroleum displacement, a remarkable achievement of the coalitions was their ability to leverage the DOE investment. In 2007, the coalitions won 199 grants worth a total of \$131.8 million, plus another \$50.8 million in leveraged funds from coalition members. This represents a 26:1 leveraging of the program budget in FY 2007. This level of funding enabled the coordinators to spend more than 100,000 hours pursuing Clean Cities' goals, which is like having a national network of 48 full-time technical sales professionals working to reduce U.S. dependence on oil.

Coordinators entered 1,252 outreach activities for 2007, which were estimated to reach 42 million people. Most often, AFVs were the subject of these activities, as has generally been the case in the past. As was the case last year, fuel blends were the second most popular outreach subject. Together, AFVs and blends were the subject of 60% of all outreach activities.

Attribution and Fuel Use Factors

To improve the link between coalition activities and end results, the coalition annual report includes an attribution factor to account for the percentage of a project's outcome that might be due to coalition activities rather than those of other participants in the project. This was used in the estimate of impacts for fuel economy, idle reduction, alternative fuel blend, and outreach projects. Coordinators entered the percentage of the project's outcome that they thought they were responsible for, and the project's overall outcome was multiplied by that percentage to determine the coalitions' impact. Although subjective, this method does attempt to address the issue of attribution where coalitions are one of multiple partners involved in a project.

As introduced in last year's survey, coordinators had the option to enter the amount of alternative fuel used by the AFVs they reported. If they knew this amount, they could enter it instead of using the default values on the form to convert numbers of AFVs reported into an amount of fuel saved.

Portfolio Performance

Coordinators from 86 of the 87 Clean Cities coalitions submitted information on all five technologies in the Clean Cities portfolio. The data were analyzed and converted into an amount of gasoline displaced by each element and reported in units of gasoline-gallon equivalents (GGE)—the amount of energy contained in a gallon of gasoline.

As shown in Table 1, about 294 million GGE were displaced through Clean Cities coalition efforts in 2007. This is 2.4% higher than the total 2006 displacement of 287 million GGE, and it averages to 3.4 million GGE per responding coalition. Petroleum displaced by ORNL's fuel economy guide then boosts the total Clean Cities effort by 80.6 million GGE, for a total displacement of 375 million GGE.

Table 1. Petroleum Displacement of Each Portfolio Element

Technology	Million GGE	Percent of Coalitions' Total	Change from Last Year
AFV	247	84%	-2%
Blends	20	7%	+93%
Hybrid Electric Vehicles	17	6%	+94%
Idle Reduction	6	2%	-28%
Fuel Economy	5	2%	-31%
Coalitions Total	294	100%	+2%
ORNL Fuel Economy	81	-	+11%
Grand Total	375	-	+4%

In 2005, Clean Cities set a goal of displacing 2.5 billion GGE per year by 2020. The data presented in this report show that Clean Cities is on schedule to exceed this goal. Progress is being tracked in Figure 1 below, where the path set forth to achieve the 2005 goal is shown as the blue dotted line and actual displacement is being tracked as the black solid line.

Achieving the goal of 2.5 billion gallons displaced in 2020 has become easier because of the progress made in the past two years. When the goal was set, a compounded annual growth rate of 16.6% was required. This requirement has now been reduced to 15.7% to meet the 2020 goal. Maintaining this annual growth rate seems achievable given that the historic annual growth rate has been 28%.

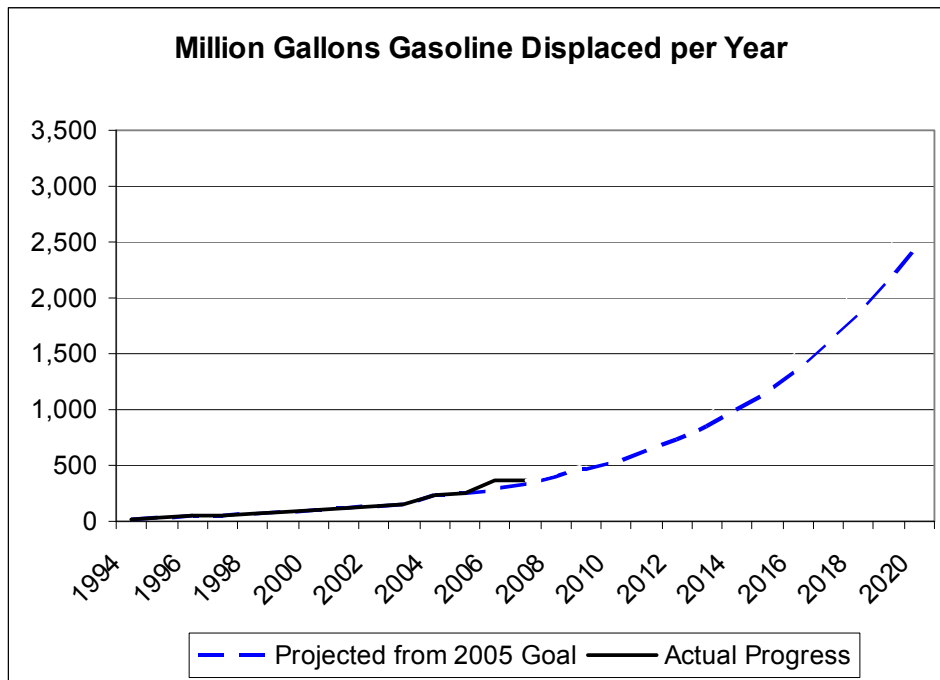


Figure 1. Annual Displacement Projection to Meet 2005 Goal and Actual Progress

Alternative Fuel Vehicles

As shown in Table 1, AFVs accounted for the displacement of 247 million gallons, or 84% of the total portfolio displacement. This is a decrease of 2% in comparison to 2006 fuel displacement by AFVs.

