



PUTTING RESEARCH TO WORK

# BRIEF

## Cost-Benefit Analysis Will Guide Future Investments in Transit

Wisconsin's 69 public transit systems significantly benefit both transit users and the state's economy. A 2002 Wisconsin DOT study of the socioeconomic benefits of transit learned that public transit use saves the state's riders and taxpayers an estimated \$730.2 million annually, contributes to the overall quality of life in communities, and mitigates traffic congestion and pollution levels.

### What's the Problem?

While the 2002 study successfully identified and quantified the social and economic benefits derived from transit, key questions remained: Do the benefits of transit systems to Wisconsin outweigh the costs of operating them? To what degree do changes in levels of state funding impact the levels of benefits? A Phase II study was needed to answer these questions through a rigorous cost-benefit analysis of transit in the state. The results of this research would be used to provide Wisconsin legislators, transit planners and transit system operators with hard numbers to guide future transit investment decisions.

### Research Objectives

HDR/HLB Decision Economics conducted the Phase II study, the first of its kind to perform this type of analysis for Wisconsin public transit. The study's principal objectives were to:

- Perform a thorough cost-benefit analysis of transit in the state, where all transit benefits and costs are assessed and compared over the life cycle of the investment (20 to 30 years in the case of transit capital investment projects).
- Develop a comprehensive benefit-cost analysis model that decision makers could use to quantify transit benefits under various funding scenarios.

### Methodology

This study was divided into three major steps:

1. Researchers updated the 2002 transit benefit and cost estimates to 2004 levels to serve as the baseline for the analysis. In 2004, operating and maintenance costs for state transit totaled \$251.5 million. More than 39% (\$98.6 million) of those costs were funded by the state. Total benefits of public transit to Wisconsin were re-estimated at \$726 million.
2. Researchers sought to quantify the relationship between funding and transit service (and ultimately ridership) in Wisconsin. Ridership is a key determinant of transit benefits. As the starting point for this step, researchers assumed a change in the level of transit funding. The change in funding level was then translated into a change in the level of transit service, and the change in transit service was translated into a change in transit ridership. The relationships between funding and service, and between service and ridership, were measured by means of "elasticities." The funding/service elasticity was estimated for Wisconsin via regression analysis with historical data collected from the National Transit Database and WisDOT. The service/ridership elasticity was derived from other transportation research studies.
3. Investigators assessed the benefits and costs of transit over a 20-year period (2005-2024). Step 2 allowed researchers to estimate the number of transit trips associated with a change in transit funding. This estimate was then translated into trips by trip purpose in order to assess the annual socioeconomic benefits of transit. Steps 2 and 3 were repeated 20 times—once for each year in the analysis period.

#### Investigator



*"The software model will allow decision makers to identify the effects of different funding levels on transit socioeconomic benefit sectors."*

—Khalid Bekka  
HDR/HLB Decision Economics  
kbekka@hdrinc.com

## Project Manager

*“Should we put more money, or less, into transit? This study provides guidance.”*

**Bob Russell**  
WisDOT Bureau of Planning and Economic Development

### For more information:

Rod Clark,  
Director of WisDOT Bureau of Transit, Local Roads, Railroads and Harbors  
rod.clark@dot.state.wi.us

Brief prepared by  
CTC & Associates LLC  
ctcandassociates.com



Researchers' cost-benefit analysis showed that investing in transit would produce a return of over \$3 for each dollar spent at all potential state funding levels evaluated. They concluded that investing in transit in Wisconsin is economically worthwhile.

Once all the benefits and costs were estimated, investigators could calculate benefit-cost metrics such as net present value, benefit-cost ratio and return on investment under different levels of state funding. These types of metrics are useful to state decision makers in assessing the economic worthiness of public transit.

## Results

Investigators summarized the results of their cost-benefit analysis under three state funding scenarios: no annual increase in state funding over the next 20 years, a 2.5% annual increase, and a 2.5% annual decrease. Dollars associated with the benefits and costs were adjusted for inflation, while annual growth rates for local funding and federal funding were held constant to focus on the impact of changes in state funding.

Under all three scenarios, transit benefits outweigh transit costs in Wisconsin: the net present value (benefits minus costs) of transit is always positive. A 2.5% annual increase in state funding would produce a net present value of \$8.2 billion by 2024, for a return of \$3.61 on each dollar spent on transit. A 0% change in funding would produce a net present value of \$6.9 billion and a return of \$3.44 per dollar invested. A 2.5% annual decrease in funding would produce a \$6 billion net present value and a \$3.32 return.

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## Implementation

The benefit-cost analysis software is an Excel spreadsheet that generates a benefit-cost analysis for transit systems under various funding scenarios. User inputs include fiscal year, percentage change in funding, operating costs, and percentage of trips per benefit sector (work, education, healthcare, etc.). The software will be packaged on a CD-ROM and distributed with copies of the final report, providing valuable tools for decision makers.

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*James McDonnell, WisDOT Research and Communication Services*