



*IntelliDrive*SM for the Environment: Environmental Impacts and Mobility Impacts

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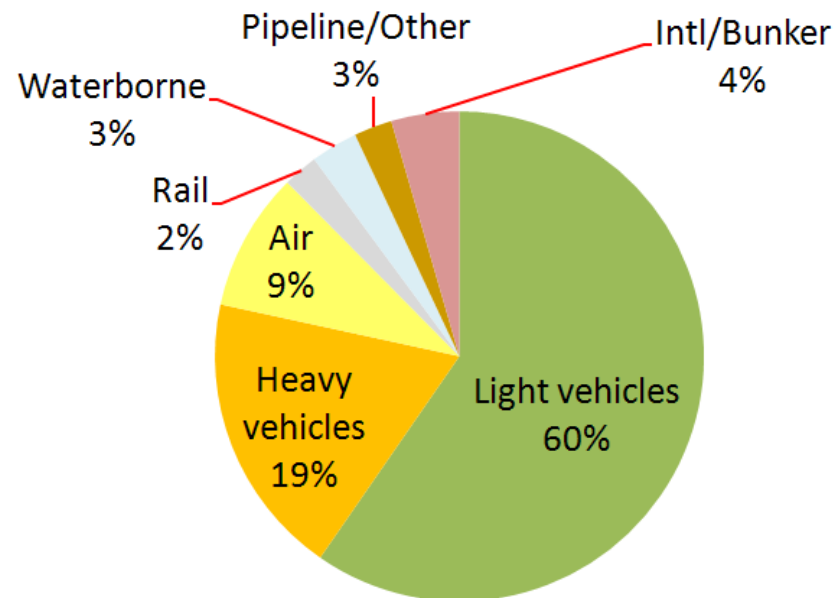
Mobility and Environment Workshop
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Environmental Research Issue

- 2.9 billion gallons of wasted fuel each year => 3 weeks worth of gas for every traveler
- Transportation accounts for approximately 28% of US greenhouse (GHG) emissions
- Vehicles represent nearly 80% of the CO₂ emissions



AERIS Vision and Objectives

Vision

- Transform environmental management of the transportation system by facilitating green choices by transportation system users and operators

Objectives

- Support generation, capture, standardization, and use of real-time data from connected travelers (e.g., pedestrians, bicyclists, transit passengers), vehicles (light vehicles, transit, freight) and infrastructure
- Leverage existing research to determine most effective use of Intelligent Transportation Systems (ITS) to reduce negative environmental impacts
- Assess whether further investment is justified for addressing future, long-range efforts to conserve energy, address air quality issues, and mitigate other environmental impacts

Environmental Research Focus

USDOT's IntelliDrive AERIS Program Research Focus

- Improve air quality, and reduce greenhouse gas (GHG) emissions and fuel consumption

US-EU Sustainability Working Group Research Focus

- Reduce negative environmental impacts, improve mobility benefits, and enhance societal benefits

ITS Strategies Can Reduce Environmental Impacts

- Traffic Signal Coordination
 - Emissions reduced by up to 22% (National Traffic Signal Report Card)
- Ramp Metering
 - Emissions decreased by 3-8% on typical day and 2-3% on high demand day (Minneapolis, MN)
- Speed Management
 - NOx emissions reduced by 17% by reducing speed limit from 65 mph to 55 mph on Ozone Action Days (Austin, TX)
- Incident Management
 - Saved 5 million gallons of fuel by reducing incident duration by 28% (CHART, MD)
- Transit Signal Priority
 - Fuel consumption reduced by 2% to 19%, and bus emissions by up to 30% (Arlington, VA; Eastleigh, England; Helsinki, Finland)



ITS Strategies Can Reduce Environmental Impacts (cont.)

- Electronic Toll Collection
 - Emissions reduced by more than 16% at plazas with electronic toll systems (Baltimore, MD)
- Low Emissions Zone
 - 13% reduction in NO_x and 15% reduction in PM (London Congestion Charging Zone, 2002 vs. 2003)
 - 30% reduction in PM emissions (Milan Access Control Scheme)
- Green Enhanced Navigation
 - 8% reduction in fuel consumption by using fuel-optimized route
- Advanced Driving Alert System (ADAS) for “Time-to-Red” (TTR)
 - 12-14% reduction in fuel consumption (CA)
- Adaptive Cruise Control (ACC)
 - 10% reduction in fuel consumption (Southeast Michigan)