The 2% drop in AFV fuel displacement from 2006 to 2007 is likely caused by increased accuracy of this year's report. Coordinators were encouraged to estimate the actual amount of fuel used rather than use defaults based on average fuel-use estimates. This makes an especially large difference for vehicles that can use both alternative and petroleum fuels, which helps to explain the 8.3% reduction that occurred between 2006 and 2007 in the use of biofuels (e.g., E85, 85% ethanol and 15% gasoline; B20, 20% biodiesel and 80% conventional diesel; and B100, neat biodiesel).

In 2007, coalitions reported a total inventory of nearly 579,000 AFVs split among the vehicle types (as shown in Figure 2). The share of the fleet capable of using E85 increased from 46% in 2006 to 67% in 2007.

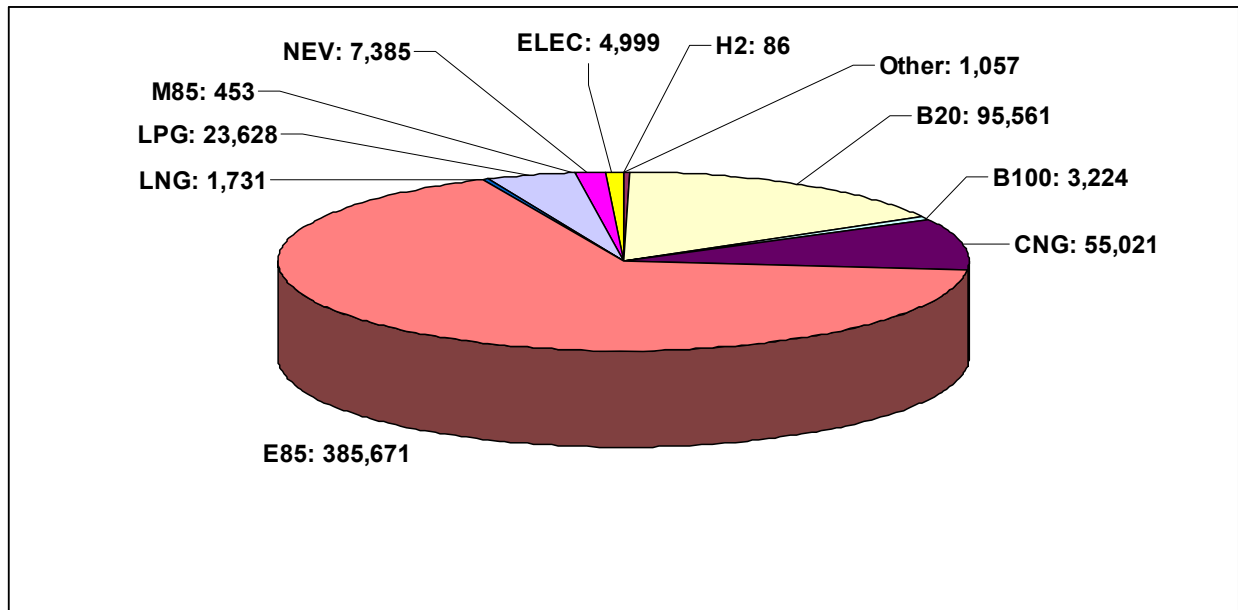


Figure 2. AFVs by Fuel Type

Figure 3 shows the total GGE displaced in AFVs by fuel type. Compressed natural gas (CNG) remains at the top of the list, accounting for 41% of the total AFV displacement. Biodiesel accounts for the next largest displacement, as B20 and B100 combine for 25% of the total. E85 accounts for only 15% of the AFV displacement despite the fact that 67% of the AFVs reported by coalitions can use E85.

