

@ A long-term study has validated the effectiveness of the vehicle emissions inspection program used in metropolitan Atlanta.

Validation and Vision

Long-term vehicle emissions monitoring validates inspection program and offers insights that may help direct research and policy.

BY JANE M. SANDERS



ABOVE: Georgia Tech researchers use remote sensing equipment to monitor emissions from vehicles in the Atlanta metropolitan area.

The numbers tell the story: 25 Georgia counties, about 420,000 vehicles assessed for emissions each year at more than 60 monitoring sites, data gathered for at least 100 days a year in the field. Fifteen years of systematic data collection along the roadside, now with a fourth generation of equipment.

It's all to see if the \$80 million to \$100 million a year Georgians pay for vehicle emissions inspections and repairs is well spent.

These numbers describe the scope and impact of a long-term research study on vehicle emissions and air quality in 21 metro Atlanta counties, plus four more in Macon and Augusta, Ga. The study, conducted by Georgia Institute of Technology

researchers, is meeting the monitoring needs of Georgia's state government and offering significant insights that help direct both research and policy, says Michael Rodgers, associate director of the Georgia Tech Research Institute's (GTRI) Aerospace, Transportation and Advanced Systems Laboratory and group leader of air quality research.

Rodgers and his team began monitoring vehicle emissions in 1991 with a pilot program that began in the Georgia Tech School of Earth and Atmospheric Sciences. With funding from the Georgia Department of Natural Resources, he and his staff designed the Continuous Atlanta Fleet Evaluation (CAFÉ) study and have systematically collected this data using remote sensing technology since the spring of 1993.

The study continues to validate the effectiveness of the state's vehicle emissions inspection program in 13 metro Atlanta counties that are part of a federal ozone level non-attainment area, Rodgers says.

"Georgians spend a major chunk of change on inspections and repairs, so you want to make sure the inspections program is working," Rodgers says. "We've found that it is indeed reducing vehicle emissions in the region. The state is investing less

than 1 percent of the cost of the program to monitor it. So that's a cost-effective solution."

CAFÉ is noted among environmental monitoring programs for the length and depth of the study, Rodgers says. "When you gather systematic data over a long period of time, you can better understand how things change," he explains. "Over time, you can gradually see how the vehicle fleet changes, how its operation changes and how emissions change."

The vehicle emissions database has revealed some interesting trends, Rodgers notes. Highlights include:

- In comparison with the late 1970s, total emissions have declined in the 20-county metro area CAFÉ tracks. This measure peaked in the early 1980s and has declined since then, despite a doubling of the Atlanta fleet size. "Whether we can continue this trend indefinitely is a different question as Atlanta continues to grow," Rodgers says.
- Newer, cleaner-burning fuels have had a very positive effect — comparable to the inspections program — in reducing vehicle emissions.

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LEFT: Michael Rodgers, who has a shared appointment in the Georgia Tech School of Civil and Environmental Engineering and the Georgia Tech Research Institute, has directed the Continuous Atlanta Fleet Evaluation (CAFÉ) study for 15 years.

BELOW: This chart shows the average concentration of carbon monoxide emissions in the Atlanta vehicles monitored by the CAFÉ program from 1992 to 2006.

- Also, only 1 percent of vehicles in the Atlanta fleet now run on carburetor-based systems. The second generation of fuel-injection vehicles has helped reduce emissions.
- As vehicles became more durable in the early 1990s, Atlantans kept their automobiles longer. But a new-car-buying trend began in Atlanta by the end of the 1990s and lasted for several years. Even though more vehicles are on the road now, per vehicle emissions has declined by about half. "It's an open question as to what we'll see between 2009 and 2012 when these vehicles are much older," Rodgers says.
- Researchers monitored the rise of the minivan and the sport utility vehicle (SUV). When they began monitoring, the Atlanta fleet was composed mostly of passenger vehicles and trucks. Minivans became popular in the early 1990s and then SUVs by the mid-1990s. Now, large SUVs, minivans and pick-up trucks dominate the fleet. These vehicle types also have demonstrated a comparable reduction in emissions.

"We've been able to monitor these changes as they have occurred, so it's been enormously enlightening," Rodgers says. "We're not speculating on whether what we think is true is true; we can actually look at the data."

Rodgers also conducts research on vehicle emissions modeling under his joint appointment in the Georgia Tech School of Civil and Environmental Engineering. The Mobile Emission Assessment System (MEASURE) model he helped develop estimates vehicle production of carbon monoxide, volatile organic compounds and oxides of nitrogen in space and time. MEASURE differs

from previous models in that it estimates vehicle emissions as a function of vehicle operating modes — such as cruise and idle — rather than average vehicle speeds. Because it is a modal model, researchers believe MEASURE more accurately reflects on-road emissions. rh

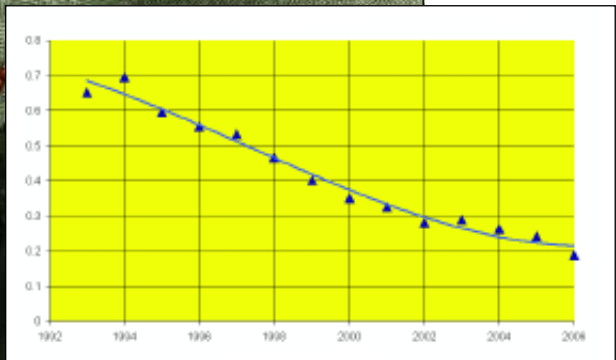


CHART COURTESY MICHAEL RODGERS