Reducing Emissions by Improving Operations

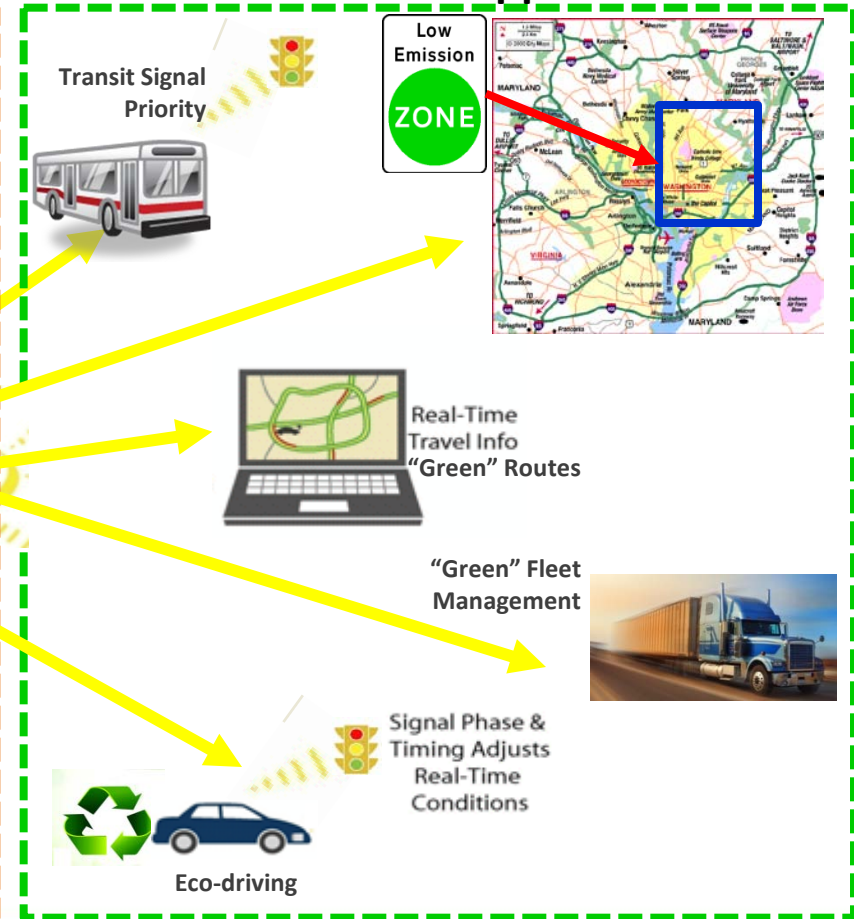
- Improve flow of vehicles (cars, trucks, buses, trains) to minimize emissions
 - Minimize accelerations (specially hard accelerations)
 - Maximize optimal speeds (varies by emission)
- Meet travel demand through lower emission modes
 - Enhance transit, bike and pedestrian attractiveness to increase mode share
 - Enhance economic competitiveness of rail over truck travel
- Make full use of engine diagnostics and information to minimize vehicle emission rates under full range of operating conditions
- Reduce the amount of travel by fossil fueled vehicles

Environmental Data Supports Transformative Applications

Data Capture and Management



Environmental Applications



Convergence/Divergence: Mobility and Environment

- AERIS must discover where Mobility and Environment can work together, and where they diverge, and this workshop audience can help
- The DMA program and breakouts focus on apps/scenarios that provide maximum mobility benefits, and which might also benefit environment
- The AERIS program must focus on apps/scenarios that provide maximum environmental benefits, even if reduced mobility is a result
- AERIS will quantify the environmental benefits from apps/scenarios derived to help mobility (from DMA) as well as to help environment (from AERIS)
- This research will provide authoritative information on these benefits so that tradeoffs between mobility and environmental benefits can be understood



Convergence/Divergence: Mobility and Environment

- Improving mobility doesn't always imply increased emissions or fuel consumption
 - Most applications prioritized at the previous breakout session can likely reduce emissions and fuel consumption (e.g., transit signal priority or drayage optimization)
- BUT, emissions and fuel consumption can also be reduced by strategies that can negatively impact mobility or productivity:
 - Charging motorists a fee to enter a restricted zone can severely impact mobility (London, Milan)
 - Restricting heavy vehicles entry into the city center can reduce productivity (Prague)
 - Dynamic route guidance based on fuel optimization may not be the best alternative for individual mobility