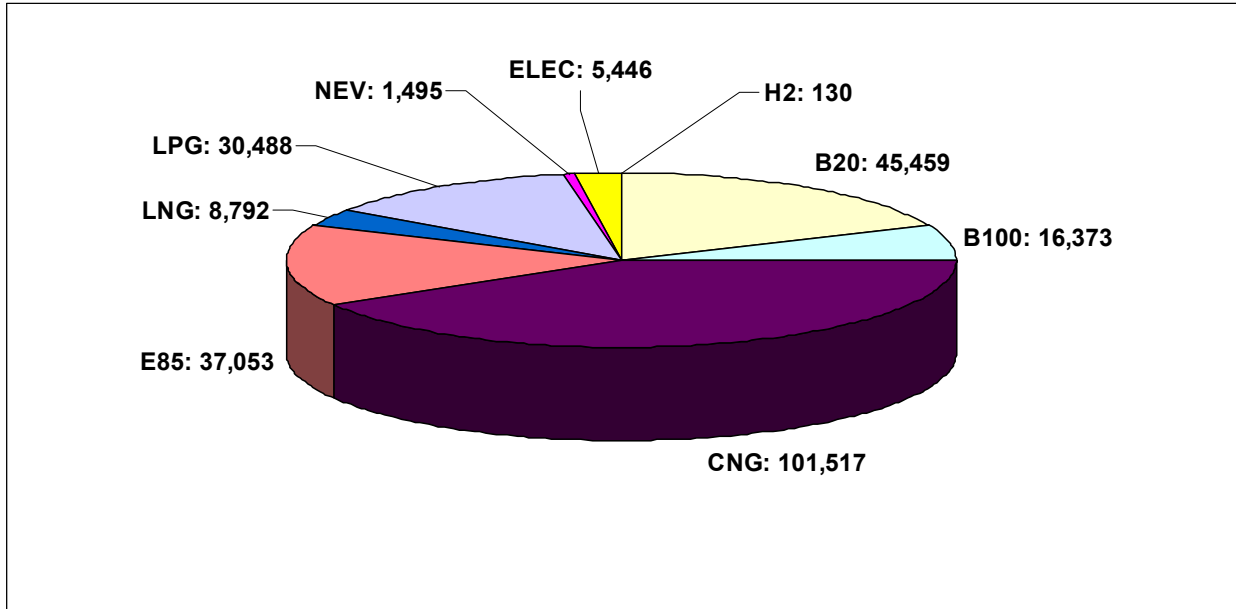


Figure 3. AFV Displacement by Each Fuel (in Thousand GGE)

Sixty-nine percent of the total displacement due to AFVs was from alternative fuel use in heavy-duty vehicles—an increase from 66% last year. The use of biodiesel and liquefied natural gas (LNG) is confined almost exclusively to heavy-duty vehicles. Roughly three-fourths of the displacement from hydrogen, CNG, and liquefied petroleum gas (LPG) occurred in heavy-duty vehicles. Approximately two-thirds of the displacement from electric vehicles comes from these heavy-duty vehicles.

Hybrid Electric Vehicles

The number of HEVs resulting from Clean Cities efforts approached 82,000 in 2007, about 12% of the total vehicles (AFVs plus HEVs) reported in the 2007 questionnaire. Using these vehicles rather than conventional vehicles saved 16 million gallons in 2007, an 83% increase from 2006. Plug-in HEVs (PHEVs) seem to be catching on in Clean Cities coalitions, as their numbers rose from 105 in 2006 to 896 in 2007. Like fuel economy measures, higher gasoline prices seem to have been a major factor in the increased displacement by HEVs and PHEVs in 2007.

Fuel Economy

This category includes projects to reduce vehicle miles traveled (VMT) as well as improvements in vehicle fuel economies (FE). The 2007 survey shows that the amount of petroleum displacement was roughly the same from projects to improve FE (2.4 million GGE) and from projects to reduce VMT (2.7 million GGE). However, this roughly equal displacement came from a very different number of projects. In fact, there were twice as many VMT projects (23) as FE projects (11).

The trends for these two types of projects are also very different. In 2007, VMT projects displaced 41% more petroleum than they did in 2006. In contrast, 2007 FE projects displaced 57% less petroleum than they did in the previous year.

Idle Reduction

Estimated fuel displacement for idle reduction technologies was 6.0 million GGE in 2007. Idle reduction technologies include truck-stop electrification, onboard idle reduction, and idle reduction policies. As shown in Figure 4, onboard idle reduction technologies accounted for 41% of the displacement estimated for the three technologies, truck stop electrification accounted for 31%, and policies accounted for 28%.

The total fuel displaced by idle reduction (6 million GGE) is down from 8.4 million in 2006. This difference is due to the large (72%) reduction in policies enacted. Both truck stop electrification and onboard idle reduction show substantial increases in displacement between 2006 and 2007 (60% and 97%, respectively).

