

New Jersey Department of Transportation
Bureau of Research

Technical Brief



Analysis of Local Bus Markets – Volumes I - III

Despite having an extensive network of public transit, traffic congestion and transportation-related greenhouse gas (GHG) emissions are significant concerns in New Jersey. This research examines the congestion and GHG impacts of transit by exclusively focusing on local buses in selected parts of the state. It involved a large-scale onboard survey of bus riders on 23 NJ TRANSIT routes serving Hudson, Middlesex, and Monmouth Counties. Data collected through the survey were used to estimate how many riders would travel by automobile modes in the absence of buses and how much GHG would be generated from the diversion of bus riders to automobile modes. A microsimulation model was used to estimate traffic impacts of buses on one route.

Background

NJ TRANSIT runs bus operations on more than 250 routes throughout New Jersey. Buses on such a large number of routes are expected to have an effect on both traffic congestion and GHG emissions since many of the current riders would have traveled by automobile if buses on these routes did not operate. Although NJ TRANSIT periodically conducts onboard surveys of bus riders to collect data for forecasting and service planning, such surveys have not been conducted for about 50 routes for over ten years. This research helped to collect data from 23 of those routes through a rider survey so that the data could be used for multiple purposes, including forecasting, service planning, and the estimation of GHG and traffic impacts of buses.



Research Objectives and Approach

This research had three primary objectives:

- Assess the GHG and congestion impacts of local buses.
- Assess the characteristics of riders and their travel patterns.

- Generate a dataset of riders through a survey that can be used to answer the research questions of this study and also assist NJ TRANSIT with future service planning and forecasting.

Pertaining to these objectives, several tasks were undertaken, including a review of literature; designing and organizing a survey involving approximately 50 surveyors over two seasons; conducting the survey between 6 AM and 4 PM onboard all buses for 23 routes; cleaning and analyzing survey data collected from more than 6,500 riders; estimating local buses’ GHG impacts; applying a microsimulation model to estimate local buses’ traffic congestion impacts; and writing a final report describing the various tasks and research results.

Findings

- Based on one-way trip alone, more than 10,200 metric tons of CO₂ would be generated annually from automobiles if bus riders on the 23 routes diverted to that mode. It would take almost 2,200 automobiles to operate for a full year to generate that amount of emission.
- The traffic simulation model (VISSIM) for one of the bus routes indicated that the route helps to reduce traffic delay by 10.4 percent during the morning peak period. Similar delays can be expected for routes operating in similar conditions, but reduction in delay for routes may vary depending on network factors and traffic volume.
- In addition to having substantial GHG and traffic impacts, the local buses provide highly equitable service as they serve a very high proportion of persons from minority, low-income, and car-less households and also provide mobility to a large number of workers traveling between home and work.

For More Information Contact:

NJDOT Project Manager:	Priscilla Ukpah
	609-530-5157
	Priscilla.Ukpah@dot.nj.gov
Principal Investigator:	Devajyoti Deka, Ph.D.
	Alan M. Voorhees Transportation Center
	Rutgers, The State University of New Jersey
	(848) 932-2875
	ddeka@ejb.rutgers.edu

A final report is available online at: <http://www.state.nj.us/transportation/refdata/research/>. If you would like a copy of the full report, send an e-mail to: Research.Bureau@dot.state.nj.us.

Analysis of Local Bus Markets, NJDOT Research Report No: FHWA-NJ-2017-013– Volume I - III