Research on ITS Applications to Improve Environmental Performance
Broad Agency Announcement (BAA)
FACT SHEET

The United States Department of Transportation (U.S. DOT) selected seven research projects in response to a Broad Agency Announcement (BAA) that will expand the ability of Intelligent Transportation Systems (ITS) applications to improve environmental performance. The objectives of the BAA are to:

- Foster innovative research on ITS applications that improve environmental performance, and possibly develop new applications;
- Promote capture and management of real-time data that are relevant to environmental applications development and performance measurement; and
- Support development and enhancement of evaluation techniques, performance measurement, and technologies to capture environmentally-relevant data.

The seven projects and awardees are:

ECO-ITS – University of California - Riverside (UCR)

Previous UCR research developed a microscopic emissions model Comprehensive Modal Emissions Model (CMEM) capable of predicting second-by-second fuel consumption and tailpipe emissions. This study will build upon previous research to synthesize results and recommend the following: data collection methods; environmental analysis methods; integration of simulation and environmental modeling tools; and suggestions for environmental ITS applications and strategies.

Developing Eco-Adaptive Signalized Intersection Algorithms – Virginia Tech

This study will develop and evaluate an innovative application for eco-adaptive signal control using traffic simulation tools. These systems would be modeled using traffic simulation software and tested for different roadway configurations (local streets and signalized arterials). Activities include: conducting a literature review; developing signal control logic that will inform the vehicle of a potential change in signal timing; testing algorithms for different vehicle types, different communication ranges, and different types of logic; and analyzing simulation results.

Engaging the International Community – University of California Partners for Advanced Transit and Highways (PATH) Program (UC Berkeley)

The goal of this study is to collaborate with the international community through direct interactions and through support to U.S. DOT. Activities include: preparing for and attending the International Symposium on *Evaluation of CO_2 Emission Reduction with ITS Applications*; and developing a technical report and action plan based on US, European, and Japanese experiences that focuses on ITS applications & reference models, traffic simulation and modeling, emissions modeling, probe monitoring systems, validation methodologies and international data warehousing activities.

Research on ITS Applications to Improve Environmental Performance – Mixon/Hill and Texas Transportation Institute (TTI)

This project will investigate extracting environmentally relevant real-time data from vehicles and then calculating performance measures (based partly upon previous research projects. Activities include: identifying available environmental data sets from connected vehicles; determining the relevance and values of the data sets; determining the gaps in available data; and developing a preliminary system design plan for a transportation-relevant environmental data capture management system.

Developing and Evaluating Intelligent Eco-Drive Applications – Virginia Tech

This project will build on previous research efforts to develop an eco-ACC system and evaluate the network-wide impacts of such systems for different levels of market penetration and network configurations. Various simulation tests will be conducted to investigate how these systems will operate within a transportation network, while interacting with other vehicles that are not equipped with such systems. Activities include: integrating predictive eco-cruise control algorithms within state-of-the-art car-following models; developing optimum vehicle acceleration and deceleration controllers; testing the controllers on different vehicle types; and developing a final report summarizing the findings of the study.

An Evaluation of Likely Environmental Benefits of Lowest Fuel Consumption Route Guidance in the Buffalo-Niagara Metropolitan Area – SUNY-University at Buffalo

This study will conduct an assessment of the likely environmental benefits of a new application for an environmentally-optimized route guidance system for a medium sized metropolitan area. Activities include: developing an integrated simulation modeling framework capable of calculating time-dependent fuel consumption factors; using TRANSIMS-MOVES2010 modeling to estimate environmental benefits to be expected from implementing low fuel consumption routing; assessing the impact of market penetration on the likely benefits of the strategy; assessing additional benefits to be expected from taking into account real-time information about traffic disturbances; and assessing modal benefits.

Research on ITS Applications to Improve Environmental Performance – University of California - Riverside and Calmar

This project will investigate the use of real-time, on-vehicle data to calculate environmental performance measures based partly upon the team's Combined Network Equilibrium Model (CNEM). Activities include: determining the effort, scope, and geographic requirements and limitations required to transform UCR's modeling structure from a static system into a real-time system; contacting commercial vehicle telemetry companies and summarizing the general availability and types of data required for improved environmental monitoring; evaluating data structures (data fusion requirements) and assessing potential changes; and developing a technical report and recommendations document.