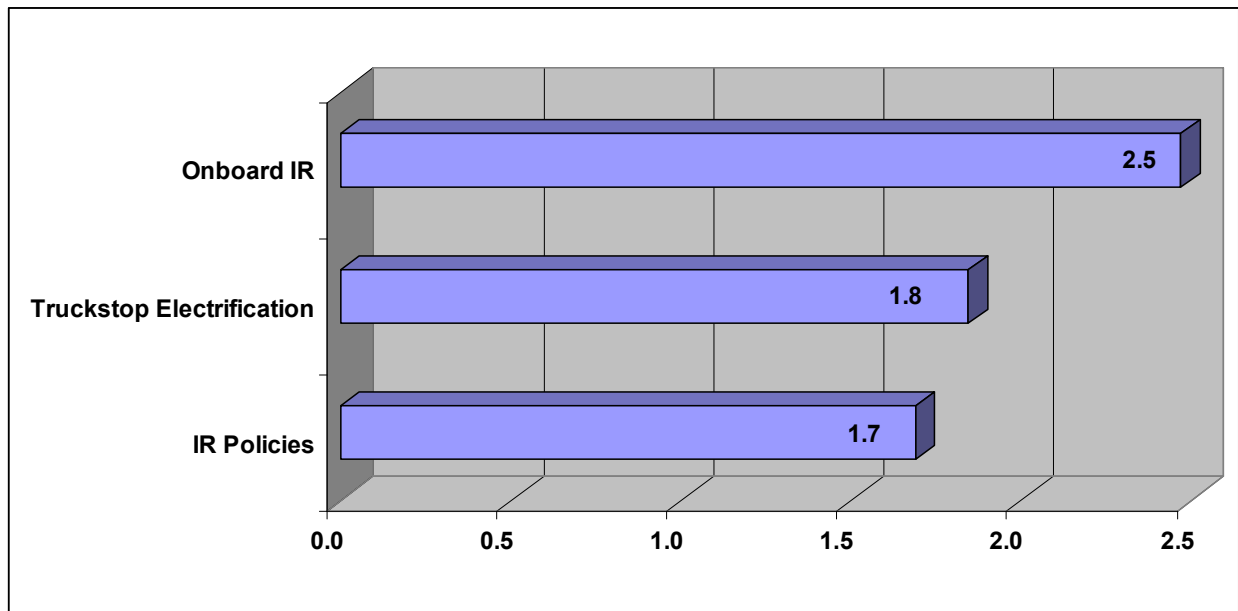


Figure 4. Displacement Due to Idle Reduction Projects (in Million GGE)

Blends

Clean Cities' efforts to promote the use of alternative fuel blends saved 20 million GGE in 2007. The use of low-level biodiesel blends saved almost 6 million GGE, and the use of E10 saved the remaining 14 million. This is a small fraction of the roughly 6.7 billion GGE of ethanol sold in blends in 2007, but it represents the amount that the coalitions believe they were influential in introducing into the marketplace.

Niche Market Vehicles

The questionnaire also asked coordinators to categorize their AFVs and HEVs into key niche market fleets. As shown in Table 2 and Figure 5, the state government light-duty vehicle (LDV) fleets contain the largest number of vehicles and account for 20% of the total niche market vehicle population. This category is followed closely by the school bus niche (18%) and local government LDVs (15%). The largest change from last year is the decrease in transit vehicles,

from 54% to 11% of all niche market vehicles. This decrease occurred specifically in B20 transit buses, and it likely stems from one or two large fleets deciding to run their buses on diesel instead of B20 in 2007.

Table 2. Number and Type of Vehicles for Each Niche Market (Updated)

Niche Market	B20	CNG	E85	HYB	NEV	LPG	LNG	ELEC	B100	H2	PHYB	OTHER	TOTAL
State Govt LDVs	6,560	640	6,718	662	16	62	0	9	3	3	2	0	14,675
School Bus	6,414	575	0	3	0	993	0	0	0	0	1	5,712	13,698
Local Govt LDVs	1,981	950	964	6,240	662	115	0	178	0	7	1	24	11,122
Transit	1,074	3,608	0	621	2,000	304	344	16	234	3	1	14	8,219
Waste haulers	4,357	201	0	0	0	6	952	0	0	0	0	0	5,516
Off-road vehicles	4,357	50	200	0	46	175	0	323	27	3	0	100	5,281
Utility	1,132	2,687	389	259	8	21	0	88	100	3	2	0	4,689
Deliv/Transport	357	1,237	45	1,172	29	1,057	0	128	153	30	0	11	4,219
USPS	0	283	2,142	0	0	0	0	22	0	0	0	0	2,447
Airport	20	1,112	22	43	104	114	48	155	0	8	0	1	1,627
Police	836	89	638	3	10	0	0	3	0	0	0	10	1,589
Maintenance	600	317	51	9	192	82	0	37	0	1	0	0	1,289
US Parks	482	8	27	34	0	8	0	16	0	0	0	0	575
Shuttle	72	203	2	5	0	21	0	0	13	3	0	0	319
Total	28,242	11,960	11,198	9,051	3,067	2,958	1,344	975	530	61	7	5,872	75,265

