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Clean Cities Annual Metrics Report 2009 (Revised)

Caley Johnson

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.

Technical Report
NREL/TP-7A20-49389
Revised August 2011

Contract No. DE-AC36-08GO28308

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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 characterizes the membership, funding, projects, and activities of their coalitions. They also submit data about sales of alternative fuels, deployment of alternative fuel vehicles (AFVs), hybrid electric vehicles (HEVs), idle reduction initiatives, fuel economy activities, and programs to reduce vehicle miles driven. NREL analyzes the data and translates them into gasoline reduction impacts, which are summarized in this report.

Eighty-seven of the 88 coalitions that were active throughout 2009 completed their reports—a response rate of 99%. This is the same response rate seen in 2008. The coalitions that submitted their 2009 annual reports are listed in the appendix to this report. 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 and the website 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 670 million gallons of gasoline were displaced[1] through the Clean Cities efforts in 2009—63% more than in 2008. This displacement represents the combined results of the activities reported by coalitions (as analyzed by NREL), coalition outreach events (as estimated by NREL and ORNL), and the impacts of the Fuel Economy Guide and related activities (as estimated by ORNL). The reason for the large increase over last year is because 2009 is the first year that impacts from outreach events and the AFDC have been estimated.

The Clean Cities Annual Metrics Report was completely revamped this year. The new reporting website has increased the data quality of HEV fuel economy, niche markets that AFVs operate in, blend levels of biodiesel, and vehicle-miles travelled (VMT) reduction projects. The new reporting website most likely reduced the amount of petroleum displaced by alternative fuels

[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.

because it discouraged coalitions from taking credit for AFVs that they did not help. Furthermore, the new reporting website most likely led some coordinators to take less credit for a given project than they did last year.

AFVs still accounted for the largest share (33%) of the total 670-million-gallon displacement. Coalition outreach events were estimated to displace 167 million gallons. Fuel economy impacts (combined impacts of coalition and ORNL activity) were responsible for displacing 152 million gallons. The AFDC facilitated actions that displaced an estimated 57 million gallons. The use of biodiesel as a blend in diesel vehicles displaced nearly 54 million gallons, or 8% of the total, and idle reduction and HEV technologies combined to displace 33 million gallons. VMT reduction projects greatly increased their displacement to nearly 6 million gallons this year.

2009 was the second year that greenhouse gas (GHG) reductions were estimated for Clean Cities activities, and accuracy was improved. Coalition projects kept nearly 1.5 million tons of carbon dioxide equivalent (CO_2e) from being emitted to the atmosphere. Outreach events, fueleconomy.gov, and the AFDC kept nearly another 3 million tons of CO_2e out of the atmosphere, for a total of 4.4 million tons. This GHG reduction is the equivalent of completely removing 823,000 cars from the roads.

In addition to petroleum displacement and GHG reductions, a remarkable achievement of the coalitions was their ability to leverage the DOE investment. In 2009, the coalitions won 225 grants worth a total of $221 million and another $229 million in leveraged funds from coalition members. This funding represents an 18:1 leveraging of the $25 million program budget in FY 2009. Clean Cities coalitions received over $190 million in American Recovery and Reinvestment Act funds and utilized it to better equip the United States to use alternative fuels.

Clean Cities coordinators spent almost 127,000 hours pursuing Clean Cities' goals in 2009, which is like having a national network of 61 full-time technical sales professionals working to reduce U.S. dependence on oil. Coordinators entered 1,973 outreach activities for 2009, which reached an estimated 72 million people. AFVs were the most popular 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 common outreach subject.

Changes to 2009 Annual Metrics Report

NREL developed and implemented a new Clean Cities annual report website in 2009. Numerous changes added accuracy and increased the ease of reporting which, it is hoped, increased thoroughness. In particular, seven changes are important when comparing this report with reports from previous years:

1. The attribution question (see the next section) was made mandatory in 2009 instead of defaulting to 100%. As a result, many of the coordinators did not give their coalition enough credit for the petroleum reductions resulting from their projects. Many of these estimates were rectified, but not all.
2. All AFVs are now allocated to a niche market. Therefore, our niche data are much more complete than in previous years.

3. Coordinators were instructed to not report AFVs that happened to operate in their region without the aid of the coalition or its stakeholders. This reduced the alternative fuel use reported by a number of coalitions.
4. Any level of biodiesel can now be typed in rather than being grouped into broad categories of blend levels. This resulted in a more accurate picture of how biodiesel is being blended and used.
5. Coordinators were asked for their fuel economy improvements for HEVs and plug-in hybrid electric vehicles (PHEVs). This enabled us to report the fuel savings from these vehicles with much more accuracy than in previous years.
6. The fuel economy improvement and VMT reduction sections have been separated, which results in both sections being more user-friendly and having increased accuracy.
7. A new model was created to estimate the petroleum displacement resulting from coalition outreach events and AFDC activity.

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, VMT reduction, idle reduction, alternative fuel use, and outreach projects. Coordinators entered the percentage of the project's outcome that they thought their coalition was responsible for, and the project's overall outcome was multiplied by that percentage to determine the coalitions' impact. Although subjective, this method attempts to address the issue of attribution where coalitions are one of several partners involved in a project.

Reported Petroleum Displacement

Coordinators from 87 of the 88 Clean Cities coalitions submitted information on the fuel-reduction 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 (GGEs)—the amount of energy contained in a gallon of gasoline. As shown in Table 1, about 315 million GGEs (MGGEs) were displaced through Clean Cities coalition efforts in 2009—an average of 3.6 MGGEs per responding coalition. This is 6.8% higher than the total 2008 displacement of 287 MGGEs. In addition, coalition outreach activities displaced an estimated 131 MGGEs. Petroleum displaced by ORNL's fuel economy guide and NREL's AFDC then boosts the total Clean Cities effort by 131 MGGEs and 57 MGGEs (respectively) for a total displacement of 671 MGGEs.

Table 1. Petroleum Displacement of Each Portfolio Element

Technology	MGGEs	Percent of Coalitions' Reported Total	Change from Last Year
AFV	220.1	69.8%	+11%
Biodiesel Blends	53.5	17.0%	-16%
HEVs	18.1	5.7%	+46%
Idle Reduction	14.7	4.7%	+91%
VMT Reduction	5.7	1.8%	+63%
Fuel Economy	2.6	0.8%	+581%
Off-Road	0.6	0.2%	-58%
Coalition-Reported Total*	315.2	100%	+6.8%
Estimated from Outreach Events	166.6		new
AFDC	57.2		new
ORNL Fuel Economy	131.0	–	+4.8%
Grand Total	670.2	–	+63%

* Totals do not fully add up due to rounding.

In 2005, Clean Cities set a goal of displacing 2.5 billion GGEs per year by 2020. The data presented in this report show that Clean Cities is somewhat ahead of schedule to meet this goal.

