



Caltrans Division of Research,
Innovation and System Information

Research



Urban Spatial Structure and the Potential for VMT Reduction

Analysis of the links between employment sub-centering and the spatial distribution of jobs in Los Angeles.

Planning/ Policy/
Programming

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Project Title:
Urban Spatial Structure and
GHG Emissions

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WHAT WAS THE NEED?

The evidence on land use and travel shows that employment access has a larger association with travel than population density. In a policy world that is focused on links between residential density and travel, the more important path is possibly (likely) from employment accessibility to travel. California Senate Bill (SB) 375 is at heart an attempt to change urban form in ways that will meet specified GHG reduction targets. This requires clear evidence that links from urban spatial structure to travel behavior.

WHAT WAS THE GOAL?

We intended to produce new evidence on the link between employment sub-centers and vehicle travel.

WHAT DID WE DO?

We examined whether all jobs matter equally for travel behavior, and whether access to sub-centered jobs is or is not different (in terms of the association with household vehicle miles traveled, or VMT) from access to jobs that are not in employment sub-centers. Our study area is the five-county Los Angeles Combined Statistical Area (CSA) - Los Angeles, Orange Riverside, San Bernardino, and Ventura Counties. Our research has three primary steps:

- First, we used detailed data on employment from the National Employment Time Series (NETS), matched to geocoded firm locations, to identify the 46 employment sub-centers in the Los Angeles CSA.
- Second, we used the most recent travel diary survey for



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the region, the 2012 California Household Travel Survey (CHTS), to measure household VMT, again matching the household's residence to their geocoded location.

- Third, we modify a standard land use - travel behavior regression to include, as explanatory variables, measures of access to jobs that are in and not in employment sub-centers.

WHAT WAS THE OUTCOME?

Our results shows:

1. Accessibility to jobs outside employment sub-centers often has a larger impact on VMT than the accessibility to jobs inside the sub-centers.
2. The effect of accessibility on household VMT varies in core counties and peripheral counties.
3. Accessibility to jobs within 5 miles from a household's residence has a larger association with household VMT than accessibility to jobs beyond 5 miles from the residence.
4. The regression results predict that households in outlying areas drive more than households who live closer to the urban center. As an example, a simulated move from the centroid of Moreno Valley in Riverside County to the centroid of Koreatown in Los Angeles is associated with a 46.6 percent reduction for household-level VMT. While our regression models cannot demonstrate that this association reflects causality, it suggests that the improved employment access in inland counties (Los Angeles, Orange) is likely a key factor in the lower levels of driving seen in central versus peripheral locations.

WHAT IS THE BENEFIT?

California's regulatory environment, including but not limited to SB 375, requires that local agencies

and municipal governments understand the links between employment location and vehicle GHG reduction goals. This research will provide evidence that is tailored to the sub-centered structure of California's metropolitan areas. California's policy makers and transportation planners need clear guidance on how the geography of employment influences VMT. This research will help move our understanding forward in ways that can inform regional transportation plans and Sustainable Communities Strategies (SCSs), in addition to providing insights for policy-makers and modelers. A key insight is that jobs that are within five miles from a household have the largest association with reduced VMT. Planners should focus on land use strategies that improve short distance (within five mile) access from residential location to employment, and that distance effect appears more important than whether the jobs are in or outside of employment sub-centers.

LEARN MORE

Project Information on National Center for Sustainable Transportation (NCST) Website

<https://ncst.ucdavis.edu/project/urban-spatial-structure-and-ghg-emissions>

Final Report on Caltrans Website

<https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/f0016842-ca16-2832-finalreport-a11y.pdf>