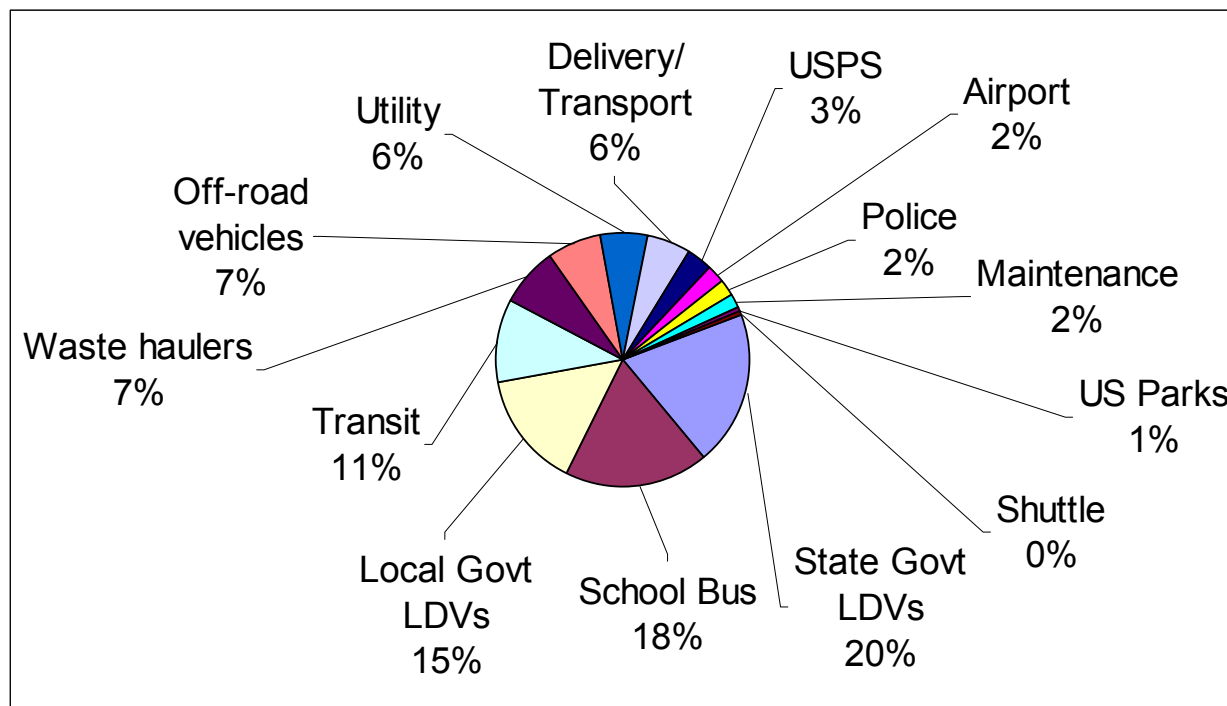


Figure 5. Percentage of Total AFVs and HEVs by Niche Market

Coalitions were asked which type of non-road equipment or vehicles they had used in their projects. They were provided six categories of vehicles and equipment from which to choose,

and their responses are shown in Table 3. Most of these categories are self-descriptive except for construction equipment (such as cranes and earth movers) and recreation equipment (such as jet skis, snow mobiles, and all-terrain vehicles).

Table 3. Number of Coalitions with Projects that Include Non-Road Vehicles or Equipment

Category	Number of Coalitions
Construction equipment	23
Forklifts	15
Railroads	10
Ships	6
Recreational equipment	5
Planes	2
Other	21
Total	82

Outreach Activities

Outreach activities were classified into seven categories, as shown in Table 4. A total of 1,252 activities were reported and were estimated to reach nearly 42 million people—twice the number reached last year. Advertisements and media events dominated the field, combining to represent more than 86% of the total number of people reached. However, these numbers do not necessarily reflect the actual impact that each event had on the audience. For example, extended personal contact at an Advancing the Choice event might have had a much greater impact than an advertisement heard on the radio.

Table 4. Results for the Seven Types of Outreach Activities

Activity Type	Persons Reached	% of All People Reached	No. of Activities	% of All Activities
Advertisement	23,654,749	56.7%	27	2.2%
Media Event	12,416,369	29.8%	164	13.1%
Literature Distribution	2,176,193	5.2%	238	19.0%
Legislation	1,503,314	3.6%	39	3.1%
Meeting	1,350,424	3.2%	621	49.6%
Advancing the Choice	497,708	1.2%	147	11.7%
Web Site	134,300	0.3%	16	1.3%
Total for All Types	41,733,057	100.0%	1,252	100.0%

Coordinators were asked to judge how much they thought they were responsible for the number of people reached in each event in contrast to the contributions of other event sponsors and participants. An analysis of the responses shows that, on average, coordinators felt they were responsible for 58% of the 42 million people reached.

Figure 6 illustrates the types of audiences that the 1,252 outreach activities attempted to reach. Any one activity could be aimed at more than one audience, and in fact about two-thirds of the activities targeted multiple audiences. The general public was most often cited as a target audience, followed by government vehicles and then fleets in general. Specialized applications—airports, waste management, delivery trucks, utility trucks, and mass transit—were identified as audiences in one-third of the outreach activities. Other audiences were cited as audience types in 10% of the activities reported.