Progress toward the goal is shown in Figure 1, where the path set forth to achieve the 2020 goal is shown by the blue dashed line, and actual displacement is tracked by the black solid line. When the goal was set, a compounded annual growth rate of 16.6% was required to follow the blue line to goal achievement. This requirement has now been decreased to 12.7% to meet the 2020 goal.

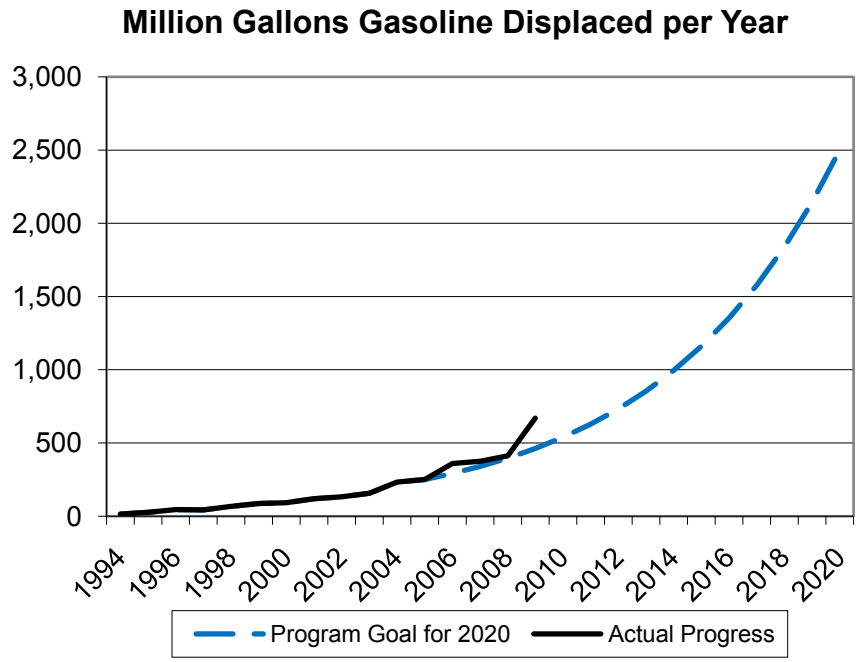

Figure 1. Annual Displacement Projection to Meet 2020 Goal and Actual Progress

Alternative Fuel Vehicles

As shown in Table 1, AFVs accounted for displacement of 220 million gallons, or 70% of the coalitions' reported displacement. This change is an increase of 11% in comparison to the fuel displaced by AFVs in 2008.

The 11% increase in AFV fuel displacement from 2008 to 2009 may have actually been reduced by improved the accuracy of this year's report. In previous years, various coalitions have reported all the flex fuel vehicles (FFVs) registered in their region and the corresponding fuel savings. This year, a concerted effort was made to inform coordinators that this was not acceptable, and annual reports were screened for these AFVs.

In 2009, coalitions reported a total inventory of over 708,500 AFVs split among the vehicle types (as shown in Figure 2). The E85 and neighborhood electric vehicle (NEV) categories increased substantially (23% and 13%, respectively) this year. There was a major reduction (84%) in B100 vehicles reported, most likely because the new reporting website reduced the types of biodiesel blends erroneously being reported as B100. Likewise, vehicles in the "other" category dropped drastically (97%), probably because the new website helped coordinators report these in the correct categories. Reductions were also seen in the liquefied petroleum gas (LPG) (64%), electric (23%), and compressed natural gas (CNG) (13%) categories.

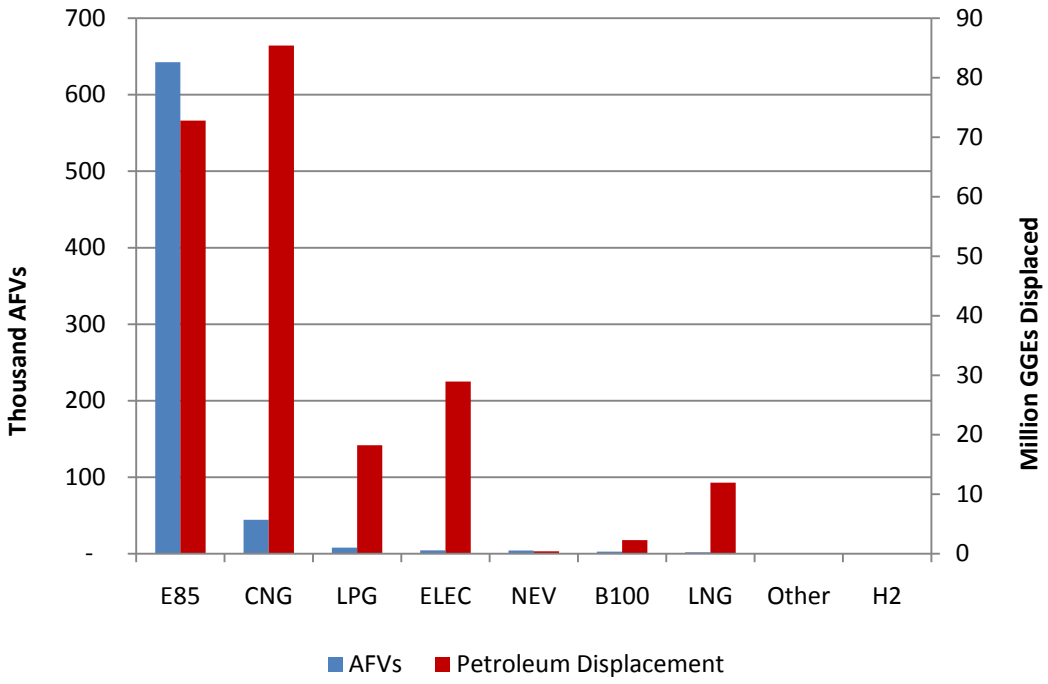

Figure 2. Number of AFVs and Fuel Displacement by Fuel Type

Figure 2 also shows the total GGEs displaced in AFVs by fuel type. CNG remains at the top of the list, accounting for 39% of the total AFV displacement despite the fact that only 6% of the AFVs used CNG. This effectiveness is in stark contrast to E85, which accounts for only 33% of the AFV displacement despite the fact that 91% of AFVs can use E85.

Only 4% of the reported AFVs were heavy-duty vehicles (HDV), yet 58% of the total petroleum displacement due to AFVs were from HDVs. These vehicles displace a disproportionate share of petroleum because they use more fuel per vehicle and because most use alternative fuel all the time instead of occasionally, like the light-duty FFVs do. The use of liquefied natural gas (LNG) is confined almost exclusively to HDVs. Eighty-seven percent of the displacement from B100, approximately 50% from LPG, and approximately 33% from CNG occurred in HDVs.

