Summary

LUTRAQ and Volume 5: Analysis of Alternatives

Making the Land Use, Transportation, Air Quality Connection (LUTRAQ) is a national demonstration project to develop alternative suburban land use patterns and design standards, and to evaluate their impacts on automobile dependency, mobility, air quality, and energy consumption.

Using the proposed Western Bypass freeway around the Portland, Oregon metropolitan region as a case study, the LUTRAQ project has, to date, successfully identified alternative land use patterns that have significantly less than average reliance on the automobile, and developed transportation modeling procedures to forecast travel behavior associated with these land use patterns.

This report outlines the likely transportation, air quality, greenhouse gas, and energy impacts of various alternative future scenarios for the urbanized portion of Washington County, Oregon. These scenarios, which are described in Chapter 1, include the LUTRAQ alternative. This alternative changes the existing land use plans in the county to focus future development around transit stations in a mixed use, pedestrian friendly environment. The alternative also includes a complementary package of transit improvements, pedestrian improvements in transit corridors, parking charges, and selected highway improvements. Another alternative, known as the LUTRAQ/Congestion Pricing alternative, adds peak hour pricing to this land use, transit, parking policy mix. Other alternatives include two highway building alternatives, one that focuses on freeway/roadway construction, and another that includes parking charges.

Chapter 2 analyzes the travel behavior, air quality, greenhouse gas, and energy outcomes associated with each alternative in the year 2010. The analysis was done using the travel forecasting and air quality models of Metro (the Portland area regional government) as modified for the LUTRAQ project.[1] Greenhouse gas effects and energy consumption were modeled using Metro's traffic parameters and procedures from EPA's *State Workbook: Methodologies for Estimating Greenhouse Gas Emissions* and *Transportation Energy Data Book: Edition 14*. See Appendix A for further discussion of methodology.

Key Conclusions

Building highways does not solve suburban transportation problems. According to the analyses, constructing the improvements associated with a highway intensive alternative (i.e., the Highways Only alternative) would result in:

- the highest rates of single occupancy vehicle use of any of the "build" alternatives surveyed (i.e., all but the No Build alternative);
- the lowest rates of transit use for work trips of any build alternative;
- the most congestion (measured in vehicle hours of delay) of any build

1. For information on the modifications made to Metro's models, see 1000 Friends of Oregon, *Making the Land Use, Transportation, Air Quality Connection,* Vol. 4, *Model Modifications* (Portland, Oregon, 1996).

alternative;

- the most vehicle hours of travel in peak periods of any build alternative;
- the most vehicle miles of travel per day of any alternative;
- significant increases in nitrogen oxide emissions and negligible reductions in hydrocarbon and carbon monoxide emissions; and
- substantial increases in greenhouse gas emissions and energy consumption.

Some of the effects of highway building can be moderated by adding transit improvements and demand management programs that include parking pricing. The Highways/Parking Pricing alternative, which includes these programs, doubles carpooling and boosts transit use 1.5 times compared to the Highways Only alternative. This shift in peak period mode of travel reduces vehicle hours of delay significantly. These efforts to manage highway use, however, have quite modest impacts on the number of vehicle trips per day, vehicle miles of travel, vehicle emissions, and energy use.

In contrast, the LUTRAQ alternative reduces vehicle travel, congestion, emissions, and energy use. If constructed, the LUTRAQ alternative would likely result in:

- auto ownership rates 5 percent lower than in the No Build alternative;
- fewer work trips by single occupancy vehicle than in the No Build alternative (58 percent compared to 76 percent for the No Build alternative);
- more than twice as many work trips by transit as the Highways Only and No Build alternatives;
- fewer vehicle trips per household each day (7.17 compared to 7.53 for the No Build alternative);
- less peak hour traffic delay than the No Build or Highways Only alternatives;
- fewer vehicle miles of travel than the No Build or the highways alternatives (7.9% fewer than the Highways Only alternative);
- fewer peak hour vehicle hours of travel (10.7% fewer than the Highways Only alternative);
- reductions in nitrogen oxide, hydrocarbons, and carbon monoxide emissions of 2.6 to 6.7 percent compared to the No Build alternative; and
- reductions in greenhouse gas emissions and energy consumption of about 6.4 percent compared, again, to the No Build alternative.

Adding congestion pricing to this package shifts more work trips to walk/bike and transit modes. The resulting reduction in peak period traffic further decreases congestion, vehicle miles of travel, emissions, and energy use.

The transit oriented developments (TODs) contribute substantially to the results achieved by the LUTRAQ alternative. In 2010, residents of TODs would enjoy the following advantages:

- about 35 percent of TOD households would choose to own only one car, and 9 percent would own none;
- nearly 30 percent of residents would travel to work by transit;
- TOD residents would be twice as likely to walk to work as residents of the study area in the Highways Only alternative;
- children in TODs would be twice as likely to walk or bike to school as children in the study area in the Highways Only alternative; and
- TOD households would need to make about 1.7 fewer car trips per day than households in the study area in the Highways Only alternative.

In sum, the analysis of the alternatives demonstrates that transit and pedestrian oriented urban design and infill development, and the retrofit of pedestrian improvements to automobile-oriented suburbs, can have significant effects on travel behavior sufficient to eliminate the need to build new ring freeways, particularly when reinforced by sensible economic and pricing incentives, such as modest parking charges and reduced transit fares that begin to level the playing field between travel modes.