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The transportation sector is responsible for roughly 28% of the country's greenhouse gas (GHG) emissions.

#### Research Goals

- To capture real-time environmental data from vehicles and integrate it with other sources for use in transportation management and performance improvement.
- To create applications that use real-time data on environmental impact for use by transportation managers and travelers.

#### Research Outcomes

Real-time, environmental data from all sources will be integrated and available for use in multimodal transportation management and performance improvement and will contribute to better environmental practices.



## Applications for the Environment Real-Time Information Synthesis (AERIS)

### INTRODUCTION

Applications for the Environment Real-Time Information Synthesis (AERIS) is the "green" research component of the multimodal research initiative of the Intelligent Transportation Systems Joint Program Office (ITS JPO) within the U.S. Department of Transportation's (U.S. DOT) Research and Innovative Technology Administration (RITA).

### VISION

The vision for AERIS research is to generate, capture, and analyze data to create actionable information that helps system users and operators make "green" transportation choices. Through research, the AERIS program intends to assess how the suite of vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) connectivity and communications options and data may contribute to air quality improvements, and greenhouse gas (GHG) reductions, and then evaluate and quantify the magnitude of these improvements.

### OBJECTIVES

The two short-term objectives of the AERIS research program are:

1. To investigate whether it is possible and feasible to capture and generate environmentally relevant real-time transportation data (from vehicles and the system) and use this data to create actionable information with technologies that can then be used by transportation system users and operators to support and facilitate "green" transportation choices for all modes.
2. To assess whether a significant environmental benefit could be realized to justify further research investment.

### CALL TO ACTION

AERIS intends to engage stakeholders and researchers, asking the entire transportation and environmental communities to become involved in the effort. It is focused on achieving environmentally-friendly choices enabled by new technologies and research to get people where they need to go—smarter, safer and, in the future, much, much greener.

This initiative was featured in *Thinking Highways*, September/October 2010 Issue.



## RESEARCH PLAN

The AERIS research program will be executed over the next five years. The first step will be to comprehensively review the state-of-the practice to:

- Determine the limits of current technology and available environmental data sets.
- Identify the limits and challenges of monitoring and analysis, including a review of existing models and algorithms.
- Examine and evaluate where ITS technologies and data can be more effective and contribute maximum value to addressing environmental impacts
- Review existing models of traveler behavior and existing traffic simulation models to determine how the effectiveness of improvement strategies can be gauged.

As the research “baseline” is developed and understood, the next step will be to identify candidate strategies and applications that appear to improve environmental decisions by both public agencies and travelers, and then profile, characterize and screen them by making an initial assessment of their effectiveness.

Based on initial results, a select group of applications that show the most promise will then undergo a more rigorous analysis. The ITS JPO team will begin a process of identifying, and modifying as necessary, appropriate evaluation tools and building a robust evaluation and modeling process using program data sets. Further research may substantiate prototyping and testing applications using the test beds. Finally, the team will investigate how the data sets might help improve and validate environmental and other models (such as the EPA’s MOtor Vehicle Emission Simulator “MOVES” model, for example).

As this research is underway, there will be a parallel effort to conduct more “policy-oriented” research, designed to ensure that the technical research will provide results that can be deployed and provide value within the institutional and social environment. There will also be a concentrated, ongoing effort to engage and interact with stakeholders throughout the program’s progress; the goal is to create champions for this research, both within the U.S. and internationally. At the end of this research program, the ITS JPO expects to be able to recommend a number of applications for further research investment, testing, and deployment.

## THE DON'T KNOWS:

### Questions on Data

- What environmentally-relevant data can we get from cars, trucks and buses and other vehicles/modes?
- Does this data support AERIS research objectives?
- What data sets are needed?
- What are the requirements for the data (granularity, frequency, type, mode, etc.)?
- Are those data requirements achievable?

### Questions on Effectiveness

- Are applications that support improved air quality locally also good at reducing GHG levels globally?
- By how much should any ITS application or scenario be able to reduce GHG to be a viable candidate for future, more in-depth testing and perhaps deployment?

### Questions on Evaluation

- How evaluation of ITS and the environment in a connected vehicle enabled future might change the way we conduct evaluations and interpret results.

### Questions on Tradeoffs

- Are there network-level tradeoffs between safety, mobility and environmental improvements to transportation system operations?
- What are the acceptable levels of tradeoffs to strike a balance between the benefits?

To learn more about the AERIS program, contact:

#### Marcia Pincus

Manager, Environment and ITS Evaluation Program  
ITS Joint Program Office  
Research and Innovative Technology Administration  
(202) 366-9230  
marcia.pincus@dot.gov

#### Robert Ferris

Office of Operations Research and Development  
Turner Fairbank Highway Research Center  
Federal Highway Administration  
(202) 493-3268  
robert.ferris@dot.gov

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