Hybrid Electric Vehicles

The number of HEVs and PHEVs resulting from Clean Cities efforts surpassed 107,500 in 2009, about 13% of the total vehicles (AFVs plus HEVs) reported in the 2009 questionnaire. This represents an increase of 5% over those reported in 2008. Using these vehicles rather than conventional vehicles saved 18 million gallons in 2009. This displacement is a 46% increase from 2008, which is much larger than the 5% increase in vehicles. This discrepancy is most likely due to the fact that the 2008 numbers were estimated as a 25% increase in fuel economy, while the 2009 numbers were calculated from replaced vehicle fuel economy and HEV fuel economy inputs from the coordinators. This higher per-vehicle fuel reduction in 2009 is possible because HEVs were likely also a downsize, which increases fuel economy more than the previously assumed 25%.

PHEVs seem to have lost some popularity in Clean Cities coalitions as their numbers dropped from 374 in 2008 to 78 in 2009. The cause of this decline is most likely mis-reporting since PHEV availability increased during the same timeframe. Changes will be made in the 2010 annual report website to guide coordinators to properly report their PHEVs.

Fuel Economy

Petroleum displacement from Fuel Economy projects increased nearly six-fold in 2009, to 2.6 MGGEs. This displacement came from 14,577 vehicles, for an average displacement of 176 GGEs per vehicle. As shown in Figure 3, some fuel economy improvement projects were much more effective at reducing GGEs than others.

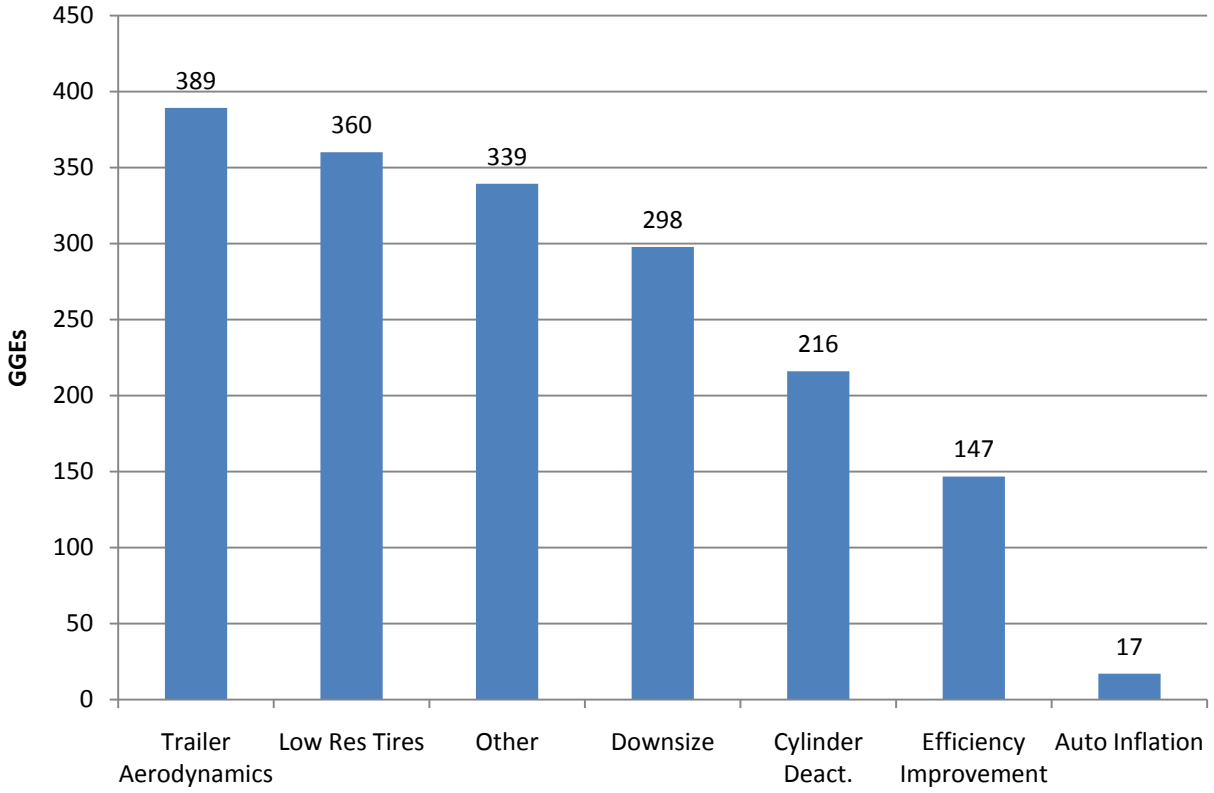

Figure 3. Average Fuel Reduction per Vehicle for Fuel Economy Projects in 2009

VMT Reduction

VMT-reduction projects save fuel by reducing the miles that vehicles travel and include methods such as carpooling, work-from-home, biking, and public transportation. The amount of petroleum displaced through these projects has sustained its high growth rate (63%), rising to 5.7 million gallons in 2009.

Idle Reduction

Idle reduction (IR) technologies include truck-stop electrification, onboard idle reduction, and idle reduction policies. Estimated fuel displacement for idle reduction technologies was 14.7 MGGEs in 2009. As shown in Figure 4, idle reduction policies accounted for 44% of the displacement estimated for the three technologies, onboard idle reduction technologies accounted for 39%, and truck-stop electrification accounted for 17%.

The total fuel displaced by idle reduction (14.7 MGGEs) is up 91% from 7.7 MGGEs in 2008. This difference is largely due to the increase (117%) in policies enacted. Truck-stop electrification also saw a substantial gain (92%) from last year while petroleum displacement from truck-stop electrification increased 67%. The truck-stop electrification industry appears to have rebounded from IdleAire's 2008 bankruptcy.

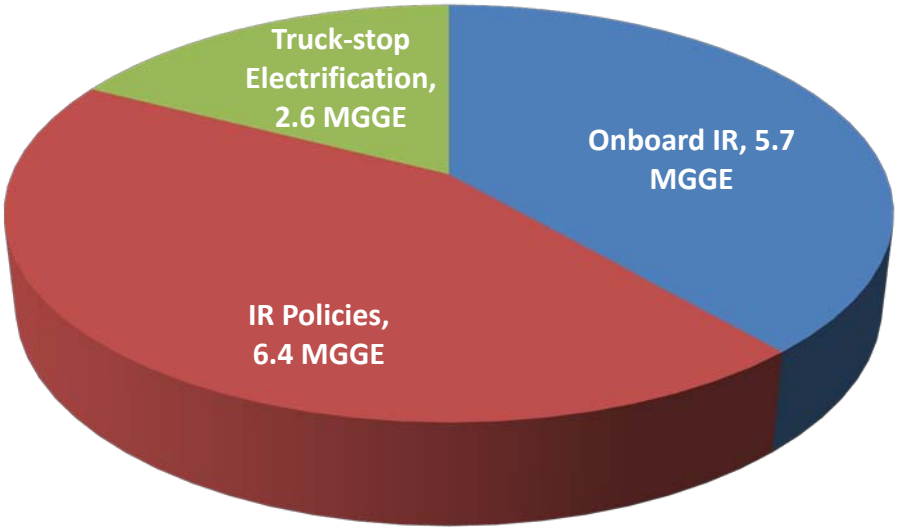

Figure 4. Displacement Due to Idle Reduction Projects in MGGEs

Biodiesel Blends

Clean Cities' efforts to promote the use of biodiesel blends saved almost 54 MGGEs in 2009. The use of low-level biodiesel blends saved 11 MGGEs—a 137% increase from last year. The use of B20 saved 36.7 MGGEs, which was a 37% decrease from 2008. High-level blends saved the remaining 5.7 MGGEs. Biodiesel blends were accounted for separately from the AFV section because most can be used without a designated AFV.

