



# The Impact of Center City Economic and Cultural Vibrancy on Greenhouse Gas Emissions from Transportation

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A vibrant urban core affects both land-use patterns and transportation behavior.

Policy makers across the country are keenly interested in reducing emissions from driving and increasing public transit use.

Guided by a large literature documenting the

connections between urban sprawl, more driving and less public transit use, land-use policy has been identified as an effective tool for reversing sprawl and reducing emissions. However, land use policy by itself may be insufficient to encourage widespread compact living. But the vibrancy of the urban core may plausibly affect both land-use and transportation patterns.

Some key questions this study explores are:

- What is the connection between vibrancy and transportation behavior?
- Do land-use patterns depend on the vibrancy of the urban core?
- Can policy makers promote green cities through fostering a vibrant center core?

## Study Methods

Urban planners and scholars have focused a great deal of attention on understanding the relationship between the built environment and transportation behavior. However, other aspects of the urban environment, including the vibrancy and quality of life in urban areas, have received little attention. This report seeks to close this gap.

Statistical analysis of data from a variety of sources explores whether, in addition to the built environment, the vibrancy of the urban environment also affects transportation behavior. Moreover, data analysis is also used to examine whether vibrancy affects land use patterns.

By integrating objective measures of city center quality of life into transportation choice models, the report's new statistical results inform public policy. The authors discuss specific public policy options for reducing greenhouse gas emissions and increasing public transit use.

## Findings

Vibrant downtown areas are associated with reduced greenhouse gas (GHG) emissions from driving, and with greater public transit use. Vibrancy—measured along multiple dimension, such as crime, jobs, and restaurants downtown—in an analysis of 2009 data from a large national survey of U.S. households, uncovers large and statistically significant relationships between vibrancy, emissions and public transit use. Many of these relationships are verified through analyses of data from multiple sources.

Analysis of Census data from the 2000 and 2010 finds that metropolitan areas with more vibrant downtowns experienced less sprawl. Why are vibrant downtowns associated with less GHG production and more public transit use? Simply put, if downtown is a place where people want to be, then people choose to live closer to it. Therefore, one effect of vibrancy is to influence land use patterns, and land use patterns in turn influence driving and public transit use.

Vibrancy strengthens the effect of land use patterns on transportation behavior. In the household-level analysis, the effect of distance—the number of miles a household lives from the city center—is much stronger in more vibrant areas with regard to driving, and to a lesser extent with regard to public transit use.

Sample Evidence from Data Analysis	
Claim	Statistical Evidence
VIBRANT DOWNTOWN AREAS ARE ASSOCIATED WITH LOWER GREENHOUSE GAS EMISSIONS FROM DRIVING	A ONE STANDARD DEVIATION INCREASE IN VIBRANCY LEADS TO A DECREASE IN CO <sub>2</sub> EMISSIONS BETWEEN 195 AND 1,579 POUNDS PER HOUSEHOLD. COMPARED TO THE 1,166 POUND DECREASE ASSOCIATED WITH A ONE STANDARD DEVIATION INCREASE IN METRO AREA DENSITY, VIBRANCY IS AS IMPORTANT AS LAND-USE IN REDUCING EMISSIONS.
METRO AREAS WITH VIBRANT DOWNTOWNS EXPERIENCE LESS SPRAWL	THE DISTANCE THE AVERAGE HOUSEHOLD IN A METRO AREA LIVES FROM DOWNTOWN INCREASED 4.3 PERCENT OVER THE 2000-2010 PERIOD. HOWEVER IN METRO AREAS WITH VIBRANCY LEVELS ONE STANDARD DEVIATION ABOVE THE MEAN, SPRAWL RATES WERE ONLY SLIGHTLY OVER HALF OF ONE PERCENT. THUS, SPRAWL IS MORE THAN SEVEN TIMES FASTER IN AREAS THAT LACK VIBRANCY.
VIBRANCY STRENGTHENS THE EFFECT OF LAND-USE PATTERNS ON TRANSPORTATION BEHAVIOR	WHEN STRATIFYING THE SAMPLE INTO VIBRANT AND NONVIBRANT SUBSAMPLES, THE EFFECT OF A HOUSEHOLD'S DISTANCE TO DOWNTOWN ON THEIR EMISSIONS LEVELS WAS BETWEEN 50% AND TWICE AS LARGE IN THE VIBRANT SUBSAMPLE.

### Policy Recommendations

Vibrancy interacts with land use and transportation, which highlights the need for an integrated approach to planning. In addition, the authors suggest:

- Land use policies that encourage compact living will be most effective in vibrant areas.
- Improving schools and fighting crime can be viewed as climate policies when they encourage households to embrace city living.
- Removing regulations that raise the cost of new construction downtown will reduce housing prices and increase downtown populations.
- Larger downtown populations will be able to sustain more consumer and cultural establishments.

### About the Authors

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### To Learn More

For more details about the study, download the full report at [transweb.sjsu.edu/project/1002.html](https://transweb.sjsu.edu/project/1002.html)