

CONGESTION MITIGATION AND AIR QUALITY (CMAQ) PROGRAM  
AND ALTERNATIVE FUEL VEHICLE PROJECTS

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## **Chapter I: Background and Scope of EESI's CMAQ Project**

### **I. The Genesis of the CMAQ Database on Alternative Fuels**

#### **Air Pollution and Foreign Oil Dependence**

The United States has been plagued with air quality problems for decades. Congress began to formally address these problems in 1970 with the passage of the Clean Air Act. The federal government has used a variety of approaches to address air quality problems and among the many strategies has been the use of alternative fuels. The United States also became acutely aware of the need to reduce foreign oil dependence during the oil crises in the 1970s. In response to these crises, Congress passed a number of legislative initiatives including the Energy Policy and Conservation Act of 1980, the Alternative Motor Fuels Act of 1988, and the Energy Policy Act of 1992. Again, alternative fuels were to play a key role, this time in addressing the need to reduce U.S. dependence on foreign oil.

#### **Alternative Fuels and Federal Funding**

Most of the work of deploying alternative fuel vehicles and related infrastructure has fallen to the states and local governments. Currently, most of the federal dollars for alternative fuels go to tax credits for ethanol production. Ethanol comprises the vast majority of the less-than-2-percent of alternative fuel use in the United States. Beyond this substantial tax credit – approximately \$500 million annually – there is a comparatively small amount of federal dollars for deploying other alternative fuels. There is approximately \$8 million through U.S. Department of Energy's (USDOE) Office of Technology Utilization, a new \$10 million program for airports, and \$200 million/year from the Clean Fuels Formula Grant program authorized by TEA-21 (through the Federal Transit Administration). However, this last funding source never was implemented.

#### **The Need for Federal Funding for Alternative Fuels**

An Environmental and Energy Study Institute (EESI) study – *Alternative Fuel Vehicle Programs: The Applicability of Government Incentives* – published by the National Academy Press in 1997 found that most state and local energy officials believe there was a lack of sufficient funding for alternative fuels. The study also found the officials believe the federal government has an obligation to provide financing because of the federal mandates related to clean air or alternative fuel vehicle purchases. If alternative fuels are to make a larger contribution to improved air quality and reduced oil dependence, then increases in federal funding are perceived as being necessary. The \$500 million annual ethanol tax credits contribute to the annual production of 1.5 billion gallons of ethanol, which is barely more than 1 percent of total U.S. vehicle transportation fuels. If all alternative fuels are to capture even 5 percent of the motor fuels market, then significant increases in federal support appear inevitable.

#### **Welcome "CMAQ"**

The federal Congestion Mitigation and Air Quality Improvement (CMAQ) program was created in 1991 with the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA). CMAQ provided \$1 billion annually for transportation projects that demonstrate air quality benefits. Alternative fuel projects were eligible for CMAQ

funding if they were identified as a strategy in the “state implementation plans” as defined by the Clean Air Act Amendment of 1990.

### New Funding for Alternative Fuels

CMAQ was a new and unique program that took state and local governments some time to understand. As a result, expending CMAQ funds to specific projects did not happen as quickly as other more traditional federal transportation funding programs. Furthermore, spending federal highway funds – gas taxes from the Highway Trust Fund – on alternative fuels projects was even more unusual. However, by 1993, 11 alternative fuel projects were funded. By 1994, 17 projects were funded. By 1995, 37 projects were funded. CMAQ began to gain national attention among alternative fuel promoters. By the time ISTEA was being reauthorized in 1997, CMAQ had become the most important new source of federal funding for alternative fuels.

### The Largest New Source of Federal Funding for Alternative Fuels

When the CMAQ program was reauthorized as part of the 1998 Transportation Equity Act for the 21st Century (TEA-21), it received a 50 percent increase in funding for an average of \$1.35 billion annually. In addition, the vast majority of legislative changes that were made to the program were to the benefit of alternative fuels. Eligibility was expanded and alternative fuels became the venue for the ground-breaking use of public funds on public-private partnership projects. Furthermore, once TEA-21 was passed, the Federal Highway Administration (FHWA) issued additional guidance for the program which eliminated the previous restriction that only allowed CMAQ funds for alternative fuels if alternative fuels were identified as a strategy in the state implementation plans.

The CMAQ program has become an important program to many constituencies such as major metropolitan governments, local air quality agencies, transit operators, environmentalists and bicycle advocates. CMAQ also has become the greatest source of innovation and flexibility for use of federal transportation dollars. And, for the alternative fuels community, CMAQ has become the most important new source of federal funding.

## **II. Understanding the CMAQ Program**

### Alternative Fuel Advocates: The New Kids on the Block

CMAQ had clearly become the most important new source of funding for alternative fuels. At the same time, the program was new and not well defined, especially compared to traditional federal transportation programs. In addition, alternative fuel advocates were not familiar with competing for federal transportation dollars. Nor were state and local transportation officials familiar with alternative fuel advocates. Clearly there was a need for alternative fuel advocates, and Clean Cities Coalitions in particular, to understand CMAQ. The U.S. Department of Energy (USDOE) – the progenitor of the Clean Cities Coalition – responded to the need by publishing *Applying for and Using CMAQ Funds*. This user guide does an outstanding job of explaining the process of how to secure CMAQ funding.

### How the CMAQ Program Works

In short, CMAQ is allocated to states that are in “non-attainment” of federal air quality standards. The allocation is based upon a formula created by Congress and based upon population and severity of non-attainment. All states receive some CMAQ funds even if they do not have any non-attainment areas. The states then decide how this money is allocated within the state if it has more than one non-attainment area. Because these funds have to be spent in non-attainment areas and most states sub-allocated the control of the funds to metropolitan planning organizations (MPOs). Alternative fuel advocates then compete with traditional transportation providers such as highway engineers, transportation planners and transit operators for CMAQ funding.