Greenhouse Gas Emissions Reduction

Clean Cities petroleum displacement leads to a substantial reduction in GHG emissions, the pollutants responsible for global climate change. To estimate the GHG reductions, the author used a variation of Argonne National Laboratory's Greenhouse Gas, Regulated Emissions, and Energy Use in Transportation (GREET) model. This model takes into account the "well to wheels" GHG emissions for transportation fuels, which include fuel production, transport, and use in the vehicle. It does not take into account the emissions from indirect land use changes or vehicle manufacturing. The tons of GHGs reduced from the atmosphere due to Clean Cities activities, along with a reference for how many passenger cars would need to be removed for an equivalent reduction, are shown in Table 2.

Table 2. GHG Emissions Reduced by Clean Cities in 2009

Technology	Tons of GHG Reduced	Equivalent Cars Removed*	% of Coalition Total
BD Blends	492,000	91,574	33.6%
AFV	467,917	87,091	31.9%
HEV	222,593	41,430	15.2%
IR	177,037	32,951	12.1%
VMT Reduction	70,122	13,051	4.8%
FE Improvements	31,779	5,915	2.2%
Off Road	3,169	590	0.2%
Coalition Reported Total	1,464,617	272,603	100%
Outreach Events	1,201,526	223,635	
AFDC	139,731	26,007	
ORNL Fuel Economy	1,614,118	300,428	
Grand Total	4,419,992	822,673	

*Calculated as total passenger car GHG emissions (Table 2–15 in the EPA's Inventory of GHG Emissions and Sinks) divided by total passenger cars (Table 1–11 in the Bureau of Transportation Statistics' National Transportation Statistics)

Biodiesel blends were responsible for more GHG reductions than any other coalition-reported activity. AFVs were responsible for almost as many. These reductions were calculated by subtracting the lifecycle GHGs emitted from the use of an alternative fuel from the lifecycle GHGs emitted from using gasoline or diesel in an equivalent vehicle. Gasoline is considered the base fuel for all light-duty vehicles (LDVs) except biodiesel, which is used in a diesel (compression-ignition) vehicle. Diesel fuel is considered the base fuel for HDVs using all alternative fuels except E85, CNG, LNG, and LPG because these vehicles are equipped with spark-ignition (gasoline-like) engines. Figure 5 shows what fuels were used to achieve these reductions and how many AFVs were required for a given reduction. Notice that the GHG reductions are not necessarily proportional to the petroleum displacement shown in Figure 2. This difference occurs because various alternative fuels emit different amounts of GHGs over their lifecycle.

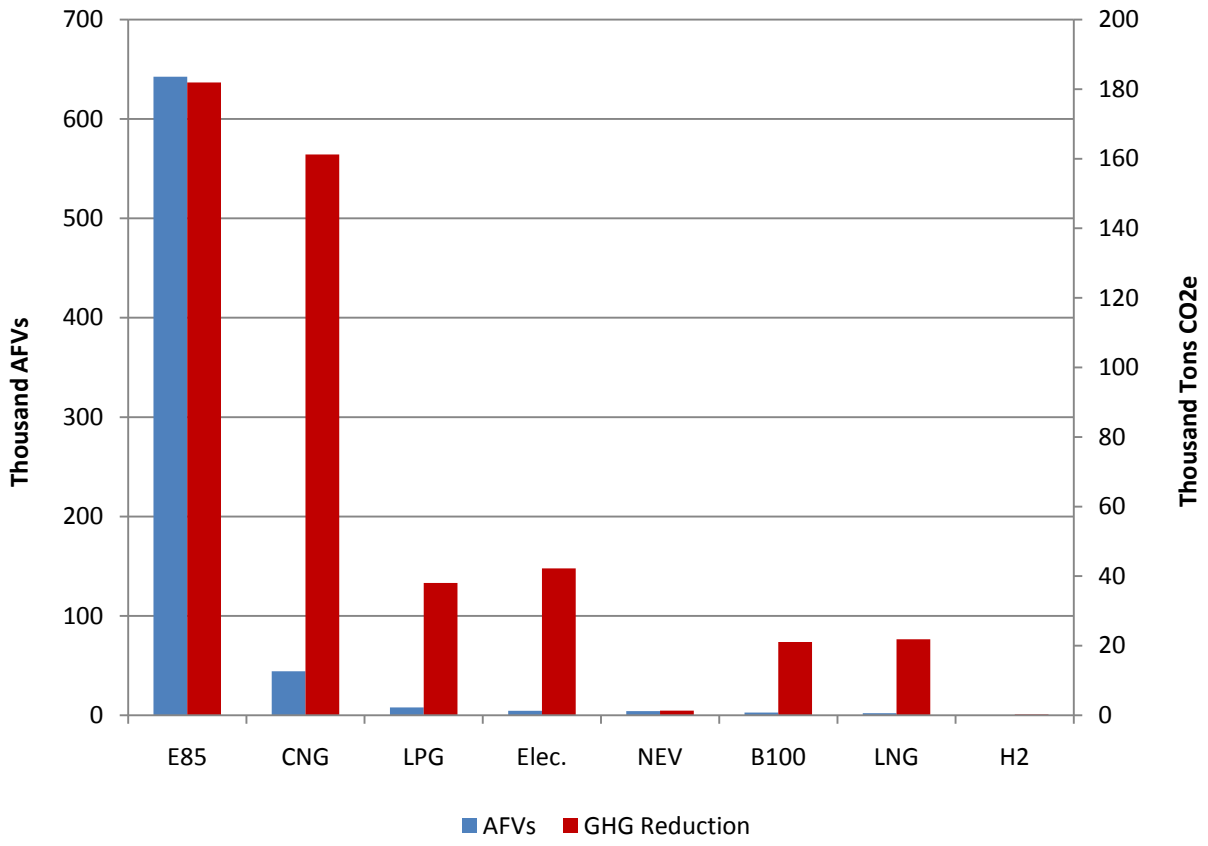

Figure 5. Number of AFVs and Amount of GHG Reduction by Fuel Type

Niche Market Vehicles

The questionnaire also asked coordinators to categorize their AFVs into key niche market fleets. Overall numbers grew dramatically because changes format of the report website made it much easier to report an AFV's niche. Table 3 shows that 87% of all niche vehicles used E85 or CNG, and Figure 6 shows that 61% of the niche vehicles were state and local government LDVs. The overall number of niche vehicles represented 15% of all reported AFVs. There was some dramatic growth in the number of electric and B100 niche vehicles. The niches that grew the most were (starting with highest growth rate) maintenance, local government, state government, shuttle, and utility fleets. The growth in these niches was partially counteracted by a contraction in (starting with highest loss rate) postal service, school bus, waste hauler, and airport fleets. Of particular interest are the huge growth of electric vehicles (EVs) (especially in transit and state government applications) and the large reduction in LNG vehicles (especially in waste hauler applications).

