SA10.30.14 The effects of built environment on driving emissions: A comparative analysis of U.S. metropolitan areas

Presenter: Kwangyul Choi, University of Texas at Austin (kwangyulc@utexas.edu)
Authors: Kwangyul Choi, University of Texas at Austin

Both vehicle travel demand and traffic congestion are highly related to regional transportation emissions. Therefore, many metropolitan planning organizations (MPOs) across the U.S. have adopted transportation and land-use based strategies to cut down regional transportation emissions. However, metropolitan areas vary in vehicle travel characteristics and associated emissions. Thus, this study has aims at 1) examining the effects of transportation and land-use factors on vehicle travel and associated emissions in six U.S. metropolitan areas, 2) comparing those effects among the regions, and 3) identifying strategies that can explain the differences in vehicle travel characteristics and associated emissions in the regions. Six metro areas include Miami, FL; Richmond, VA; Tampa, FL; Greenville, SC; Austin, TX; Atlanta, GA. This study utilized the 2009 National Household Travel Survey (NHTS) add-on data to examine variations in households' vehicle travel characteristics and associated emissions in six metropolitan areas. The NHTS add-on data include detailed location information and were analyzed in conjunction with the Smart Location Database (SLD), which summarizes several built environment variables for every census block group (CBG) in the U.S. The trip files were utilized to estimate carbon dioxide equivalent (CO2e) by the Motor Vehicle Emission Simulator (MOVES), which is an emission modeling system developed by the Environmental Protection Agency (EPA). By employing structural equation modeling (SEM) techniques, this study describes how transportation and land-use factors affect vehicle travel and associated emissions in each metropolitan areas. The study findings show that on the one hand compact, mixed-use, and small block developments with more transit service can reduce vehicle travel demand, but on the other hand, they can result in slower vehicle movement, and consequently generating more driving emissions. These findings suggest that strategies for reducing vehicle travel demand and alleviating traffic congestion should be simultaneously implemented in order to achieve the regional environmental goal.

SA10.30.14 Relationship between Jobs-Housing Ratio and Residents' Work Trip Vehicle Mile Travel

Presenter: Nahal Hakim, University of Florida (nahalhakim@ufl.edu)
Authors: Nahal Hakim, University of Florida; Yingfei Huang, University of Florida

The common experience of wasting time on long commute distances is not a new phenomenon to American people. The average travel time to work in the United States is 25.5 minutes while the percentage of workers with commutes of 60 minutes or longer is 8.1 (U.S. Census Bureau, 2011). This inconvenience has been largely discussed as a result of common development pattern of American cities with disparate land use distribution. Many studies accused the imbalance between job and housing of increasing travel distances and lessening the probability of walking or cycling. The purpose of this study is to analyze the relationship between job-housing ratio and work-related vehicle mile travel (VMT) on First Coast Metropolitan Planning Organization (MPO). A cell-based method using GIS is applied to calculate job-housing ratio at a micro-level and at different aggregate scales (cell sizes of 1, 2 and 3 miles). Apart from the multiple regression, Geographic weighted regression (GWR) is calibrated to capture the spatial variation between job-housing ratio and VMT for three area types of housing-rich,

balanced, and job-rich. The study argues that residents in housing-rich area have the highest average VMT, which is 50% more than average VMT of residents in job-rich area. The results reveal a significant association between VMT and job-housing ratio only for housing-rich areas. Within housing-rich area, one unit increase in job-housing ratio is associated with -21 mile decrease in VMT. Therefore, policies improving job-housing balance would have better effect on reducing VMT in housing-rich neighborhoods, mainly located at the outskirt of the Jacksonville urbanized area. Keywords: Job-housing balance, Job-housing ratio, vehicle mile travel, Geographic weighted regression

SA10.30.14 Revealed Preferences of Residents Living Near Multi-Use Trails: Do Use Levels Matter?
Presenter: Seth Payton, Indiana University Purdue University Indianapolis (sbpayton@iupui.edu)
Authors: Seth B. Payton, Indiana University Purdue Universiy Indianapolis; Greg H. Lindsey, University of Minnesota

Payton, S.B., Lindsey, G. "Revealed Preferences of Residents Living Near Multi-Use Trails: Do Use Levels Matter?" Researchers and practitioners have investigated the relationship between property values and urban, multi-use trails using survey methods and through analysis of property sales. Most surveys of people who own property adjacent to trails have found that most people think trails have a positive effect or no effect on property values; small percentages of property owners believe their property is negatively affected. Analyses of property sales generally yield similar results: depending on the trail and how proximity or access is measured, researchers have found that the proximity to trails is either positively correlated with property values or not significantly correlated with property values. This study uses the property value approach to assess the relationship between trails and residential housing prices in Franklin County, Ohio (Columbus, Ohio). In the research literature, this approach is known as hedonic price analysis and it involves construction of multivariate statistical models where the dependent variable is sales price and the independent variables that affect price are the characteristics of the property, including neighborhood characteristics such as access to trails. Formally, hedonic price models determine the implicit price of multiple attributes in the bundle of goods purchased by buyers. Consistent with other studies in the literature, all models summarized in this document are pooled cross-sectional, ordinary least squares (OLS), with Census tract fixed effects. From a methodological perspective, this study improves on others in the literature in that it incorporates measures of trail use from the Mid-Ohio Regional Planning Commission's trail monitoring program. These trail counts are used as measures of "trail attractiveness."