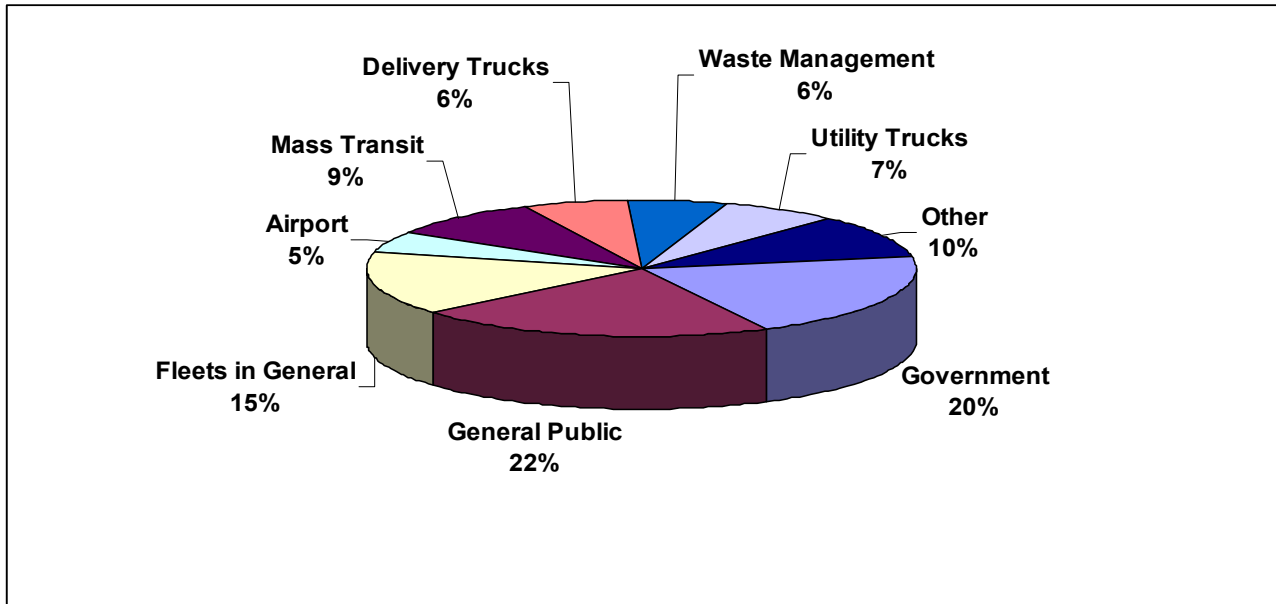


Figure 6. Number of Outreach Activities Split Among Audience Types

Figure 7 shows that AFVs were the technology most often targeted during outreach activities. This has generally been the case in the past. In general, the split among the technologies listed as targets are very similar this year to results from the 2006 questionnaire.

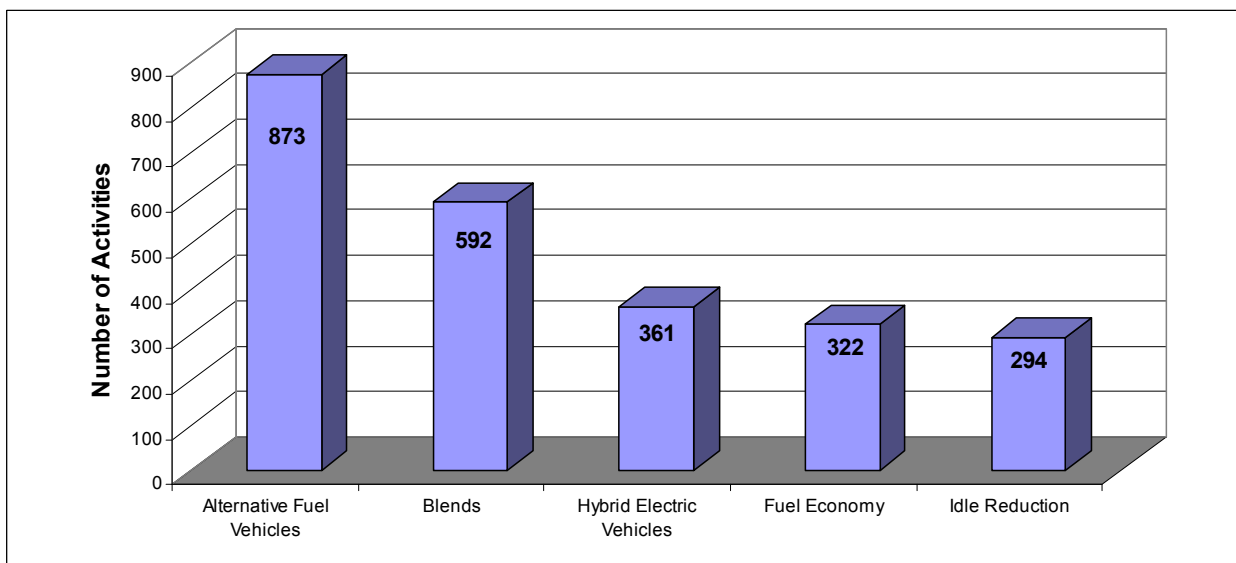


Figure 7. Number of Outreach Activities by Technology Type

About the Coordinators

Coordinators reported spending a total of 1,852 hours per week on Clean Cities tasks. The average amount of time spent on Clean Cities business per week was 22 hours, and the median amount of time was 16 hours per week. Information on coordinator experience was also gathered in the questionnaire. On average, coordinators have been on the job for 4.6 years. Half have had more than 3 years of experience, and half have had 3 or fewer years of experience. The longest serving coordinator has accumulated 15 years of experience, and three have been with Clean Cities for 14 years. If all 87 coalition coordinators worked the average of 22 hours per week, then they spent almost 100,000 hours in all promoting the Clean Cities petroleum reduction portfolio in 2007. This is equivalent to having a national network of 48 full-time experienced technical sales professionals working to reduce U.S. dependence on oil.