Vehicles reported in the State Government, Utility, USPS, and US Parks niches represent a vehicle population that might be reported through other federal programs such as the Federal Fleet and State and Fuel Provider programs. Analysts should be careful not to double-count these vehicles when assessing the cumulative impact of these three federal programs.

Table 3. Number and Type of Vehicles for Each Niche Market

Market	E85	CNG	LPG	Elec	NEV	B100	LNG	H2	Other	Total
State Govt LDVs	37,776	5,072	1,351	428	62	7	0	0	0	44,696
Local Govt LDVs	12,576	5,776	801	446	801	210	0	9	100	20,719
Utility	5,730	4,687	132	75	38	1,409	8	0	0	12,079
Transit	162	7,704	601	686	64	0	545	4	0	9,766
Deliv/Transport	2,182	991	2,116	36	0	153	212	0	10	5,700
Police	2,840	204	1	43	53	3	0	0	0	3,144
Maintenance	1,676	913	114	269	33	48	14	0	44	3,111
Airport	0	1,660	96	221	128	7	20	3	0	2,135
Waste Haulers	333	794	42	18	0	4	849	4	0	2,044
School Bus	0	845	1,102	3	0	0	0	0	0	1,950
Taxis	55	230	675	0	0	0	0	0	0	960
Shuttle	0	711	4	18	9	5	0	1	0	748
USPS	568	104	0	0	0	0	0	0	0	672
US Parks	117	97	6	16	4	0	0	0	0	240
Total Niche	64,015	29,788	7,041	2,259	1,192	1,846	1,648	21	154	107,964
General AFV	578,505	14,529	896	2,231	3,028	968	390	53	0	600,600
Grand Total	642,520	44,317	7,937	4,490	4,220	2,814	2,038	74	154	708,564

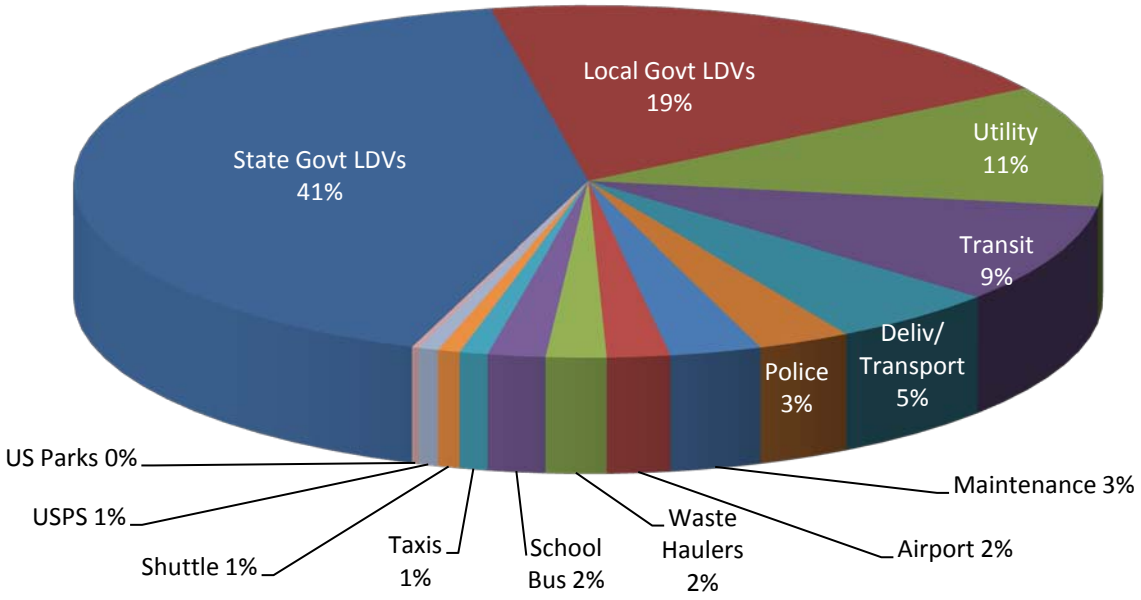

Figure 6. Percentage of Total AFVs and HEVs by Niche Market

Off-Road Vehicles

Alternative fuels are also used in off-road applications. Table 4 shows the number of AFVs (or pieces of equipment) used by the coalitions in 2009. Most of these categories are self-descriptive except construction equipment (such as cranes and earth movers) and recreation equipment (such as jet skis, snow mobiles, and all-terrain vehicles). Fuel-use calculations and defaults were then used to quantify how much petroleum these vehicles displaced. Fuel type was also reported, with electricity and LPG accounting for about 30% of the AFVs each. Less popular fuels were B100 (22% of equipment), HEVs (10%), and the rest accounted for less than 2% each.

Overall displacement from off-road vehicles increased 29% from last year. Particularly popular fuel/application combinations are (in order of most to least popular) LPG forklifts, B100 construction equipment, electric forklifts, and LPG landscaping equipment (mostly mowers). Average displacement per off-road vehicle was 186 GGEs, with above-average applications being airplanes (4,480 GGE/vehicle), construction (429 GGE/vehicle), landscaping (247 GGE/vehicle), and farm (202 GGE/vehicle).

Table 4. Number of Non-Road Vehicles or Equipment and Petroleum Displaced

Application	Number of Vehicles	GGEs Displaced
Forklifts	906	146,449
Construction equipment	460	197,301
Landscaping equipment	229	56,660
Recreational equipment	68	0
Farm equipment	28	5,662
Planes	9	40,313
Ships	1	76
Other	1,314	115,816
Total	3,015	562,277

Outreach Activities

Outreach activities were classified into seven categories, as shown in Table 5. A total of 1,973 activities were reported and were estimated to reach over 72 million people. The number of projects increased 15% while the number of persons reached decreased 36% from 2008, suggesting much smaller projects. Media and Advancing the Choice events dominated the field, combining to represent 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.

The number of activities, as listed in table 5, are reported differently than in previous years. This year, an activity that was repeated multiple dates counted as multiple activities. This change inflated the activity count by an average of 31%. Advertisements and websites were inflated the most, since they can most easily be ran multiple days, while media events and meetings were

inflated the least. Comparisons between 2008 and 2009 were made on the previous accounting system.

