Passenger Vehicles and Air Pollution: A Profile of Southeast Michigan's Fleet

February 2008

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Southeast Michigan Council of Governments

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Mission

SEMCOG's mission is solving regional planning problems — improving the efficiency and effectiveness of the region's local governments as well as the quality of life in Southeast Michigan. Essential functions are:

- providing a forum for addressing issues which extend beyond individual governmental boundaries by fostering collaborative regional planning, and
- facilitating intergovernmental relations among local governments and state and federal agencies.

As a regional planning partnership in Southeast Michigan, SEMCOG is accountable to local governments who join as members. Membership is open to all counties, cities, villages, townships, intermediate school districts, community colleges and public universities in Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne Counties.

Responsibilities

SEMCOG's primary activities support local planning through use of SEMCOG's technical, data, and intergovernmental resources. In collaboration with local governments, SEMCOG has responsibility for adopting regionwide plans and policies for community and economic development, water and air quality, land use, and transportation, including approval of state and federal transportation projects. Funding for SEMCOG is provided by federal and state grants, contracts, and membership fees.

Policy decision making

All SEMCOG policy decisions are made by local elected officials, ensuring that regional policies reflect the interests of member communities. Participants serve on one or both of the policymaking bodies — the General Assembly and the Executive Committee.

Prior to policy adoption, technical advisory councils provide the structure for gaining input on transportation, environment, community and economic development, data analysis, and education. This deliberative process includes broad-based representation from local governments, the business community, environmental organizations, and other special interest and citizen groups.

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Abstract

As the lead agency responsible for air quality planning in Southeast Michigan, SEMCOG conducted a study to determine the proportion of high polluting vehicles in the region as well as the potential for reducing the number of these vehicles through a program that encouraged volunteer repairs. This document summarizes the findings and conclusions of this study as well as the policy implications they raise. Additional information on this project can be found in the technical report, *2007 High Emitter Remote Sensing Project.* This report is available on SEMCOG's Web site, www.semcog.org.

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Project Goals

The majority of passenger vehicles on the road today have relatively low pollutant emissions. However, several studies have shown that a small fraction (8-10 percent) can have disproportionately high emissions and account for as much as 50 percent of total on-road vehicle pollution. Recognizing the ramifications of this issue, SEMCOG undertook the High Emitting Vehicle Project to:

- Determine the proportion of high emitting vehicles in Southeast Michigan as compared to other areas and how much they contribute to total vehicle pollution;
- Understand the characteristics of these vehicles; and,
- Find out if the owners of these vehicles would voluntarily repair them if informed of their pollution problem and the benefits of repair.

Project Overview

SEMCOG contracted with Environmental Systems Products Holdings, Inc. (ESP) to collect emissions data on approximately 65,000 vehicles in Southeast Michigan. Data were collected using a roadside remote sensing device (RSD) that measured hydrocarbon (HC), carbon monoxide (CO), and nitrogen oxide (NO) emissions as vehicles passed by. A photo of each vehicle's license plate was also taken so that contact information for the vehicle owner could be obtained. This was also needed to gather information on vehicle characteristics such as make, model, and age.

The resulting data were used to develop a profile of high emitting vehicles in the region. In addition, owners of the highest polluting vehicles were contacted to gain additional information on vehicle mileage and maintenance and to encourage them to seek repairs. A follow-up survey was then conducted to determine how many people actually took action and what types of repairs were done.

An advisory group of university researchers and automobile emissions experts was formed to help guide the project design and review the resulting analysis. This group also included representatives from the Michigan Departments of Environmental Quality and Transportation, as well as several experts in remote sensing technology.

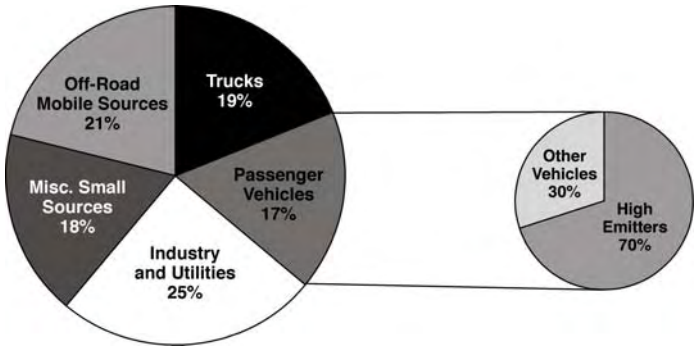
Findings

- Approximately two percent of the passenger vehicles operating in Southeast Michigan were high emitters. This is less than reported in several other metropolitan areas around the country.
- Southeast Michigan has fewer high emitters because its vehicle fleet is newer.
- Nonetheless, this project confirmed that a small fraction of vehicles account for a major portion of emissions. Ten percent of the vehicles accounted for roughly 70 percent of the total pollutant emissions from passenger vehicles.
- 20-30 percent of 1988 and older models were high emitters. In contrast, the rate for new models (2002-2007) averaged less than one percent (0.13 percent).
- The percentage of middle-aged vehicles (1992-1999) that were high emitters was lower than that of older vehicles, but there are a large number of vehicles in this age range.
- The average mileage reported by owners of high emitting vehicles was high. Over 75 percent had more than 100,000 miles. The median was 136,602.
- High emitting vehicles are used on a regular basis. Most (78 percent) are driven every day.
- On-board technology to alert drivers to possible emission problems is frequently ignored. Of those who owned 1996 and newer vehicles, which are equipped with "check engine" lights that alert drivers to potential problems with the vehicle's pollution control system, over half (53 percent) said the check engine light was on.
- Many owners of high emitters assumed their emissions were high simply because their vehicle was old. However, in reality, these vehicles emit far more pollution than a properly operating vehicle of that age.
- While older vehicles are more likely to be high emitters, a majority of older vehicles are NOT high emitters. Furthermore, newer vehicles can be high emitters if not properly maintained. Thus, age alone does not explain the occurrence of higher emissions. Studies have shown that routine vehicle maintenance is the key to keeping vehicles from becoming high emitters, no matter what their age.
- Voluntary efforts to reduce vehicle emissions were met with a high degree of acceptance. Very few negative comments were received and a significant percentage of owners reported taking their vehicle in for repairs.
- Overall, 39 percent of the survey respondents voluntarily took their vehicle in for servicing when informed of its pollution problem and 74 percent of these owners actually had repairs done.
- Those owning 1996 and newer vehicles were more likely to seek repairs than those with older vehicles. Among owners of 1996 and newer vehicles, 52 percent said they took their vehicle in for servicing and 70 percent of these vehicles were actually repaired.
- Inability to pay for repairs was the reason most often cited by those who did not take their vehicle in for servicing, and by those who took it in but did not have repairs done.

