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# QUANTIFIED TRAVELER

## Travel Feedback Meets the Cloud to Change Behavior

RAJA SENGUPTA AND JOAN L. WALKER

**H**alting climate change will require a concerted effort to reduce emissions from on-road vehicles. While significant progress has been made to improve vehicle efficiency and reduce CO<sub>2</sub> emissions, surface transportation accounted for half the increase in US greenhouse gas (GHG) emissions over the past two decades. Today, surface transportation accounts for 24 percent of all US emissions.

Automobile improvements alone will not be sufficient to meet federal and state emissions targets; policy makers also need to identify solutions that reduce the demand for car travel. Information technology offers a promising breakthrough on this front.

While many people are aware of the environmental damage caused by GHGs, that knowledge has not resulted in substantially less car travel. If travelers knew more about the impacts of their travel decisions, they might change their trip modes, routes, or departure times. And if they could compare their trips to those of their peers or the national standard, they might change their travel habits even more. To test this idea, we built and evaluated an information technology called Quantified Traveler. QT is meant to encourage travelers to be more mindful of their travel decisions and encourage drivers to walk, bike, ride transit, or forego a trip altogether. >

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If travelers knew more about the impacts of their travel decisions, they might change their trip modes, routes, or departure times.

To test the effects of QT, we recruited 135 subjects from UC Berkeley to track their travel habits using our phone app. QT then processed the data into travel diaries (lists of trips with times, locations, routes, and modes) while producing a personalized “travel impact footprint” (Figure 1). This provided users with web-based access to their travel time, travel cost, calories expended, and CO<sub>2</sub> produced. The footprint also compared each user’s data with three peer groups: the SF Bay area, the US average, and fellow Berkeley students (Figure 2). We then evaluated the participants over two weeks to learn whether access to this information led to a measurable increase in environmental sensitivity and a corresponding reduction in driving.

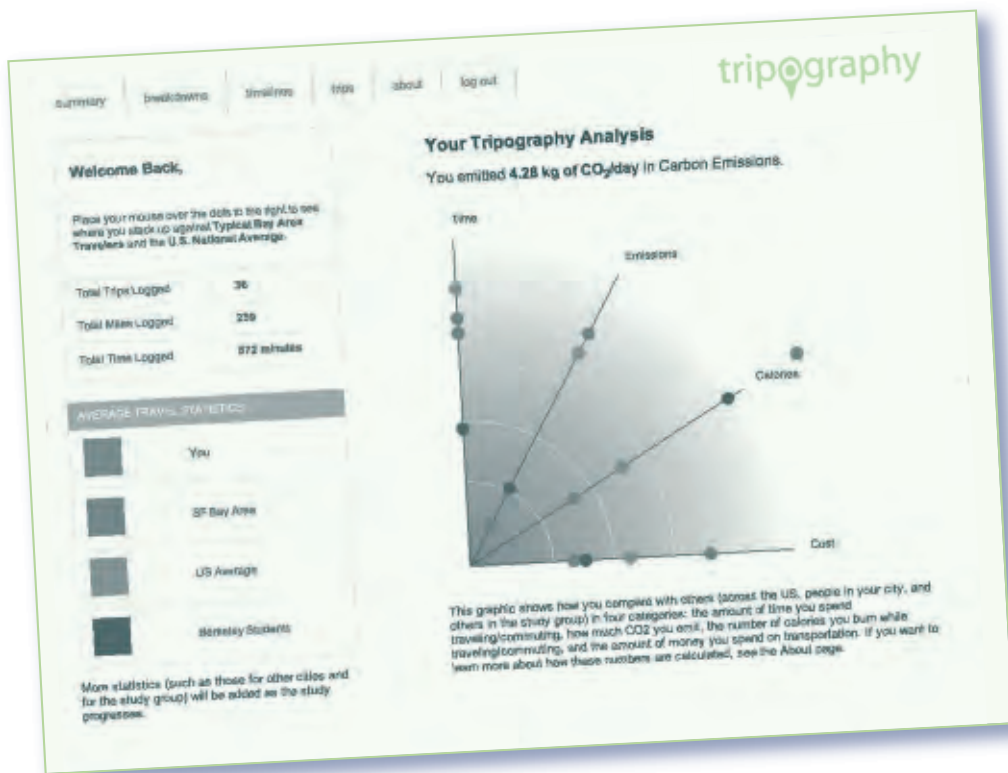
We paid participants \$20 to sign up, install the app, and take an entry and exit survey. Each subject streamed travel data during the first week of the experiment. We used the data to develop personalized profiles that became the baseline footprint for each person. In the second week, participants gained access to the QT website. Most said they enjoyed the site and appreciated the information provided. All 135 subjects kept the QT App active during the two week study and looked at their personal QT web profile an average of 4.1 times during the second week. Analysis of the before-and-after survey responses suggests that QT represents a promising tool to shift people toward more sustainable attitudes and travel behavior.