Table 5. Results for the Seven Types of Outreach Activities

Activity Type	Persons Reached	% of all people reached	No. of Activities	% of All Activities
Media Event	55,253,503	76%	205	10%
Advancing the Choice	6,894,337	10%	311	16%
Advertisement	2,890,168	4%	64	3%
Website	2,868,379	4%	57	3%
Meeting	2,085,936	3%	950	48%
Literature Distribution	1,325,476	2%	334	17%
Legislation	1,070,811	1%	52	3%
Total	72,388,610	100%	1,973	100%

Figure 7 illustrates the types of audiences that the 1,973 outreach activities attempted to reach. Any one activity could be aimed at more than one audience; in fact, each activity targeted an average of 2.7 different audiences. The general public was most often cited as a target audience, followed by government fleets, and then fleets in general. Specialized applications—airports, waste management, delivery trucks, utility trucks, and mass transit—were identified as audiences in nearly 40% of the outreach activities. "Other" audiences were cited as audience types in 10% of the activities reported.

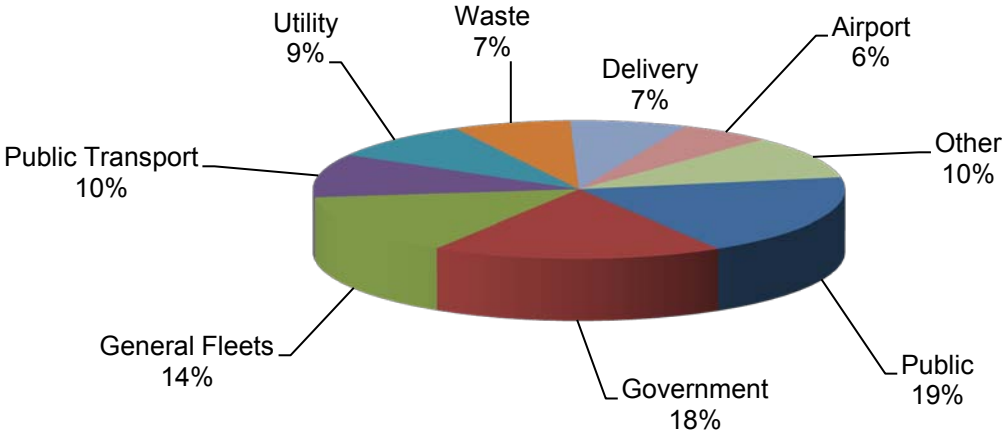

Figure 7. Number of Outreach Activities Split Among Audience Types

Figure 8 shows that AFVs were the technology most often targeted during outreach activities. AFVs, HEVs, and idle reduction have seen an increase in coverage this year, while blends and fuel economy were targeted in fewer activities than in 2008.

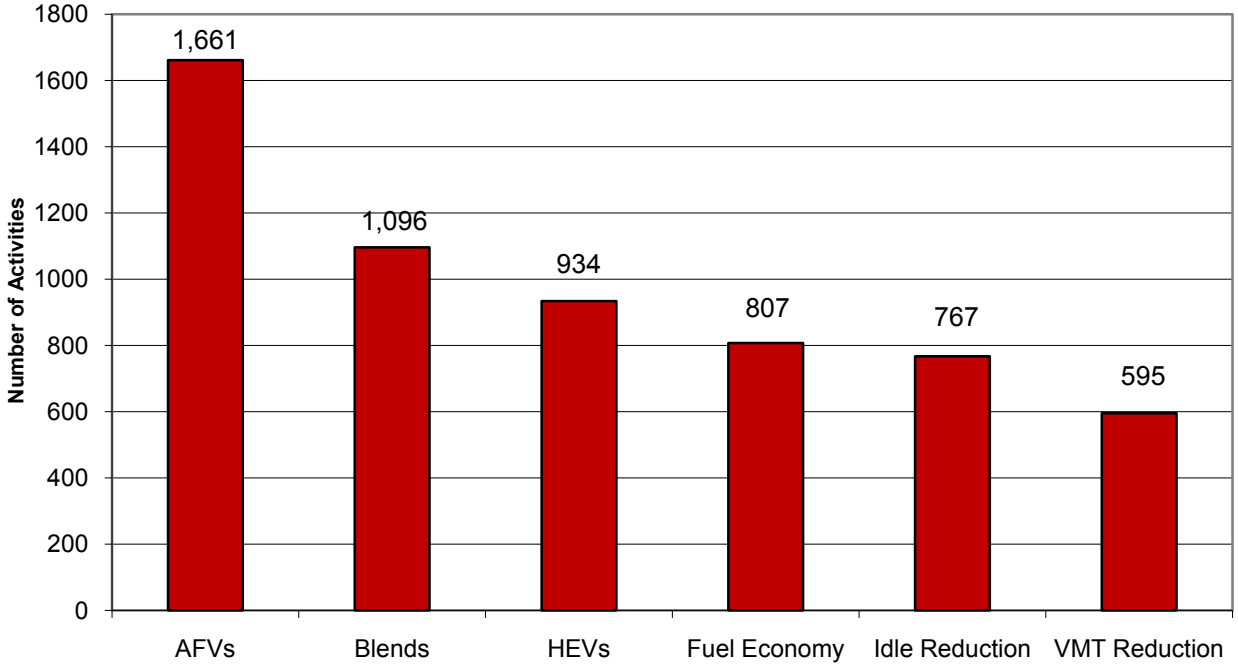

Figure 8. Number of Outreach Activities by Technology Type

NREL and ORNL developed a model to estimate the petroleum displaced from coalition outreach events. This is called the Petroleum Impacts Model (PIM), and it is more thoroughly explained in Appendix B. This model estimates that Clean Cities outreach events prompted and enabled actions that displaced 167 MGGEs of petroleum in 2009.

About the Coordinators

Coordinators reported spending a total of 2,465 hours per week on Clean Cities tasks. For an individual coalition, the average amount of time spent coordinating Clean Cities business per week was 28 hours, and the median amount of time was 25 hours per week. Both of the per-coordinator metrics show a slight increase over last year while the total hours decreased slightly.

Information on coordinator experience was also gathered in the questionnaire. On average, coordinators have been on the job for 4.9 years. Half of the coordinators have had more than three years of experience, and half have had three or fewer years of experience. The four longest serving coordinators have been with Clean Cities for at least 15 years. If all 87 coalition coordinators worked the average of 28 hours per week, then they spent almost 127,000 hours in all promoting the Clean Cities petroleum reduction portfolio in 2009. This work is equivalent to having a national network of 61 full-time, experienced technical sales professionals working to reduce U.S. dependence on oil.

Coalition Grants

In 2009, 65 coalitions reported receiving 225 grants worth a total of $221 million. These coalitions also reported garnering an even greater amount ($229 million) in leveraged (matching)

funds. Of the 225 grants, the value of 11 grants each exceeded $10 million. The grant with the highest value, $16.8 million, was received by the San Diego Clean Fuels Coalition as part of the Ecotality EV project and was matched by a conglomeration of San Diego entities. The funds will be used to introduce EVs and install infrastructure to charge them. Table 6 presents the breakdown of the number and value of grants reported by the coalitions.