#### Fundamental Questions about the CMAQ Program

While the USDOE user guide provides an excellent blueprint for alternative fuel advocates on how to compete for funding at the local level, there remained fundamental questions about CMAQ in general, and how it related to alternative fuels in particular. The questions about this new and innovative CMAQ program were so prominent that Congress charged the National Academy of Sciences (NAS) with conducting a study of the program which is expected sometime this fall. The charge to the NAS included such items as:

- Determining the amount of money being spent through the program and on what types of projects;
- Evaluating the emissions reductions attributable to the projects; and
- Assessing the effectiveness of the program including a cost per ton evaluation of pollution reduction.

### **III. Uncovering the Limitations of the CMAQ Data**

#### Fundamental Flaws in the CMAQ Data

At the same time that the NAS was charged with providing an overall assessment of the CMAQ program, EESI sought to create a national database of alternative fuel projects funded through the CMAQ program. A national database would establish a solid foundation of data that would enable reliable analysis of the AFV projects within the CMAQ program. It was clear from the state of the information about the CMAQ program that the NAS was going to be severely limited in providing the comprehensive assessment intended by Congress. The very first meeting of the NAS panel included an assessment of the FHWA data: *Overview of CMAQ Database As a Study Analysis Tool* (Harry Cohen, October 12, 1999). Some of the findings included:

- Total CMAQ spending for some states did not equal the sum of total project spending;
- FHWA had different spending totals than the Federal Management Information System;
- Tracking data was complicated by multi-year and multi-phase projects;
- Many projects were missing air quality data;
- Very little consistency and reliability of the different methodologies used to calculate emissions reductions;
- Emissions calculations were based on out-of-date factors; and

- Little information on the life expectancy of projects.

As EESI began to review the FHWA data, and later as direct data collection was compared to FHWA data, additional problems became, and continue to become, evident. They include:

- Many state and local officials do not understand the fundamental FHWA funding terminology of “obligations” – the contractual commitment of programmed CMAQ funds. Obligations are the primary FHWA tracking tool for financial accounting of federal transportation programs.
- According to federal officials, state-based data and FHWA data cannot be consistently or accurately linked.
- The projects that can match up exactly by finances must have been closed and completed in that fiscal year which is a very rare occurrence.
- Timeliness of reporting on data is very difficult. For example, the release of the 1998 data was held up because of one project for almost eight months and; FHWA had to disregard the project because of insufficient data before they could release the 1998 report.
- The 1999 data has still not been released (as of May 2001) because two states have not submitted their information. FHWA will have to release the 1999 report without the two states.
- State and local record keeping systems have changed which results in inconsistent data tracking.
- State and local officials in charge of the CMAQ programs have changed which results in inconsistent data tracking.

#### Lack of Specific Information about Alternative Fuels

It also was clear that the NAS was not going to be able to provide detailed information about alternative fuel projects that would be most useful to advocates and the Clean Cities Coalitions. Basic questions about alternative fuels would remain unanswered. Such questions include:

- How much CMAQ money is being spent on alternative fuels?
- Which states and MPOs are spending the most CMAQ money on alternative fuels? Why?
- What types of alternative fuel projects are most prevalent?
- Which ones compete most effectively for funding?
- What are the reasons for their success?
- How can alternative fuel advocates learn from others' success?
- What is the most common type of fuel and vehicle being funded?
- What is the most common type of organization(s) sponsoring alternative fuel projects?
- How much money is being spent on vehicles compared to infrastructure?

These and other questions are important to the alternative fuel advocate if they are going to maximize the opportunity to compete effectively for CMAQ funding.

#### IV. Assessing and Re-Categorizing FHWA Data

EESI has almost completed a critical early step of the CMAQ Monitoring Project -- unification of all the FHWA CMAQ project records into one database. Thanks to Nan Humphrey at the Transportation Research Board (TRB), who had a clerk enter 1923 project records from paper lists into electronic files, EESI has unified all 5,440 FHWA CMAQ project records from years 1992-1997 in an MS Access database. They are now searchable and sortable.

As a part of this task EESI re-examined the Category classifications made for each project. FHWA data classified each project into one of the following mutually exclusive Categories:

- *Shared Ride*
- *Demand Mgmt.*
- *Transit*
- *Traffic Flow*
- *Ped/Bike*
- *STP/CMAQ*
- *Other*
- *Experimental*
- *N/A*

The FHWA data lists an initial 194 alternative fuel projects for fiscal years 1992-1997. This list does not include all alternative fuel projects funded with CMAQ money during those fiscal years, but only the data that FHWA was able to collect. We had originally suspected that there were 10 to 20 percent more alternative fuel projects for that time period but found from our own data collection that the number of projects implemented was significantly less. In addition, 92 of those 194 projects do not list location data specific to any MPO, and are only listed within a given state. Of the remaining 102 projects, very few listed the MPO location and most only listed location by county. The Association of Metropolitan Planning Organizations (AMPO), the Bureau of the Transportation Statistics, the Bureau of Labor Statistics, the U.S. Geological Survey, the FHWA, the National Association of Regional Councils, the U.S. Conference of Mayors, and the National Association of Counties did not have listing of counties for each MPO nor did any of these organizations know if the data existed.

As a result, we were forced to go to the websites for the major MPOs and locate their county information. However, only about half of the MPOs listed their counties. This required us to use atlases to identify which counties are located within each MPO. For fiscal years 1992-1997, 60 percent of the CMAQ projects that have location information were funded through just ten MPOs. This allowed our initial data retrieval to focus on the majority of alternative fuel projects. Location data of alternative fuel projects provides a valuable tool for Clean Cities stakeholders to use for networking among project sponsors.

One of our first steps before we could gather any data was to test and refine strategies for gathering additional information. This activity required trial-runs of calls to federal,

state and local contacts to determine a) which type of contacts are best for obtaining the various types of information, b) how many referrals and follow-up calls are required to get desired information and c) how to best organize our questions to make information gathering and recording most efficient. Various methodologies were explored to make the task as convenient as possible for both the data collectors and the data providers, including fax-back information sheets, email and phone interviews.

