



SPR RESEARCH PROGRAM

SECOND-STAGE PROBLEM STATEMENT

FY 2009-10

ODOT Research Unit
200 Hawthorne Ave. SE
Suite B-240
Salem OR 97301-5192

Phone (503) 986-2700
Fax (503) 986-2844

I. PROBLEM NUMBER

GHE-10-03

II. PROBLEM TITLE

Energy Efficiency and GHG Emissions of Oregon Transit Systems

III. RESEARCH PROBLEM STATEMENT

Oregon is about to launch several policy initiatives intended to reduce GHG emissions from transportation. It is important that these initiatives are based on sound information regarding energy efficiency (on a passenger-mile basis) and associated GHG emissions. This information is not presently available for transit systems in Oregon, which seriously limits ODOT's ability to evaluate policy initiatives related to resource investments in transit.

At the national level, the Transportation Energy Data Book, prepared annually by Oak Ridge National Laboratory (ORNL) for the Department of Energy (DOE), reports passenger-mile energy efficiency information for transit modes using data reported by about 500 transit systems to the Federal Transit Administration's (FTA) National Transit Database (NTD). A first step to recovering energy efficiency information for Oregon transit systems would be to apply the ORNL methodology to the operating data that Oregon transit systems report to the NTD. Information on GHG emissions could then be derived from energy efficiency estimates.

While system-level energy efficiency information is useful, it nevertheless hides considerable energy efficiency variation that occurs below the system level. Such variation occurs across transit routes, by time of day, and between weekdays and week ends. These variations are a reflection of a transit agency's multiple missions, including its responsibility to ensure mobility as a public good and its efforts to provide competitive service to customers with mobility options. Meaningful policy analysis thus requires an ability to make energy efficiency assessments below the system level in order to reflect such variation and underlying mission differentiation. At the sub-system level, however, NTD data are no longer statistically valid.

The large number of transit trip samples needed to recover statistically valid energy efficiency estimates by route, time of day and other service characteristics can only be reasonably obtained from transit systems that have deployed automatic passenger counting (APC) systems. Deployment of transit ITS technologies has been monitored by the Volpe Transportation Systems Center of the USDOT. The most recent Volpe Center deployment information (2005) indicates that three Oregon transit systems have APC systems: Lane Transit District (LTD), Rogue Valley Transportation District, and Tri-County Metropolitan Transit District (TriMet). Thus, three Oregon transit systems have the potential capability of recovering sufficient passenger data to support samples that would yield the detailed estimates of energy efficiency needed for policy evaluation. The proposed research would analyze ridership data of at least one of these systems to produce detailed estimates of energy efficiency and GHG emissions per passenger mile.

IV. RESEARCH OBJECTIVES

The goal of this project is to develop energy efficiency and GHG emission estimates to support policy analysis of state resource investments in Oregon's bus transit systems. The objectives for reaching this goal include 1) the production of system level energy efficiency and GHG emissions on a passenger-mile basis for all Oregon transit providers that report operating data to the NTD; 2) the production of sub-system level energy efficiency and GHG emission estimates for at least one Oregon transit provider that has deployed APC technology; 3) to provide an assessment of the energy/emissions trade-offs associated with transit's multiple missions; 4) compare these to the passenger-mile energy efficiency of light passenger vehicles.

V. WORK TASKS, COST ESTIMATE AND DURATION

The research objectives would be accomplished through the following work tasks.

Task	Description	Cost
Literature Review	Review research on modal energy efficiency & GHG emissions; transit policy, planning, operations & service environment issues influencing energy efficiency & GHG emissions; near-term future technology and its likely effects on bus and light passenger vehicle GHG emissions.	\$20,000
System GHG Emissions	Estimate system level GHG emissions per passenger mile from data reported by Oregon transit agencies to the NTD.	\$15,000
Case Study Selection	Identify and engage one or more Oregon transit agencies with APC technology capable of providing passenger and vehicle mile data for analysis of energy efficiency & GHG emissions along mode, space (route location/type) & time dimensions of service.	\$20,000
Case Study Analysis	Estimate modal energy efficiency and GHG emissions per passenger mile for the case study agency, with detailed breakdown across daily service periods, route types/locations. Discuss transit system missions, their differences, how they are linked, and their relative energy efficiencies. Make appropriate comparisons with light passenger vehicle use.	\$20,000
Future Outlook	Discuss how these estimates are likely to change within the next 10 years. Discuss whether generic bus transit investments are likely to reduce baseline GHG emissions. Discuss whether targeted bus transit investments can reduce baseline GHG emissions.	\$10,000
Draft/Final Reports	Develop conclusions and prepare draft report for TAC review and comment. Prepare final report addressing TAC comments.	\$15,000
ODOT Research	Project coordination	\$5,000
	Project Duration: 12 months	Total Project Cost
		\$105,000

VI. IMPLEMENTATION

The results of the project will be directly used by ODOT in evaluating state initiatives to reduce GHG emissions in Oregon's transportation system. The results will also contribute to informing the OTC in defining policies on climate change and sustainability.

VII. POTENTIAL BENEFITS

This project would result in the development of benchmark information on energy efficiency and GHG emissions per passenger-mile for Oregon's transit systems. The information would be comparable to similar information that exists for automobiles. Issues that condition modal comparisons would be addressed to enable reasonable policy evaluations to be made. As reduction of GHG emissions becomes a priority, this information will enable better resource allocation decisions to be made by the Governor's Office, the Legislature, and the OTC. The research will also identify and examine transit planning and policy issues that affect transit GHG emissions on a passenger-mile basis. When GHG emission reduction becomes a priority, this information will help transit agencies minimize GHG emissions from their systems.

VIII. SUBMITTED BY

ODOT Champion:
 Jack Svadlenak
 Long Range Planning Unit
John.R.Svadlenak@state.or.us
 (503) 986-3261

James G. Strathman
 Center for Urban Studies
 Portland State University
strathmanj@pdx.edu
 (503) 725-4069