The American Recovery and Reinvestment Act was signed into law on February 17, 2009, for the purpose of creating jobs in all areas of the country and spurring future economic development in key areas such as clean energy. Clean Cities proved to be a highly effective way to identify effective projects around the nation and quickly fund them. Over $190 million of the grants reported by Clean Cities coalitions were funded by American Recovery and Reinvestment Act, and that money attracted $176 million in matching funds. Thirty-five different coalitions worked with several federal agencies, state governments, and private companies to disperse this money.

Of the $450 million in grants and leveraged funds, $3.7 million were listed as coming from the U.S. Department of Energy independent of the American Recovery and Reinvestment Act. Clean Cities coalition support contracts were not counted among the grants received by coalitions because they do not represent outside funding.

Table 6. Breakdown of Grants by Number and Value

Size Category	Number	% of Total Number	Total Value	% of Grand Total Value
< $50,000	114	51%	$1,807,722	1%
$50,000–$99,999	24	11%	$1,536,387	1%
$100,000–$499,999	45	20%	$9,296,480	4%
$500,000–$999,999	16	7%	$10,546,987	5%
$1,000,000 +	26	12%	$197,854,694	90%
Grand Total	225	100%	$221,042,270	100%

About the Stakeholders

In 2009, 88 coalitions reported a total of 8,485 stakeholders for an average of 96 stakeholders per coalition. Furthermore, Clean Cities coalitions are growing: 1,914 of the 8,485 stakeholders were added in 2009 for an average of 21.8 new recruits per coalition. This makes for a coalition growth rate of 28%.

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 47% of the total stakeholders were from the private sector. This composition represents a slight shift (2%) from private to public stakeholders this year.

Data Sources and Quality

Gathering data is always challenging for the coordinators because they rely on voluntary reporting from their stakeholders. Therefore, the annual report website contains some 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 9 presents the response breakdown for the 88 coordinators who answered the question. Fifteen percent of the respondents classified their data as excellent, 66% as good, 15% as fair, and 4% as poor. When compared to 2008, many more coordinators moved from the fair to good category. A small number moved from fair to poor, and about the same number moved from excellent to good.

Coordinators were also asked where they obtained their data. They could choose one or more of the following: written (paper or electronic) questions to stakeholders, phone questions to stakeholders, coalition records, or coalition estimates. Written questions were the most popular form of data gathering, accounting for 34% of the sources. The next most popular was a phone question (27%), then coalition records (21%), and finally estimates (18%). Figure 10 shows that all forms had about the same (within 5%) rate of combined "excellent" and "good" data.

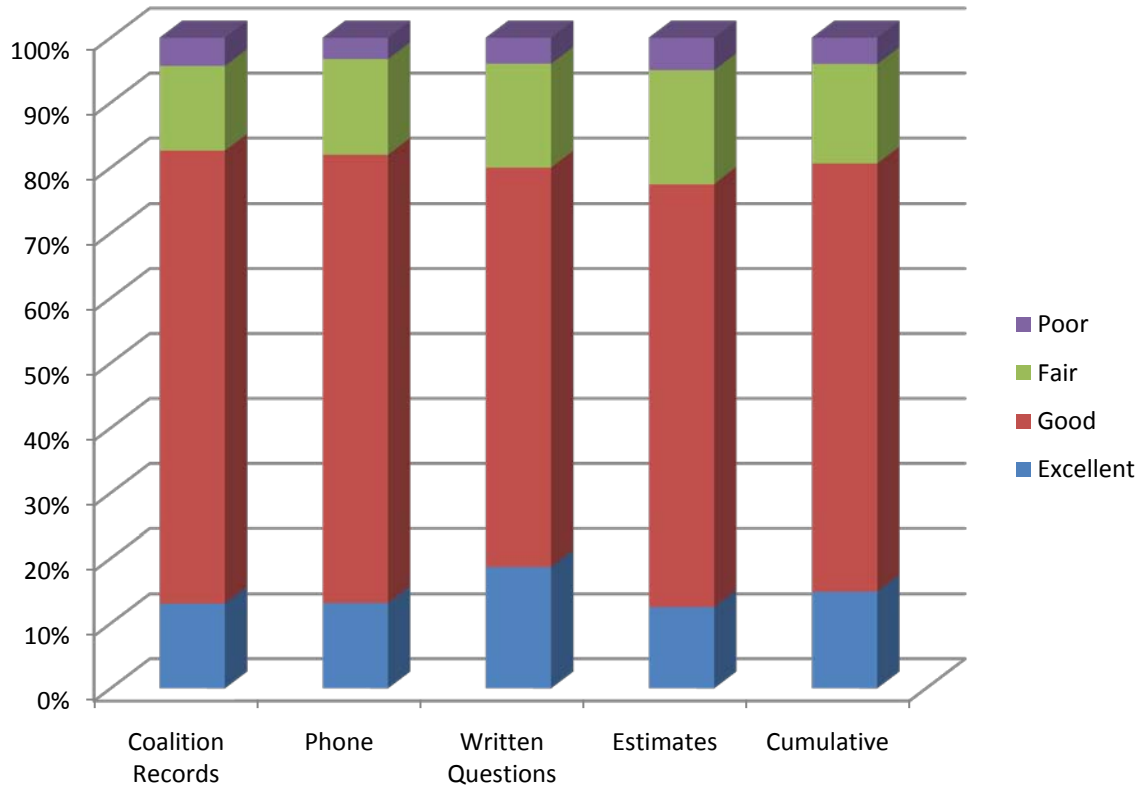

Figure 9. Data Quality Responses by Data Source

Metrics on National 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 website along with other print and educational activities related to fuel economy. By tracking the number of new car buyers, used car buyers, and car drivers exposed to fuel economy products through their educational materials and assuming a 1 to 3.3% improvement of fuel economy per customer, ORNL estimated that the fuel economy materials resulted in a savings of 131 million gallons of gasoline in 2009. These fuel savings are 5% greater than those estimated for 2008.

Online resources at NREL reached a large audience in 2009 as users accessed 4.3 million pages of information on the Clean Cities and AFDC websites. The sites at www.eere.energy.gov/cleancities and www.afdc.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 and tools.

NREL estimated that the 4 million page views, 820,000 visits by 577 million users of the AFDC resulted in a petroleum displacement of 57 MGGEs in 2009. See Appendix B for details about the estimation methodology. Estimates were not made for the Clean Cities website because those displacement numbers were assumed to have already been reported through the coalition's annual report.