Our sample group consisted of UC Berkeley affiliates, most of whom were undergraduate students. Their responses to our pre-test survey suggested they

- had little knowledge of the impact of their individual travel habits,
- held mixed views on the environment,
- were open to using sustainable travel modes,
- valued the potential health benefits, and
- had friends and family who support sustainable modes.

**FIGURE 1**  
Example of Quantified Traveler Diary





**FIGURE 2**  
Personalized Travel  
Footprint with Peer  
Comparisons

Nevertheless, our subjects also acknowledged constraints on their ability to alter their travel modes, and most stated they had no intention of changing their travel behavior.

How then did the QT experiment affect their travel behavior? We explored whether receiving QT information affected travel patterns, and developed a model to identify statistically significant drivers of behavioral change. In the pre- and post-test surveys, we asked our subjects about a wide range of topics, including their

- awareness of the resources they expend in their travel,
- attitudes toward travel and its environmental and health impacts,
- beliefs regarding how their friends, family, and society view travel issues,
- belief in their ability to change their travel behavior, and
- interest in setting goals to change their travel behavior.

In the post-survey responses, we observed significant shifts across a range of behavioral categories suggesting that information from QT made their behavior more sustainable. The most significant shifts in responses were related to questions regarding the calories and CO<sub>2</sub> they expended from their travel—unsurprising results since the data in these two categories were the primary focus of the QT feedback system. QT had less impact on social norms, goal setting, and perceived ability to change their travel behavior. There were, however, small-scale shifts in these categories. In the post-survey, respondents disagreed more with the statement, “many constraints and limitations keep me from changing my transportation behavior.” They also agreed more with the statement, “I can get exercise when traveling.” These responses suggest that QT can generate more sustainable travel habits. ➤

Several responses to the questions targeting attitudes toward sustainable transport changed as well. For example, in post-survey responses, more people agreed with the policy to raise the price of gas to reduce congestion and pollution. People also shifted their feelings on sustainable behavior. After QT, more people felt it was important to engage in sustainable travel behavior and felt guilty for not using sustainable modes. Even though the individuals in our sample generally held “pro-health” views from the start, we observed an increase in the belief that sustainable transportation modes are beneficial to one’s health.

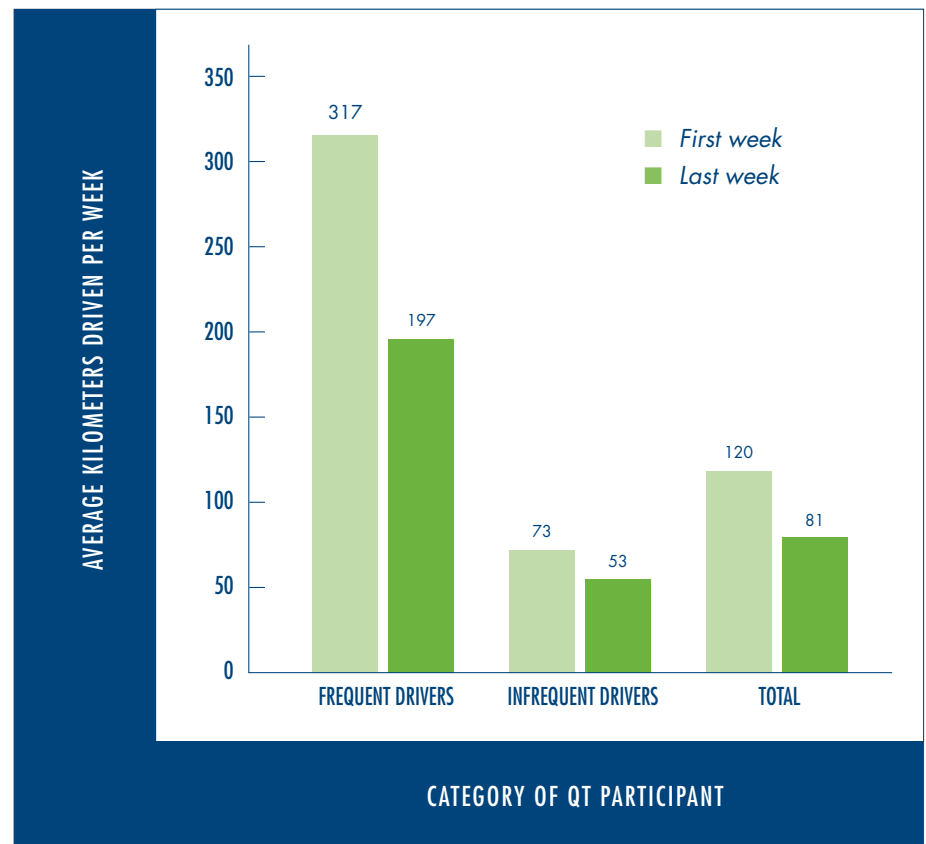
Responses to two questions, however, demonstrated shifts toward less sustainable beliefs. Subjects were less likely to agree with the statements:

- “Greenhouse gases cause environmental problems such as global warming.”
- “Everybody together should reduce the amount of fuel burned by their transportation behavior.”

The reasoning behind these responses is unclear. It could be a reaction to the clearly environmentalist orientation of the experiment. Another explanation could be that pre-survey responses were very positively pro-environment, offering little room for improvement.

We also saw positive shifts in respondents’ stated intentions to drive less and bike and walk more. Intentions and actions, however, are two different things. Smartphone tracking

**FIGURE 3**  
Changes in  
Driving Behavior



allowed us to measure actual travel mode shifts between the two weeks, and we observed a statistically significant decrease in the average distance driven—39 kilometers (24 miles) or 33 percent less driving than the first week (Figure 3). While we did not observe a statistically significant increase in non-vehicle kilometers traveled, we did observe shifts in walking and biking based on driving frequency. Frequent drivers—those who reported in the pre-survey that they drove two or more days per week—shifted to walking and biking more than infrequent drivers. Frequent drivers drove on average 120 fewer kilometers (75 fewer miles) during the second week of the experiment than they drove during the first week, representing a reduction of 38 percent. Infrequent drivers drove 20 fewer kilometers (12 fewer miles) during the second week, for a reduction of 27 percent. Neither group significantly changed their distance traveled by transit, although frequent drivers walked on average 5 km more during the second week, for an increase of 42 percent over the first week.

We developed a behavioral model to assess whether the reductions in driving related to psychological changes measured by the entry and exit surveys. The model showed heightened awareness of CO<sub>2</sub> and calories expended when travelers changed attitudes and norms. The QT design of comparing one's own resource expenditures with those of one's peers seemed to play a significant role in changing attitudes toward more sustainable travel. We found that a positive change in attitude toward environmentally friendly transportation was strongly associated with less driving in the second survey week. In addition, those who more frequently signed in to the QT website significantly increased their walking and biking distances.

#### A DIFFERENT ITS

Intelligent Transportation Systems (ITS), like QT, integrate information technology with transportation. While much of ITS aims to make better use of the existing transportation infrastructure, QT represents an emerging effort to develop information services designed to encourage behavioral changes. Real-time traffic information can impact route and departure time choice, but these services have little impact on mode choice. Mode choice is rooted in lifestyle choices that are psychologically complex and harder to change. Several programs effectively use information to influence mode and trip choice, such as the Travel Feedback Programs in Japan, Personalized Travel Planning in England, and Travel Blending in Australia. Such programs, however, often rely on person-to-person dialog and intervention instead of a Google Map-style automated information system. QT's automated style targets mode and trip decision-making by showing real-time results of travelers' actions and how those results compare to their peers' behavior. This form of ITS mimics certain psychological approaches to behavior change used by counselors and society in general.