## **Data Collection, Verification and Entry**

Our general approach was to call individual MPOs to confirm previous AFV projects or if they had no projects. We would only call MPOs located in nonattainment areas. We would request to speak to someone involved with the CMAQ program or alternative fuels. We identified ourselves as employees of the Environmental and Energy Study Institute working as contactors for FHWA and DOE, explaining our project and what information we needed. These phone conversations usually took about 10 to 15 minutes and we made an average of five calls to one person before receiving the information we needed. That information could consist of another contact or project information.

In order to keep track of the hundreds of calls we made, we designed an Excel spreadsheet to catalog all the contacts and the information we received from them. For every person we spoke with, an entry was made that included their contact information and relevant notes about the conversation. This provides a valuable resource for anyone wishing to pursue future research.

A separate excel spreadsheet was created that included the project elements we were seeking more information about. (Appendix 1) In an effort to make the process as simple as possible, we asked the contact to give us the information on a specific project and we would fill in the spreadsheet. If we had concerns about the validity of the information, we would fax or email the sheet to them asking them to check for accuracy and fill in the missing data.

## **What type of Information is available in the EESI CMAQ Database?**

- State and year
- Project name and description
- MPO, county and city
- Project type, transportation service provided
- Key to getting the project proposal funded
- Vehicle type, vehicle count, vehicle character, fuel characteristic, engine type, type of assistance (e.g. Payment for full cost of project or incremental cost of project)
- Infrastructure development
- Project financial information (sources, amounts)
- Emissions data
- Project sponsor contact information

## **Data Analysis**

This phase of the project was designed to evaluate the data integrity and identify specific areas where credible analysis could be supported by the data. We accomplished this with the assistance of Bob Patten, Rick Seltzer and various contacts within FHWA and DOE. By using Access to generate reports and queries we were able to pinpoint the weakness and strengths in our data set which we will discuss later.

## **Outreach**

The intended audience for this research and analysis includes a wide range of government, industry, and public sector organizations. It is focused first around those interested in alternative fuels transportation but includes the wider group of stakeholders in the CMAQ program as a whole. EESI expects the initial users and beneficiaries of this research to include, but not be limited to the following groups:

- DOE's Office of Transportation Technologies
- DOE's Clean Cities Program
- The Alternative Fuels Hotline
- USDOT's Federal Highway Administration (FHWA)
- USEPA
- The National Academy of Sciences (task force that is evaluating CMAQ)
- The Surface Transportation Policy Project (STPP) and its member organizations
- The American Association of Metropolitan Planning Organizations (AMPO)
- The American Public Transportation Association (APTA)
- The National Association of State Energy Officials (NASEO)
- State and regional air quality agencies and,
- the general public

## **Evaluation and Report**

The evaluation of our project consisted of several meetings to review the database design and information collected. We convened meetings with several key individuals involved in the CMAQ program.

## **Chapter II: FINDINGS “result of an examination” summary**

### **Summary of Findings**

The Congestion Mitigation and Air Quality Improvement (CMAQ) program under the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) is a continuation of the innovative CMAQ program introduced under the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). The CMAQ program provides funds to State Department of Transportation (DOTs), Metropolitan Planning Organizations (MPOs), and transit agencies to invest in projects that reduce emissions from transportation-related sources. The first six years of the CMAQ program resulted in \$1 billion per year of funding for activities that assisted communities in reducing transportation related emissions, reducing congestion, and increasing public dialogue concerning pollution and transportation choices. Under TEA-21 the program has been increased by 35 percent to provide \$1.35 billion per year for projects. Each state receives CMAQ funds, however, the majority of funds are spent in metropolitan areas that are in “non-attainment”, i.e., do not “attain” federal air quality standards.

There are a variety of activities that are eligible for CMAQ funding. According to the U.S. Department of Transportation Federal Highway Administration (FHWA) Annual Reports 1992-1997, during the first six years of the CMAQ program, transit activities that promote the use of public transportation received the majority of the funding at 43 percent, followed by traffic flow improvements with 34 percent, while the remaining activities such as pedestrian and bicycle, shared ride, alternative fuel technologies, and travel demand management, used the remaining funds.

The CMAQ program provides an enormous opportunity to increase the number of alternative fuel technology projects in the United States. These opportunities are why alternative fuel vehicle (AFV) advocates have rallied around this program, however a lack of information exists about AFV projects because a uniform tracking system was not available within the program. EESI felt that a solid foundation of data that enabled reliable analysis of the CMAQ program, specifically, alternative fuel technologies, was needed. A database with extensive categories describing individual projects was developed. Although EESI’s database is not all inclusive it provides a significant sample of alternative fuel vehicle projects funded through the CMAQ program and is the largest database on AFV technology projects available today.

From this data EESI estimates that only \$200 million has been spent over the past ten years on alternative fuel projects. We were surprised to discover that AFVs are receiving such a small percentage of funds from the program. Obviously, AFV technology projects have not taken full advantage of the opportunity that exists within the CMAQ program to make a tremendous impact on the reduction of harmful emissions.

According to EESI’s data on AFVs, most of the money that is spent deals with vehicles and infrastructure development. The remaining projects focus on operations and maintenance, education and training, and plans or studies. Buses and paratransit

vehicles sponsored by city and county governments receive the majority of CMAQ funds. Compressed natural gas (CNG) is the most common alternative fuel used for CMAQ projects. California has spent the most money, nearly \$80 million, on CMAQ funded AFVs. Other states utilizing significant amounts of their CMAQ funds for AFVs are Georgia, Michigan, New York, Texas and Pennsylvania.