Conclusion

The metrics produced by Clean Cities help 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 coalitions' 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 A: Clean Cities Coalitions That Completed Annual Reports

State	Coalition
AL	Alabama Clean Fuels Coalition
AR	Arkansas Clean Cities
AZ	Tucson Clean Cities
AZ	Valley of the Sun Clean Cities (Phoenix)
CA	Antelope Valley Clean Cities
CA	Breathe California of the Bay Area
CA	Central Coast Clean Cities
CA	Coachella Valley Region Clean Cities
CA	East Bay Clean Cities (Oakland)
CA	Long Beach Clean Cities
CA	Los Angeles Clean Cities
CA	Sacramento Clean Cities
CA	San Diego Clean Fuels Coalition
CA	San Francisco Clean Cities
CA	San Joaquin Valley Clean Cities
CA	Silicon Valley Clean Cities (San Jose)
CA	Southern California Clean Cities
CA	Western Riverside County Clean Cities
CO	Denver Clean Cities
CO	Northern Colorado Clean Cities
CO	Southern Colorado Clean Cities
CT	Capitol Clean Cities of Connecticut
CT	Connecticut Southwestern Area Clean Cities
CT	New Haven Clean Cities
CT	New London Clean Cities
CT	Norwich Clean Cities
CT	Waterbury Clean Cities
DC	Washington DC Metropolitan Clean Cities
DE	State of Delaware Clean Cities
FL	Gold Coast Clean Cities (Miami/Fort Lauderdale/West Palm Beach)
FL	Space Coast Clean Cities (Orlando)
GA	Atlanta Clean Cities

State	Coalition
GA	Middle Georgia Clean Cities
HI	Honolulu Clean Cities
IA	State of Iowa Clean Cities
ID	Treasure Valley Clean Cities
IL	Chicago Clean Cities
IL	Evansville
IL	Peoria
IN	Greater Indiana Clean Cities
IN	South Shore Clean Cities
KS	Kansas City Regional Clean Cities
KS	Manhattan, Kansas Clean Cities
KS	Southwest Kansas
KY	Commonwealth Clean Cities Partnership
LA	Greater Baton Rouge Clean Cities
LA	Shreveport-Bossier City Clean Cities
LA	Southeast Louisiana Clean Fuels Partnership
MA	Massachusetts Clean Cities
MD	State of Maryland Clean Cities
ME	Maine Clean Communities
MI	Ann Arbor Clean Cities
MI	Detroit Clean Cities
MI	Greater Lansing Clean Cities
MN	Twin Cities Clean Cities
MO	St. Louis Clean Cities
MT	Missoula Clean Cities
NC	Centralina Clean Fuels Coalition
NC	Land of Sky Clean Vehicles Coalition
NC	Triangle Clean Cities (Raleigh, Durham, Chapel Hill)
ND	Red River Valley - Canada
ND	Red River Valley Clean Cities (Grand Forks, Winnipeg, Manitoba)
NE	Omaha
NH	Granite State Clean Cities
NJ	New Jersey Clean Cities

State	Coalition
NM	Land of Enchantment Clean Cities (New Mexico)
NV	Eastern Sierra Regional Clean Cities (Reno)
NV	Las Vegas Clean Cities
NY	Capital District Clean Cities (Albany)
NY	Central New York Clean Cities (Syracuse)
NY	Clean Communities of Western New York (Buffalo)
NY	Genesee Region Clean Cities (Rochester)
NY	Greater Long Island Clean Cities
NY	New York City and Lower Hudson Valley Clean Communities
NY	White Plains, NY Clean Cities
OH	Clean Fuels Ohio
OH	Northeast Ohio Clean Transportation (Cleveland)
OH	Tri-State (Cincinnati)
OK	Central Oklahoma Clean Cities (Oklahoma City)
OK	Tulsa Clean Cities
OR	Columbia-Willamette Clean Cities
OR	Rogue Valley Clean Cities
PA	Philadelphia Clean Cities
PA	Pittsburgh Clean Cities
RI	Ocean State Clean Cities
SC	Palmetto State Clean Cities
TN	East Tennessee Clean Fuels Coalition
TN	Middle Tennessee Clean Cities
TN	West Tennessee Clean Cities
TX	Alamo Area Clean Cities (San Antonio)
TX	Central Texas Clean Cities (Austin)
TX	Dallas-Ft. Worth Clean Cities
TX	East Texas Clean Cities
TX	Houston-Galveston Clean Cities
TX	Laredo Clean Cities
TX	Paso del Norte Clean Cities
TX	South East Texas Clean Cities (Beaumont-Port Arthur)
TX	Texas Coastal Bend Clean Cities (Corpus Christi)
TX	Victoria Clean Cities

State	Coalition
UT	Utah Clean Cities
VA	Virginia Clean Cities
VT	State of Vermont Clean Cities
WA	Puget Sound Clean Cities (Seattle)
WI	Wisconsin Southeast Area Clean Cities
WV	State of West Virginia Clean Cities
WY	Yellowstone Teton Clean Energy Coalition

Appendix B: Estimating Petroleum Reduction from Outreach Activities and Websites

2009 is the first year that petroleum reduction was attributed to the outreach events that clean cities coalitions held. To estimate the size of these reductions, NREL and ORNL developed the Petroleum Impact Model (PIM) and functionality was added to the Clean Cities annual report website.

The Clean Cities coordinators input the type of outreach event, the number of people reached by each event, and their percent attributed. The annual report website assumed that the audience was divided evenly between events to determine how many people were reached by event, then it multiplies that number by the percent attributed to the coalition. This data is then entered into the PIM as the "persons reached by the coalition about a given technology".

The PIM multiplies this persons-reached number by the probability that they will take action (which means purchase an AFV or change their driving or fueling behavior, as listed in the top row of table 7). 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 firms such as Fireclick, GfK Mediamark Research, and the Direct Marketing Association. For activity type/audience action combinations that weren't directly addressed by research, NREL adjusted the customer conversion ratios based on the Ostrow Model of Effective Frequency. This model lists a set of relationships that increase or decrease the impact of advertisements. The customer conversion factors used in the PIM are displayed in Table 7.

Table 7. Customer Conversion Ratios Used in the PIM

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	Idle reduction HDV (equip purchase)	Reduce vehicle miles travelled
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%	0.8%	10.0%	0.8%	10.0%	1.4%	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	0.5%	3.0%	3.0%	0.6%	8.0%	6.0%	8.0%	1.3%	3.8%
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%	1.0%	3.0%

The persons-reached multiplied by the appropriate customer conversion ratio (from Table 7) results in the number of people assumed to take the intended action. At this point, the PIM is similar to the Clean Cities annual reporting tool as it converts the estimated number of vehicles purchased or number of people changing their driving habits into displaced petroleum. Reductions are made for probable overlap between those attending outreach events and those reporting their real displacement through a Clean Cities coalition. Only the petroleum displaced during that given year is accounted for even though many of the vehicle purchases and behavioral changes will likely last beyond the year. The PIM estimates that 167 MGGEs of petroleum were displaced by 2009 outreach events.

The PIM was also used to estimate the petroleum displacement resulting from the AFDC. Web statistics are kept on the AFDC that enable the estimation of individual users. The PIM then used similar inputs, defaults, and methodologies as it did to calculate the displacement by coalition websites portion of the outreach events (including the website row of Table 7) to estimate the displacement from the AFDC. This resulted in an estimated petroleum displacement of 57MGGEs from actions that the AFDC instigated or enabled.