Coalition Grants

In 2007, 66 coalitions reported receiving 199 grants worth a total of \$131.8 million. These coalitions also reported garnering another \$50.8 million in leveraged funds. Of the 199 grants, the value of nine grants each exceeded \$1 million. The grant with the highest value, \$56.6 million, was received by the Sacramento coalition. The funds will be used for AFV and advanced vehicle purchases. The Los Angeles coalition was awarded a grant of \$45.9 million for purchasing CNG buses.

Table 5 presents the breakdown of the number and value of grants reported by the coalitions.

Table 5. Breakdown of Grants by Number and Value

Size Category	Number	% of Total Number	Total Value	% of Grand Total Value
< \$50,000	127	62%	\$1,632,320	1%
\$50,000–\$99,999	19	10%	\$1,388,266	1%
\$100,000–\$499,999	38	19%	\$10,521,697	8%
\$500,000–\$999,999	6	3%	\$2,341,712	2%
\$1,000,000 +	9	5%	\$115,962,151	88%
Grand Total		100%	\$131,796,146	100%

About the Stakeholders

In 2007, 83 coalitions reported a total of 5,719 stakeholders, for an average of 69 per coalition. Furthermore, Clean Cities coalitions are growing: 719 of the 5,719 stakeholders were added in 2007 for an average of nearly nine new recruits per coalition.

Clean Cities is voluntary, and coalitions draw local stakeholders from the public and private sectors. Stakeholders include local, state, and federal agencies; public health and transportation departments; transit agencies and other government offices; and auto manufacturers, car dealers, fuel suppliers, public utilities, and professional associations. Coalitions reported that 48% of the

total stakeholders were from the private sector. This represents a slight shift (2%) from private to public stakeholders this year.

Data Sources and Quality

Gathering data is always challenging for the coordinators, as they rely on the voluntary reporting of their stakeholders and members. Therefore, the survey contains a couple of questions relating to coordinator sources and data 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 8 presents the response breakdown for the 85 coordinators who answered the question. Fifty-six percent of the respondents classified their data as good, 25% as fair, 14% as excellent, and 2% as poor.

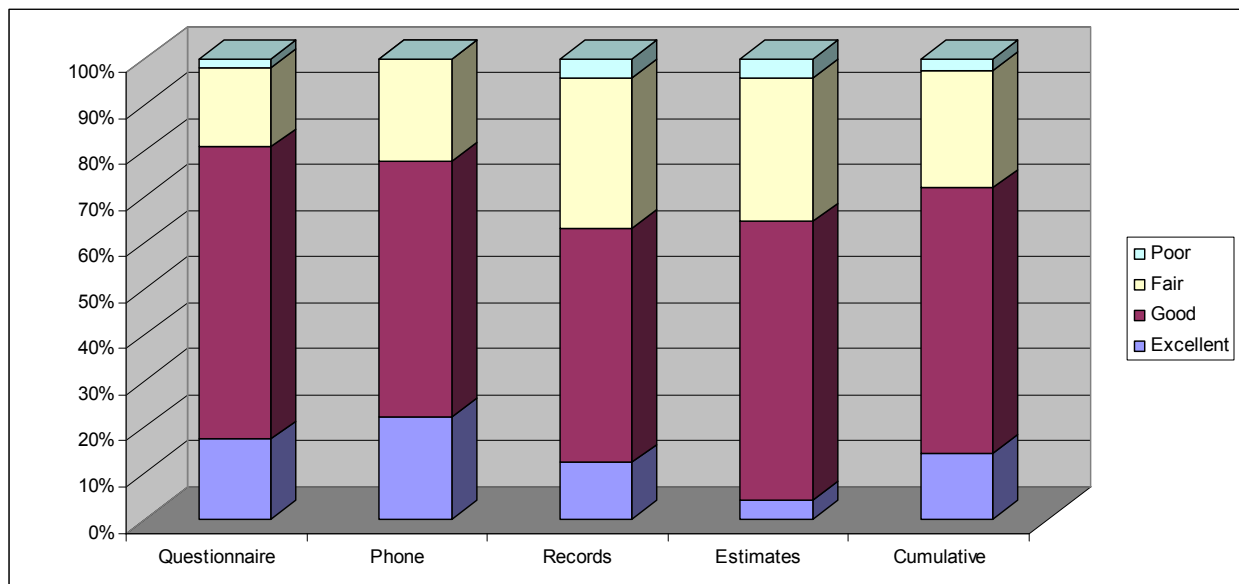


Figure 8. Data Quality Responses by Data Source

Coordinators were also asked where they obtained their data. They could choose one or more of the following: paper or electronic questionnaires to stakeholders, phone questionnaires of stakeholders, coalition records, or coalition estimates. All four methods were used equally—24% to 26% of the time. Figure 8 shows that written surveys and phone interviews resulted in a higher rate of “excellent” and “good” data than did coalition records and estimates. This could be because the coordinators were more aware of the uncertainties in the data in the latter two options.