Initial results indicate that alternative fuel projects demonstrating strong cost effectiveness for emissions reductions have the best chance of getting CMAQ funding. If a metropolitan area puts a premium on emissions reductions, then alternative fuel projects have a better chance of getting funded. However, it appears from our data that a number of projects are not being completed. Clean Cities advocates and other stakeholders must follow through with projects in order to insure implementation.

Our database is unique because of the large amount of detailed information it contains concerning alternative fuel projects. Although we have not been able to capture all alternative fuel projects that have been funded through the CMAQ program we have developed the most comprehensive database available on CMAQ funding for alternative fuels in the United States today. The database and our analysis can provide powerful tools to increase the use of CMAQ funds for alternative fuel vehicle technology projects as well as serve as the basis for a more extensive study on CMAQ funding of AFV projects.

Please note that in the following analysis, the “percentages” provided are all keyed to the information in EESI’s database.

## **General Findings**

- EESI collected information on 327 projects, representing \$119 million dollars, from 25 states for the following years: 1992-2002. (EESI contacted only the states that FHWA indicated had AFV projects.)
- Average project amount: \$615,000 dollars, single project funding range: \$1,000 dollars to \$9 million dollars.
- 51 percent of all purchases are bus purchases
- 141 projects involved CNG vehicles
- In terms of states spending the most money on AFV projects, our database found California, Georgia, New York, Michigan, Texas and Pennsylvania to be spending the most.
- The top four metropolitan areas with the most CMAQ funded AFV projects are: Los Angeles, CA; Dallas, TX; Bakersfield, CA; and New York, NY.
- Over 80 percent of our data came from state departments of transportation (SDOT) and metropolitan planning organizations (MPO)

## **Chapter III: GENERAL ANALYSIS**

As was noted earlier, FHWA data is connected through Access software to the data we collected in order to allow us to link corresponding projects. Unfortunately, we have only been able to link, with certainty, 60 projects out of the 327 projects collected. This begins to illustrate the extent of the disconnect existing between the data FHWA is collecting and the data that local MPOs, transit operators and state DOTs are collecting. Many of the projects that we collected, mainly from California and Connecticut, do not include any federal dollar amounts. This contributes significantly to the inconsistencies reference above.

As other research on the CMAQ program has shown, the data that is available on air quality data is inadequate. Only 20 percent of the projects in our data set include air quality data. Despite numerous requests, we discovered over and over again that it is almost impossible to get emissions data.

Because of the depth of information we requested about each individual project, many miscellaneous data elements are missing. We experienced the second highest level of missing data within the element requesting qualitative data. When asked to choose the key to the success of their CMAQ proposal, 58 percent of respondents did not respond.

However, from the 40 percent that did respond, we can draw some significant conclusions on what contributes to the selection of CMAQ projects.

Other data elements that contain significant amounts of missing data are:

- 71 percent did not respond to the operational life of the project
- 32 percent did not respond to fuel configuration
- 28 percent did not respond to the question concerning public/private partnership.
- 24 percent did not respond to type of vehicle
- 17 percent did not respond to finance characteristics
- transportation service provided -- 7 percent did not respond

These missing data elements create holes that lead us to an incomplete data set. The questions we asked about the projects should be easy to answer but since the data is often not kept in one place if at all, we are left with numerous gaps in information.

### **BY MAJOR DATA ELEMENTS**

Most of the projects are occurring in large metropolitan areas that are scattered across the United States. We know that California has the most projects and most federal dollars being use to fund AFV projects and this can be contributed largely to the political climate in the state. Unfortunately, it is difficult to make assumptions about the CMAQ program as a whole from the data we have collected. However, we can say with confidence that alternative fuel projects are growing in popularity across the country. (Chart 2) We know that CNG is by far the alternative fuel of choice under the CMAQ program. Most of the dollars spent are going to paratransit and linehaul buses in large

metropolitan areas. There are many innovative projects taking place across the country. New York City is using their CMAQ money to expand their taxi fleet, Texas is experimenting with alternative fuel off-road vehicles and Atlanta is blazing the public-private partnership trail.

## **YEAR**

From the data we have collected it appears that 1995, 1998 and 1999 are when the most projects started. However, problems with records that include multi-year projects may skew these results.

- 1992- 5 projects
- 1993 - 17 projects
- 1994 - 18 projects
- 1995 - 41 projects
- 1996 - 17 projects
- 1997 - 18 projects
- 1998 – 69 projects
- 1999 – 46 projects
- 2000 – 74 projects
- 2001 – 15 projects
- 2002 – 6 projects

## **The Metropolitan Planning Organizations (MPOs)**

MPOs that have secured the highest percentage of CMAQ dollars are as follows:

1. Southern California Association of Governments (CASCAG), Los Angeles, CA: 26 percent/ \$32.2 million
2. Atlanta Regional Commission (GAARC), Atlanta, GA: 18 percent/ \$21.9 million
3. Sacramento Area Council of Governments (CASACOG), Sacramento, CA: 14 percent/ \$16.9 million
4. North Central Texas Council of Governments (TXNCT), Dallas/Arlington, TX: 12 percent/ \$14 million
5. New York Metropolitan Transportation Council (NANYMTC), New York City, NY: 11 percent/ \$13.7 million
6. Council of Fresno County Government, (CACFCG), Fresno, CA: 11 percent/ \$13.4 million
7. Delaware Valley Regional Planning Commission (PADVRPC), Philadelphia, PA: 8 percent/ \$10.5 million
8. Southeast Michigan Council of Governments (MISMCOG), Detroit, MI: 8 percent/ \$10.2 million

## **ALTERNATIVE FUEL TYPE**

What types of projects are being funded?