Conclusions

- It is important to remember that passenger vehicles are only one source of pollution in Southeast Michigan. As the pie charts below indicate, trucks, off-road mobile sources such as locomotives and marine craft, industrial sources, and a whole range of other small sources (gas stations, dry cleaners, lawn and garden equipment, etc.) all contribute significantly to total pollutant emissions in the region.

Ozone Causing Emissions in Southeast Michigan



- Nevertheless, passenger vehicles currently contribute 17 percent of ozone causing emissions and the vast majority of their emissions come from a small fraction of the vehicles.
- Positive responses documented in this study indicate that a voluntary program aimed at getting owners to repair their vehicles could have a significant impact on reducing the number of high emitters on the road.
- The *percentage* of middle-aged vehicles (1992-1999) that are high emitters is lower than for older vehicles. However, there are more vehicles in this middle age group so their pollution contribution can be significant.
- These middle-aged vehicles may represent a greater opportunity for repair than the oldest model vehicles for several reasons:

  It is likely that they are driven more frequently and for longer distances,

  They may be more repairable than older vehicles,

  Their owners may be better able to afford repairs, and

  Owners may see the investment in repair as more worthwhile because of expected remaining vehicle life.

- Owners of 1996 and newer vehicles, which are equipped with more advanced emissions systems and “check engine” lights, were more willing to seek repairs than those with older vehicles. This bodes well for the future as, over time, the entire fleet will be equipped with these systems.
- While it is encouraging that 52 percent of owners with 1996 and newer vehicles sought repairs as a result of SEMCOG’s outreach, increasing this response rate is in the best interest of the region. Better public education on the importance of responding to the vehicle’s “check engine” light is needed. This will reduce both air pollution and fuel consumption as high emitters burn more fuel than they should.

- Passenger vehicles in Southeast Michigan have a lower rate of high emitters than other parts of the country because the region's fleet is newer. Thus, the higher rate of new vehicle sales in the region represents a significant air quality benefit to our area.
- As many high emitters are older vehicles and numerous owners stated they couldn't afford repairs, providing financial assistance to repair or replace these vehicles would be a prerequisite to successfully addressing the problem with this segment of the fleet.
- In the longer term, the most effective way of reducing the number of high emitters is to focus on preventing vehicles from becoming high emitters in the first place. One way to accomplish this is to better educate vehicle owners on the importance of responding to their "check engine" light and properly maintaining their vehicles so they never become high emitters.

In summary, as we look to the future, there are two targets of opportunity for reducing emissions from motor vehicles. The first involves reducing emissions from existing high emitters. The second focuses on educating the public to prevent vehicles from becoming high emitters in the first place.

Questions/Policy Implications Raised by This Project

As this report is written, the U.S. Environmental Protection Agency is proposing a lowering of the ozone standard. Such a change would put Southeast Michigan and a majority of the country in noncompliance. State and local governments will have to find ways to reduce their overall emissions in order to attain the new standard. This has major ramifications for both air quality and the automobile industry. For instance, there will be increased pressure to implement mandatory vehicle emissions testing programs and for further tightening of motor vehicle emissions standards.

In light of this project's results, we propose the following for both Southeast Michigan and other parts of the country. Since nearly every vehicle will soon have on-board emissions detection equipment, mandatory testing would be an inefficient use of scarce fiscal resources. This is compounded by the finding that a small percentage of vehicles is responsible for the vast majority of emissions.

Instead of testing all vehicles to find the small number that are causing the majority of the problem, resources should be focused on incrementally reducing the number of high emitters and preventing high emitter occurrence. Finally, because the cost of this pollution control is built in to the price of a car, this represents more reasonable public policy for securing air quality improvement from motor vehicles.

Some questions related to reducing high emitters require further investigation. These include:

- What reductions in emissions could realistically be achieved on very old vehicles?
- If repairs on these vehicles are effective, where would the funding for these repairs come from?
- Since high emitters also burn more fuel, is reducing their number also a target of opportunity for addressing climate change concerns?

Some questions related to preventing the occurrence of high emitters also need to be explored, including:

- What are the most effective ways of engaging vehicle owners in proper vehicle maintenance in order to minimize emissions, maximize fuel economy, and help address concerns about climate change?
- Does the current level of attention by the media and in advertising provide a unique opportunity for success in this area?

- Is this heightened environmental awareness temporary, or will it be sustainable and actually result in significant action?
- As the home of the domestic auto industry, should Southeast Michigan set an example for other urban areas around the country seeking to address tougher air quality standards, climate change, or both?

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