Metrics on Lab Activities

Both NREL and ORNL track the use of their information and resources. On behalf of Clean Cities, ORNL produces the Fuel Economy Guide based on fuel economy data developed by the Environmental Protection Agency. In addition, ORNL produces and maintains the www.fueleconomy.gov Web site, along with other print and educational activities related to fuel

economy. Based on the distribution and use of these products and assumptions about their impact on consumer behavior, ORNL estimated that the impact of the materials on new car buyers, used car buyers, and car drivers exposed to Clean Cities products and projects resulted in a savings of 81 million gallons. The 81 million gallons is just the impact estimated for 2007. As a likely indication of increasing concerns among consumers about higher fuel prices, the annual 2007 savings are 11% higher than those estimated for 2006.

Online resources at NREL reached a large audience in 2007, as users accessed 7.2 million pages of information on the Clean Cities and AFDC Web sites. This usage number cannot be compared directly with the number for last year because of a change in accounting methods, but it appears to be a substantial increase. The sites at www.eere.energy.gov/cleancities and www.eere.energy.gov/afdc provide a range of resources to support coordinators, fleets, businesses, and local decision makers in their efforts to implement the technologies of the Clean Cities portfolio. The sites' content includes technical data, success stories, publications, and industry contacts, along with databases of federal and state incentives and laws, fuel station locations, available vehicles, and other information.

Conclusion

The metrics produced by Clean Cities help to quantify the impact of the program as a whole and of the activities of individual coalitions. Clean Cities believes the calculated impacts are a conservative measure of the program's overall impact, because the ability of coordinators to gather specific data about the impact of their activities is, by its very nature, limited. Furthermore, the ripple effect of their efforts in their local communities is difficult to measure. Clearly, though, the support of DOE and its national laboratories is enabling coalitions to coordinate the efforts of otherwise disparate groups and funding sources to accelerate the nation's progress toward petroleum displacement.

Appendix

Coalitions that Reported for 2007

Alamo Area
Ann Arbor Area Clean Cities Coalition
Antelope Valley
Atlanta Clean Cities
Capital Clean Cities of Connecticut, Inc.
Capital District—Albany
Central Arkansas
Central Coast Clean Cities Coalition
Central Indiana Clean Cities Alliance, Inc.
Central New York
Central Oklahoma Clean Cities
Central Texas Clean Cities
Centralina Clean Fuels Coalition
Chicago Area Clean Cities Coalition
Clean Fuels Ohio
Coachella Valley—Palm Springs
Colorado Springs Clean Cities Coalition
Columbia-Willamette, Inc.
Commonwealth Clean Cities Partnership
Dallas-Fort Worth
Delaware, State of
Denver
Detroit Area Clean Cities
Earth Day Coalition Clean Transportation Program
East Bay
East Tennessee Clean Fuels Coalition
East Texas Coalition
Eastern Sierra Regional Clean Cities Coalition, Inc.
Florida Space Coast Coalition
Genesee Region Clean Communities
Gold Coast
Granite State Clean Cities Coalition
Greater Baton Rouge Clean Cities Coalition
Greater Lansing Area Clean Cities
Greater Long Island Clean Cities Coalition
Greater New Haven Clean Cities, Inc.
Greater Philadelphia Clean Cities Program
Hampton Roads Clean Cities Coalition
Honolulu Clean Cities
Houston
Iowa Clean Cities Coalition
Kansas City Regional Clean Cities Coalition
Land of Enchantment Clean Cities Corridor
Las Vegas, Inc.
Long Beach
Los Angeles Clean Cities Coalition
Maine Clean Communities

Maryland Clean Cities
Massachusetts
Metropolitan Washington Alternative Fuels Clean Cities Partnership
Middle Georgia Clean Cities Coalition
Middle Tennessee Clean Cities
New Jersey
New York City
Northern Colorado Clean Cities
Norwich Clean Cities Coalition
Ocean State Clean Cities Coalition
Palmetto State Clean Fuels Coalition
Pittsburgh
Puget Sound Clean Cities Coalition
Red River Valley/Winnipeg Manitoba
Rogue Valley
Sacramento
San Diego Clean Fuels Coalition
San Francisco
San Joaquin Valley
Silicon Valley - San Jose
South East Texas Clean Cities Coalition
South Shore Clean Cities, Inc.
Southeast Louisiana Clean Fuels Partnership
Southern California Assoc of Governments
Southwestern CT Clean Cities
St. Louis Regional Clean Cities
Treasure Valley
Triangle Clean Cities Coalition
Tucson
Tulsa Area Clean Cities
Twin Cities Clean Cities Coalition
Utah Clean Cities
Vermont Clean Cities Coalition
Victoria Clean Cities
West Virginia Clean State Program
Western New York, Inc.
Western Riverside County Clean Cities Coalition
Wisconsin Clean Cities—Southeast Area, Inc.
Yellowstone-Teton Clean Energy Coalition

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