The alternative fuel projects being funded are primarily vehicles. As we noted above, out of 327 projects, 236 of them are vehicles projects. The majority of these vehicles are either line haul or paratransit buses which are purchased to be included among government and public fleets. By far the most prominent type of alternative fuel used is Compressed Natural Gas (CNG). 202 of the projects we collected use CNG. The other alternative fuel types used are as follows:

- Electricity (**ELEC**): 36 projects
- Ethanol (**ETH**): 1 project
- Liquid Natural Gas (**LNG**): 17 projects
- Propane (**LPG**): 22 projects
- Methanol (**METH**): 2 projects
- Hydrogen (**H2**): 3 projects
- Not a fuel specific project (**NA**): 26 projects

## **DATA SOURCE**

In an effort to look at the broader CMAQ picture, we included the source of the data we were received. Forty-nine percent of our information came from State DOTs with 36 percent of project information coming from MPOs. The following is a list of data source types and the number of projects received from each.

- Contractor: 3
- MPO: 117
- State Department of Transportation (SDOT): 159
- Sponsor: 25
- Transit Operator: 23

## **SPONSORING AGENCIES**

- City government: 28 percent
- County governments: 11 percent
- State agencies: 11 percent
- Private entities: 8 percent
- Transit operators: 7 percent
- School districts: 4 percent
- Universities: 1 percent
- Unknown: 30 percent

## **KEYS TO SUCCESSFUL CMAQ FUNDED AFV PROJECTS**

General statements on the keys to success can be made despite the limited amount of data we were able to collect. We asked people to explain the primary factor that helped their project secure a CMAQ funding award. We gave them five choices with an option to explain. Of those six choices this is the breakdown of the 139 responses we received:

- Local elected official support: 14 agreed/ 10 percent
- CMAQ selection criteria favored alt fuels: 37 agreed/ 26.6 percent
- Project provided a high level of key emission reduction: 18 agreed/ 12.9 percent
- Project was highly cost effective for emissions reduction: 39 agreed/ 28 percent
- An air quality or other agency expressed support for the project: 16 agreed/ 11.5 percent
- Other explanation: 15 responded/ 10.7 percent

## **BY PROJECT TYPE**

We have collected information on 327 projects from 25 states. Of those 327 projects, 228 of them were alternative fuel vehicles, 58 were fueling facilities, 8 were plans or studies about alternative fuels, 3 were for operator assistance, 7 projects were for maintenance of existing facilities, 7 projects were for training purposes and 8 projects went to educational needs.

### **1. VEHICLE PROJECTS**

- Of the 327 projects we collected information on, 236 of them were alternative fuel vehicles.
- Vehicle projects made up 72 percent of all projects we collected information on for the years 1992- 2001.
- The total number of vehicles on record in our database is 6,841
- Compressed natural gas (CNG) is the most widely used among CMAQ alternative fuel vehicle projects.
- \$148,298,651 was total dollar amount of the AFV vehicles we collected.
- More buses were bought than any other vehicle or vehicles combined.
- On average most vehicle projects include 1 to 3 vehicle purchases, however New York City has a project with 300 vehicle purchases.

### **ALTERNATIVE FUEL TYPE BY VEHICLE PROJECTS**

Compressed Natural Gas (CNG) was clearly the alternative fuel of choice for vehicle projects with 60 percent of all vehicle projects using CNG.

- 141 projects were CNG vehicles
- 31 projects were electric (ELEC) vehicles
- 3 projects were hydrogen (HYDRO) vehicles
- 14 projects were liquid natural gas (LNG) vehicles
- 20 projects were propane (LPG) vehicles
- 1 project was a methane (METH) vehicle

- 18 projects did not specify an alternative fuel (NA)

## VEHICLE TYPE

Within the projects collected by EESI we found that 51 percent of all purchases were bus purchases. No other vehicle type made up more than 14 percent of all alternative vehicle projects.

<u>Vehicle Type</u>	<u>Number of Vehicles</u>
Bus	121
Line-haul bus	46
Paratransit bus	62
Van	18
Passenger car	21
Light truck	32
Medium truck	6
Heavy duty	4
Off-road vehicle	6
Other (vehicle type not specified)	32
Multiple (more than one vehicle type)	6

## Alternative Fuel by Number of each Vehicle Type

- **Buses**
  - CNG- 71
  - Electric- 15
  - Hydro- 3
  - LNG- 5
  - LPG- 6
  - Methane- 1
  - NA- 6
- **Van**
  - CNG- 14
  - Electric- 0
  - Hydro- 0
  - LNG- 0
  - LPG- 1
  - Methane- 0
  - NA- 0
- **Passenger Car**
  - CNG- 15
  - Electric- 5
  - Hydro- 0
  - LNG- 0
  - LPG- 1
  - Methane- 0
  - NA- 0

- **Light Truck**

- CNG- 13
- Electric- 2
- Hydro-
- LNG- 1
- LPG- 13
- Methane- 0
- NA- 0

- **Medium truck**

- CNG- 4
- Electric- 2
- Hydro- 0
- LNG- 0
- LPG- 0
- Methane- 0
- NA- 0

- **Heavy duty**

- CNG- 3
- Electric- 15
- Hydro- 0
- LNG- 0
- LPG- 0
- Methane- 0
- NA- 1

- **Off-road vehicle**

- CNG- 3
- Electric- 1
- Hydro- 0
- LNG- 0
- LPG- 0
- Methane- 0
- NA- 0

- **Other**

- CNG- 15
- Electric- 6
- Hydro- 0
- LNG- 4
- LPG- 1
- Methane- 0
- NA- 5

## **TRANSPORTATION SERVICE PROVIDED BY VEHICLE PROJECTS**

Government fleets made up 36 percent of all transportation service provided by CMAQ alternative fuel vehicle projects. Paratransit vehicles make up 21 percent of all vehicles

and line haul buses come in third with 14 percent of all vehicle projects collected. However, as public private partnerships continue to gain under the CMAQ program we believe the number of private fleets, shuttles and paratransits will continue to gain a competitive edge.

