Oregon Greenhouse Gas Reduction Toolkit:

Strategy Report

OREGON SUSTAINABLE TRANSPORTATION INITIATIVE

Systems and Operations

This report highlights howtechnology can be used to help make better use of existing capacity and reduce greenhouse gas (GHG) emissions.

EMPHASIZE EARLY RESULTS

EMPHASIZE COST EFFECTIVENESS

STRATEGIES FOR SMALL CITIES

What is it?

Ramp metering, traffic signal coordination, traffic incident management, and variable message signs are strategies that can be used as part of a traffic management program or intelligent transportation system (ITS). The overall goal of these strategies is to improve traffic flows and safety on freeways and arterials in locations with high levels of congestion. The strategies are designed to improve the operations of the existing transportation system, make better use of existing capacity, and encourage more fuel-efficient travel speeds.

Traffic signal coordination, adaptive signal control, signal timing, transit signal priority and other signal improvements program signals to work together to minimize stopping and idling. Vehicles tend to produce the highest levels of emissions when they are accelerating, particularly from a stop or very low speeds. Coordinating signals to allow for better traffic flow helps reduce stopping and starting, thereby reducing GHG emissions. Traffic signal coordination is normally implemented to improve performance of a road or a network of roads where the spacing of signals is such that isolated signal operation would cause excessive delays, stops, and loss of capacity. Although most people understand traffic signal coordination as providing well-timed green lights, that is only one aspect. The primary purpose of coordination is to minimize overall delay and/or number of stops. This can be achieved using fixed-timing plans or using adaptive technology.

Variable message signs provide real-time roadway information to travelers, including location of accidents, and expected delay, detours and alternative routes, travel times to specific destinations, and weather condition advisories. This information helps travelers make decisions about route and mode options and can contribute to the efficiency of a roadway system, reducing overall fuel consumption.

How well does it work?

The effectiveness of traffic management strategies, including those described in this report, is highly contextual and can vary greatly depending on location and other factors. The Moving Cooler[1] report analyzed a set of operational and ITS strategies that included the three strategies discussed in this report. That analysis estimated the following GHG reductions (from the baseline) by 2030:

- Coordinated traffic signals: 0.1%
- Variable message signs: 0.1%
- Ramp metering: 0.01%

When used in combination with other traffic management strategies such as eco driving, the estimated GHG reductions listed above can be improved. Additional findings related to the efficacy of these strategies are available at the Oregon Mosaic website (see "Where Can I Learn More?" below).

1 *Moving Cooler: An analysis of transportation strategies for reducing Greenhouse Gas Emissions. Cambridge Systematics, Inc. July, 2009.*

How can it benefit my community?

In addition to reducing greenhouse gas emissions, these strategies can:

- Reduce travel times for users
- Produce fuel savings for drivers because they can travel at, or nearer to, the most fuel-efficient speeds
- Increase overall safety on the roadway network
- Produce positive economic impacts in the form of improved freight travel time and reliability and improved access to industrial and employment centers

What does it cost?

The cost of implementing these traffic management strategies will depend on the specific strategy and how widely it is implemented. Of the three strategies described in this report, traffic signal coordination is the least expensive option, costing approximately $3,000 per signal update. Ramp metering can become quite costly (both in terms of capital costs and ongoing maintenance) and will depend on the level of technology used, the number of units installed, and the communication medium connecting the ramps to the control center.[2] The cost of variable message signs will also vary depending on the number of signs and the type of technology used. In Vancouver, Washington, a traveler information system was implemented at a total cost of $511,300. The system consisted of three variable message signs, two highway advisory radio stations, and one road weather information system.[3]

Where has it been used?

- **Gresham, Oregon** implemented a system of coordinated traffic signals in order to improve traffic flow along Burnside Road, a major arterial street. Recent evaluation (2008) indicated that the system was effective at reducing travel times and saves an estimated 75,000 gallons of fuel annually. More information is available at: *http://www.its.pdx.edu/upload_docs/1248894238mPTJ0AxnYW.pdf*
- The Oregon Department of Transportation **Trip Check** website provides up-to-date road condition information throughout the state that can be easily accessed via cell phone or computer, along with real-time camera views and options for other transportation modes (light rail, commuter train, etc.). *http://www.tripcheck.com/Pages/RCmap.asp?curRegion=0&mainNav=RoadConditions*

Where can I learn more?

- Oregon Mosaic, Traffic Management Strategies: *http://www.oregonmosaic.org/163/operations.html*
- The Role of Transportation Systems Management & Operations in Supporting Livability and Sustainability. "Chapter 2: Potential Roles of M&O in Supporting Livability and Sustainability." : *http://www.ops.fhwa.dot.gov/publications/fhwahop12004/c2.htm#fn4*
- Climate Smart Communities Scenarios Project: Strategy Toolbox from Metro: *http://www.oregonmetro.gov/index.cfm/go/by.web/id=36945*, adaptive signal control, signal timing, transit signal priority and other signal improvements program signals to work together

The Toolkit is a component of the Oregon Sustainable Transportation Initiative (OSTI), which was formed to address the requirements of Senate Bill 1059 (2010).

For more information, please visit:

http://cms.oregon.gov/ODOT/TD/TP/pages/ ghgtoolkit.aspx

Oregon Department of Transportation

2 *Assessing the Benefits and Costs of Intelligent Transportation Systems: Ramp Meters. S. Kang and D. Gillen, July 1999. http://www.path.berkeley.edu/PATH/Publications/PDF/PRR/99/PRR-99-19.pdf*

3 *Oregon Mosaic, Traffic Management Strategies. Value and Cost Informed Planning from the Oregon Department of Transportation. Website: http://www.oregonmosaic.org/163/operations.html*