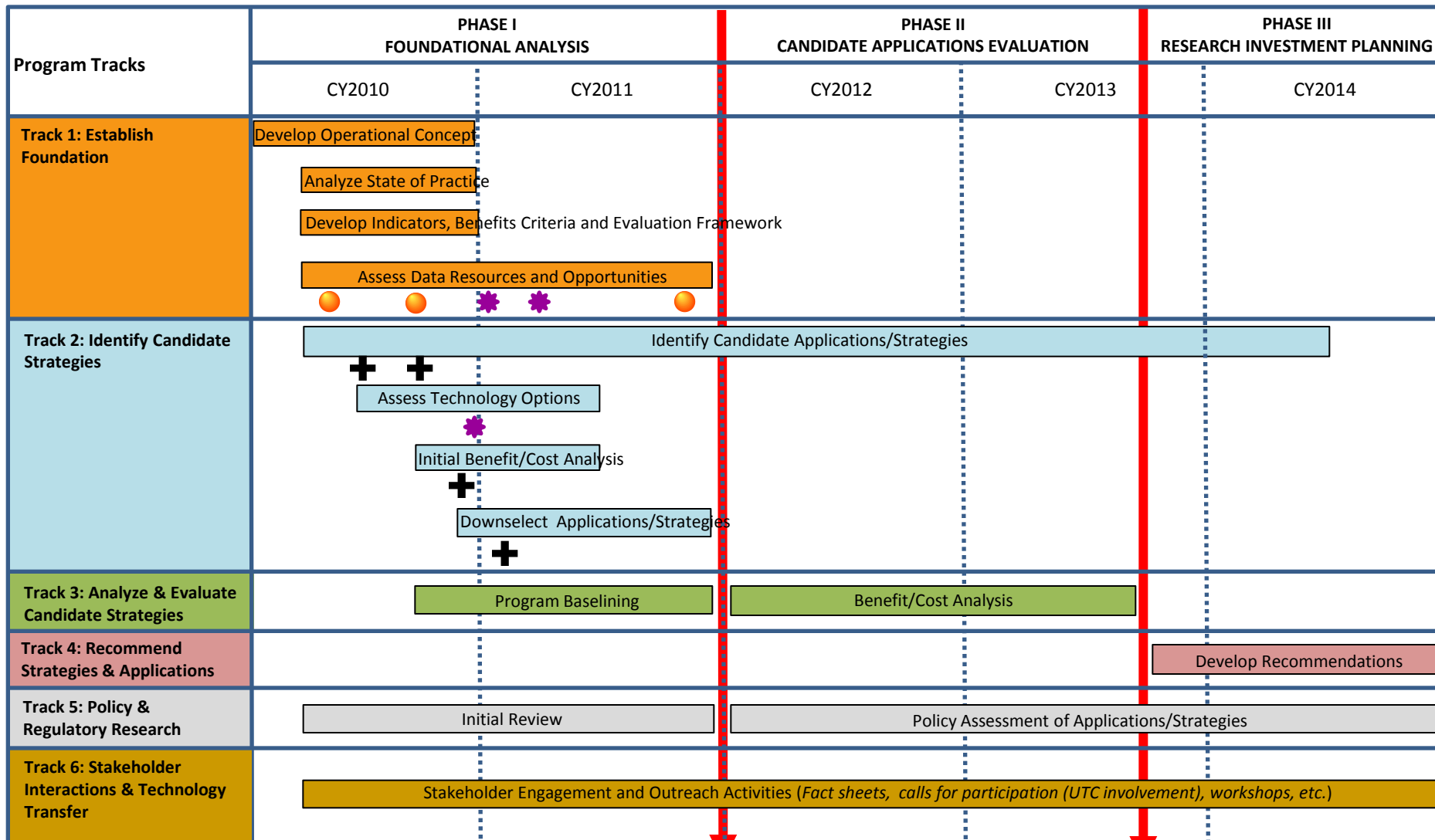


Convergence/Divergence: Mobility and Environment

- Assuming that AERIS finds that tradeoffs between mobility and environmental benefits are likely, the research must determine:
 - For what apps/scenarios do these occur, and with what impacts?
 - If the mobility and environment are in conflict, how can we balance?
 - What techniques might be used to manage the tradeoffs?
 - Must the tradeoffs be managed all the time, or just in certain situations?
 - What are the minimum thresholds that must be met for BOTH the environment and mobility in order for an app/scenario to be acceptable for deployment? (and system-wide or individual person?)
 - How can AERIS best model and evaluate these?
 - How can the environmental and mobility communities work together?



Applications for the Environment: Real-Time Information Synthesis (AERIS) High-Level Roadmap



Do the applications/strategies show enough environmental benefits to warrant further investment?
Are the stakeholders engaged?

Do the benefit/cost analyses indicate need for continued research?



- AERIS has just awarded seven (7) projects from the Broad Agency Announcement, with objectives to:
 - Foster innovative research on ITS applications that improve environmental performance
 - Promote capture and management of real-time data that are relevant to environmental applications development and performance measurement
 - Support development and enhancement of evaluation techniques, performance measurement, and technologies to capture environmentally-relevant data
- AERIS will also identify and assess applications and strategies that reduce negative environmental impacts

- *Thank you*