Type of service

Number of Vehicle Projects

Carpool	3
Vanpool	5
Private fleets	7
School buses	8
Shuttles	10
Line haul buses	33
Paratransit	50
Government fleets	86
Other (transportation service not specified)	21

**FINANCIAL INFORMATION FOR AFV VEHICLES**

Total Spent on Each Vehicle Type

- Buses: \$98,002,303.00
- Vans: \$794,934.00
- Passenger car: \$7,316,583.00
- Light truck: \$3,145,528.00
- Heavy truck: \$4,028,020.00
- Medium duty: \$1,431,040.00
- Multiple: \$6,096,116.00
- Offroad: \$604,500.00
- Other (vehicle type not specified): \$25,929,227.40

Total Spent on Transportation Service Provided

- Linehaul Bus: \$60,681,243
- Government Fleet: \$34,190,689.00
- Paratransit: \$29,936,148.00
- Shuttles: \$10,592,000.00
- Vanpool: \$397,648.00
- School Buses: \$187,852.00
- Other (service not specified): \$8,722,962.00

**FUEL CONFIGURATION**

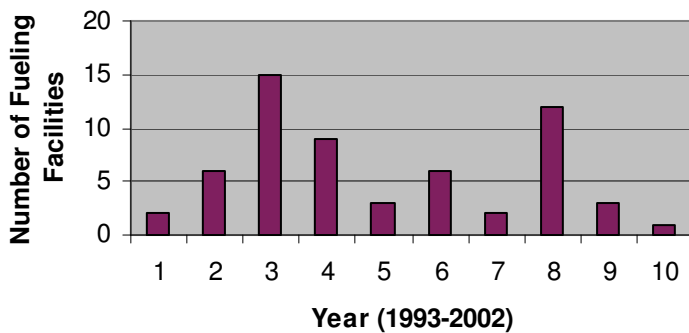
- Dedicated (Alternative Fuel Only) makes up 78 percent of all vehicle projects
- Bi-Fuel (Gasoline/diesel and alternative fuel, separate tanks) makes up 14 percent of all vehicle projects

- 7 percent of vehicle projects collected did not include any fuel configuration information.

## **2. FUELING FACILITIES PROJECTS**

- The total number of facilities included in our data set is 127.
- 54 of these facilities are new
- 18 of them are upgrades
- For 55 projects we did not receive a facility type
- The total spent on these 127 facilities was \$30.3 million
- \$25.9 million was spent on new facilities
- \$4.4 million was spent on upgrading old facilities.

### **TREND for FUELING FACILITY PROJECTS**



### **Fueling Facilities by Fuel Types**

- CNG: 49
- ELECTRIC (EV): 2
- ETHANOL (ETH): 1
- PROPANE (LPG): 2
- LIQUID NATURAL GAS (LNG): 2
- METHANE (METH): 1
- NOT A SPECIFIC FUEL (NA): 2

## **3. PLAN OR STUDY PROJECTS**

- The total number of plans and studies included in EESI's data set is 8.
- Total CMAQ dollars spent on these 8 projects was \$4.5 million.

## **4. OPERATING ASSISTANCE PROJECTS**

- The total number of operator assistance projects included in our data set is 3.
- Total CMAQ dollars spent on these 3 projects was 1\$ million.

## **5. MAINTENANCE PROJECTS**

- The total number of maintenance projects captured in our data set is 7.
- Total CMAQ dollars spent on the 7 maintenance projects was \$1.5 million.

## **6. TRAINING PROJECTS**

- The total number of training projects in our data set is 7.
- Total CMAQ dollars spent on these 7 projects was \$10.3 million.

## **7. EDUCATION PROJECTS**

- The total number of education-related projects included in our data set is 8.
- Total CMAQ dollars spent on 7 of the 8 educational projects was \$3.4 million. (The eighth project did not include any financial information)

## **BY FINANCIALS**

### **How much money was programmed and obligated for these projects?**

Of the 327 projects that we have collected \$287,583,065.40 has been spent on alternative fuel projects. Of that \$287 million \$199,551,078.60 has come from the CMAQ program, \$79,204,804.80 represents matching funds and \$17,432,048.00 has been secured from other sources.

According to FHWA data, the CMAQ program has contributed \$235,459,121 to alternative fuel vehicle projects. This is a difference of \$35 million between our data set and FHWA's data. However, we must note again, we do not have a complete data set on all alternative fuel projects funded through CMAQ, and that 12 percent of all projects we have collected do not contain any federal financial information.

In addition to the reasons for these discrepancies mentioned before, the type of financial data we received could contribute to this large gap. Of the 327 projects collected, of the information collected 64 percent came from Transportation Improvement Programs (TIPs). The remainder of the financial data we can assume breaks down in this way: 26 percent was obligated, meaning a contract had been signed for a particular project. The remaining data, 8 percent came from unknown sources.

## **BY STATE**

### **In what states and metropolitan areas were these projects undertaken?**

When discussing the importance of CMAQ in one area or another, states and metropolitan areas can be ranked in two ways under the CMAQ program. We can rank metropolitan areas and states with the highest number of projects and/or percentage of funding by comparing all data collected by EESI.

**The states with the highest percentage of projects in EESI's database:**

- California: 33.9 percent/ 111 projects
- Texas: 18.3 percent/ 61 projects
- Michigan: 12.8 percent/ 43 projects
- Wisconsin: 7 percent/ 24 projects

**The states with the highest percentage of funding:**

- California: \$77 million/ 64 percent
- Georgia: \$21.9 million/ 18 percent
- Michigan: \$19.9 million/ 16 percent
- New York: \$16.9 million/ 14 percent
- Texas: \$14.5 million/ 12 percent
- Pennsylvania: \$11 million/ 9 percent

**According to EESI's data, within these states the metropolitan areas with the most alternative fuel CMAQ projects are:**

- Los Angeles, CA: 14.6 percent of the projects- 48 projects
- Dallas/Arlington, TX: 13.4 percent- 44 projects
- Kern County, CA: 8 percent- 28 projects
- Detroit, MI and Waukesha, WI both 7 percent of all projects- 22 projects, 24 projects

**ALASKA**

- Total CMAQ dollars spent on AFV projects (EESI data): \$893,462.00
- Types of alternative fuel projects: 3 CNG
- Sponsor Agency Type(s): county

**ALABAMA**

- Total CMAQ dollars spent on AFV projects (EESI data): \$1,212,000.00
- Types of alternative fuel projects: 3 CNG, 1 electric
- Sponsor Agency Type(s): city, county

**CALIFORNIA**

- Total CMAQ dollars spent on AFV projects (EESI data): \$77,541,456.00
- Types of alternative fuel projects: 81 CNG, 10 electric, 4 LNG, 7 Not a specific fuel project

- Sponsor Agency Type(s): city- 26 percent, transit agency- 18 percent, private industry- 10 percent, county- 7 percent, schools- 2 percent, state- 1 percent
- We had the most difficulty getting information about the Los Angeles/ Riverside area. MPOs do not keep track of CMAQ spending and projects. California Department of Transportation (CALTRANS) tracks projects and for large metropolitan areas this information was difficult to obtain at the local level. Because of inconsistent record keeping and difficulty locating good contacts we do not have complete information on this region of California.

## **COLORADO**

- Total CMAQ dollars spent on AFV projects (EESI data): \$250,500.00
- Types of alternative fuel projects: 2 CNG
- Sponsor Agency Type(s): city

John Daggette a planner from the city of Fort Collins designed a comprehensive CMAQ application process for the city and the state of Colorado. It is a great tool for other MPOs to consider using because of it's user-friendliness.

## **CONNECTICUT**

- Total CMAQ dollars spent on AFV projects (EESI data): unknown- CT has a general fund for allocating money to AFV projects that make it difficult to track CMAQ dollars for each project.
- Types of alternative fuel projects: 20 CNG, 4 electric
- Total projects: 24
- Sponsor Agency Type(s): city- 58 percent, private industry- 20 percent, state- <1 percent

Connecticut has a unique program that distributes it's CMAQ dollars from a general fund that contains money from several different sources. This makes the CMAQ money difficult to track. We have a general idea of where the money is going but we cannot determine the exact cost of federal dollars going into each project.

## **DISTRICT OF COLUMBIA**

- Total CMAQ dollars spent on AFV projects (EESI data): \$1,000,000.00
- Types of alternative fuel projects: 1 CNG
- Sponsor Agency Type(s): city

## **FLORIDA**

- Total CMAQ dollars spent on AFV projects (EESI data): \$1,800,000.00
- Types of alternative fuel projects: 3 electric
- Sponsor Agency Type(s): county, state

## **GEORGIA**

- Total CMAQ dollars spent on AFV projects (EESI data): \$21,909,606.00
- Types of alternative fuel projects: 3 CNG
- Sponsor Agency Type(s): private- 50 percent, transit agency- 33 percent, city- 16 percent
- Clean Cities Atlanta has been blazing a public private partnership trail.

## **ILLINOIS**

- Total CMAQ dollars spent on AFV projects (EESI data): \$5,331,200.00
- Types of alternative fuel projects: 1 CNG, 2 Hydrogen, 1 LNG, 1 Methanol
- Sponsor Agency Type(s): city

## **INDIANA**

- Total CMAQ dollars spent on AFV projects (EESI data): \$848,053.00
- Types of alternative fuel projects: 1 CNG, 2 LNG
- Sponsor Agency Type(s): county

## **KENTUCKY**

- Total CMAQ dollars spent on AFV projects (EESI data): \$2,464,000.00
- Types of alternative fuel projects: 1 ethanol, 2 not a specific type of fuel projects
- County, state
- Kentucky has the only ethanol project in our database.

## **LOUISIANA**

- Total CMAQ dollars spent on AFV projects (EESI data): \$400,000.00
- Types of alternative fuel projects: 1 CNG
- Sponsor Agency Type(s): unknown

## **MAINE**

- Total CMAQ dollars spent on AFV projects (EESI data): \$1,678,000.00
- Types of alternative fuel projects: 1 electric, 1 propane
- Sponsor Agency Type(s): state

## **MASSACHUSETTS**

- Total CMAQ dollars spent on AFV projects (EESI data): \$3,231,758 .00
- Types of alternative fuel projects: 1 CNG, 1 electric, 1 not a specific fuel type
- Sponsor Agency Type(s): state

## **MICHIGAN**

- Total CMAQ dollars spent on AFV projects (EESI data): \$19,915,900.00

- Types of alternative fuel projects: 30 CNG
- Sponsor Agency Type(s): county

## **NEW HAMPSHIRE**

- Total CMAQ dollars spent on AFV projects (EESI data): \$594,400.00
- Types of alternative fuel projects: 1 CNG, 1 electric
- Sponsor Agency Type(s): state

## **NEW JERSEY**

- Total CMAQ dollars spent on AFV projects (EESI data): \$62,650.00
- Types of alternative fuel projects: 1 CNG, 1 electric, 1 LNG, 1 propane
- Sponsor Agency Type(s): state

## **NEW MEXICO**

- Total CMAQ dollars spent on AFV projects (EESI data): \$1,380,000.00
- Types of alternative fuel projects: 3 CNG
- Sponsor Agency Type(s): city

## **NEW YORK**

- Total CMAQ dollars spent on AFV projects (EESI data): \$16,944,200.00
- Types of alternative fuel projects: 5 CNG, 2 electric
- Total number of projects: 8
- Sponsor Agency Type(s): city- 50 percent, state- 37 percent, private industry- 12 percent

## **OHIO**

- Total CMAQ dollars spent on AFV projects (EESI data): \$4,270,000.00
- Types of alternative fuel projects: 4 CNG, 1 not a specific fuel type
- Sponsor Agency Type(s): transit agency- 60 percent, county- 40 percent

## **PENNSYLVANIA**

- Total CMAQ dollars spent on AFV projects (EESI data): \$11,015,823.00
- Types of alternative fuel projects: 2 CNG, 1 electric, 1 methanol, 1 not a specific fuel type
- Sponsor Agency Type(s): city, state, private industry, university (all sponsor 1 project)

## **RHODE ISLAND**

- Total CMAQ dollars spent on AFV projects (EESI data): \$4,933,640.00
- Types of alternative fuel projects: 3 CNG, 2 electric

- Sponsor Agency Type(s): state

## **TEXAS**

- Total CMAQ dollars spent on AFV projects (EESI data): \$14,587,313.00
- Types of alternative fuel projects: 21 CNG, 7 electric, 8 LNG, 18 propane, 9 not a specific fuel type
- Sponsor Agency Type(s): city- 24 percent, transit agency- 16 percent, school district- 14 percent, state- 13 percent, air quality agency – 8 percent, county and city – 4 percent, port authority and university- <1 percent

## **VIRGINIA**

- Total CMAQ dollars spent on AFV projects (EESI data): \$1,957,000.00
- Types of alternative fuel projects: 2 electric
- Sponsor Agency Type(s): city and private agency

## **WISCONSIN**

- Total CMAQ dollars spent on AFV projects (EESI data): \$5,258,283.60
- Types of alternative fuel projects: 15 CNG, 1 LNG, 2 propane, 5 not a specific fuel type
- Sponsor Agency Type(s): city- 62 percent, county- 22 percent, university- 9 percent

## **Chapter IV: CONCLUSIONS AND SUGGESTED RESEARCH**

### **LACK OF EMISSIONS DATA**

In our original proposal we set out seeking emissions data for each project because emissions reduction is the primary foundation of the CMAQ program. We did not anticipate that it would be as difficult as it was to locate emissions data. We found that it was often unavailable and untracked. Therefore, we are unable to provide reliable analysis for emissions reduction for AFV projects.

### **CAVEATS**

One of the most pressing problems with the information we have collected is the conflicting financial data. When compared to FHWA data, the data we have collected shows significant financial discrepancies that we have been unable to resolve. The obligation rate hovers around 73 to 74 percent. However, according to a FHWA source, the CMAQ data that is available is just not good data. One of the problems is states find CMAQ to be a unique and unfamiliar program.

There are several assumptions that we can make in an effort to understand why these discrepancies exist in our data. The first assumption that should be addressed is that we are not receiving accurate or complete data from the contacts that we made. There are two reasons that can be used to explain this: our contacts did not have the data available or they were unwilling to take the time to search for the data because it was before their tenure. We experienced the most trouble collecting data on projects that occurred in the first three years of the program. The second assumption is that deobligation rates for alternative fuel projects is greater than anticipated because of unexpected costs, lack of alternative fuels or due to canceled contracts. From the data we have collected, we feel confident in assuming that the deobligation rates for alternative fuel projects is somewhere between 20 to 30 percent. Deobligations occur when project scopes have been de-funded and funds may have been salvaged for use on another project. For example, a project that was originally programmed to purchase eight CNG buses ended up with five CNG buses. The project scope changed, therefore, less money was obligated and the difference was shoveled back into the general fund. Changes make tracking the data more difficult. A final explanation that can be used to explain these discrepancies is to note the different types of data we are analyzing. FHWA only deals with obligations and reimbursements, however, the data we have collected comes from a variety of sources, Transportation and Improvement Programs (TIPs), "obligated" data and "reimbursed data". The rate of reprogramming from TIPs to actual reimbursements is so inconsistent that it is difficult to know when funds for an alternative fuel project programmed in 1994 actually were obligated and reimbursed, if ever.

#### **Data Verification**

Verifying the data has been a very difficult process. FHWA can take months to verify one project. For example, in 1998 the entire data set was held up because of one project. FHWA officials spent eight months trying to determine the scope of the project. They eventually released the 1998 data without the project because of a lack of adequate information. FHWA data for fiscal year 1999 is being held up because two

states have not submitted their information. We did circulate some of the data on major projects to Clean Cities Coordinators in an effort to verify them. Although significant time and additional resources could be spent to contribute to fill gaps in the survey information, we believe EESI's database represents a very strong effort which provides solid information to interested parties. It will now be important to consistently update the database with new project information through the duration of CMAQ.

Although our database is, incomplete in various ways and certainly not exhaustive, it does contain a wealth of information that should be maintained in order to insure that the data we have found is used and built upon and not lost. Filling in the missing data can contribute the validity of our database and answer some important questions about the CMAQ program. Obtaining new projects could and should be pursued if one is to establish the potential of this program to contribute significant emissions reduction and provide ongoing information about projects that have been undertaken across the country. This is a valuable resource for the AFV/AFT stakeholders and public officials.

#### Future of EESI's Database

EESI would like to see this database made available to alternative fuel advocates. We believe that it should be adapted to a web-based system managed by the U.S. DOE National Renewable Energy Laboratory. This would encourage AFV stakeholders; public agencies and other organizations to take advantage of the wealth of information we have brought together.

#### How do can advocates make CMAQ work to fund more alternative fuel vehicle technologies?

- Provide Clean Cities Sessions on CMAQ – use these to share information, provide case studies, and determine what categories of information would be most useful for Clean Cities
- Provide these recommendations (from above) to FHWA, and seek to get information gathered in a consistent- and careful way.
- Provide technical assistance to help Clean Cities Tap CMAQ
- Increase emphasis on AFVs in our communities
- Educate public officials about the benefits of AFVs
- Encourage technology providers, public officials and other stakeholders to work together to develop CMAQ projects.
- CMAQ is a big program- Clean Cities should tap its potential! Based upon EESI's information CMAQ funding is a huge- largely untapped- opportunity for AFV/AFT projects which could make a significant difference in technology deployment/market transformation and in attaining emissions reduction.