Can automated travel feedback replace the human-to-human component used in other travel counseling programs? Travel feedback programs with in-person counselors have a record of success. If a computational surrogate could behave similarly to a counselor, travel feedback programs could be deployed at larger scales. We know people persuade people. Can computational systems persuade people? Our QT evaluation suggests they can. ♦

This article is adapted from "Quantified Traveler: Travel Feedback Meets the Cloud to Change Behavior," originally published in the *Journal of Intelligent Transportation Systems: Technology, Planning, and Operations*. Note: the Quantified Traveler website is no longer active.

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# Unraveling the Modal Impacts of Bikesharing

SUSAN SHAHEEN AND ELLIOT MARTIN

Public bikesharing has emerged as one of the latest transportation innovations, transforming North American cities and providing people with more transportation options. Much attention has focused on how new bikesharing programs fit in with the largely auto-oriented transportation culture. But there is another fascinating question: how do bikesharing programs influence the travel patterns of their members with respect to travel by rail, bus, and on foot? Our earlier study of several North American cities found the following:

- *In large, dense cities*, where public transit provides a robust network of lines and services, bikesharing may offer quicker, cheaper, and more direct connections for short distances normally traveled by walking or public transit. Though bikesharing competes with traditional public transit services, it also eases transit congestion during peak hours.
- *In suburbs and small- to medium-sized cities*, where public transit can be sparse, bikesharing complements transit and provides better access to and from existing lines. In these places, bikesharing serves as an important first- and last-mile connector and increases public transit use.

Despite notable differences in how bikesharing programs affect different cities, they consistently enhance urban mobility and reduce automobile use. To better understand these enhancements, we delve further into the demographics of bikeshare members and provide a detailed analysis of how bikesharing affects other types of travel.

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**BIKESHARING BACKGROUND**

Bikeshare systems allow users to access bicycles on an as-needed basis from a network of stations typically concentrated in urban areas. Bikesharing stations are usually unattended and accessible at all hours, providing an on-demand mobility option. Most bikeshare operators are responsible for bicycle maintenance, storage, and parking costs. Bikesharing patrons join the system for an annual fee or rent a bike on a trip-by-trip basis. At the conclusion of their rental, riders return the bike to any docking station, which allows for both one-way and roundtrip travel. One-way travel has, in particular, unlocked new travel options that result in modal shifts among bikeshare users. For example, a person might bikeshare in the morning to get to work and then take the bus home.

Bikesharing has the potential to bridge gaps in existing transportation networks as well as encourage people to use multiple transportation modes. Bikeshare systems offer numerous benefits:

- reduced transportation costs, traffic congestion, and fuel use;
- increased mobility and use of alternative travel modes (e.g., rail, bus, taxi, carsharing, ridesharing);
- economic development;
- health benefits; and
- greater environmental awareness.

Although before-and-after studies documenting public bikesharing benefits are limited, several programs have conducted member surveys and collected bicycle data to record program effects. Early program data suggest that bikesharing can result in emission reductions and modal shifts. For example, in Boston, Hubway data showed a carbon offset of 285 tons after two years of bikesharing operation.

**A TALE OF FOUR CITIES**

Beginning in November 2011, we administered an online survey to members of bikesharing programs in Montreal, Toronto, Washington, DC, and Minneapolis-Saint Paul. About 15 percent of members responded to our survey, for a total of 10,661 responses (6,486 in the US and 4,175 in Canada). The survey asked how respondents shifted modes as a result of bikesharing. Table 1 summarizes the results. We also collected respondent demographics, including home and work locations. ➤

CITY	PERCENTAGE CHANGE IN VEHICLE OWNERSHIP	PERCENTAGE OF BIKESHARERS WHO DRIVE LESS OFTEN
Montreal	-3.6%	36%
Toronto	-2.0%	25%
Washington, DC	-2.1%	41%
Minneapolis-Saint Paul	-1.9%	52%

**TABLE 1**  
Changes in Vehicle Ownership and Driving Behavior among Bikesharers

Bikesharing has the potential to bridge gaps in existing transportation networks as well as encourage people to use multiple transportation modes.

We geocoded intersection data to calculate the distance between home and work locations in Minneapolis-Saint Paul and Washington, DC. We used this information together with survey responses to evaluate whether commute distance was associated with a shift to or from alternative forms of transportation. Our study indicated both a modal shift toward bicycle use and a heightened public awareness of bikesharing as a practical transportation mode, corroborating findings from previous bikesharing evaluations.

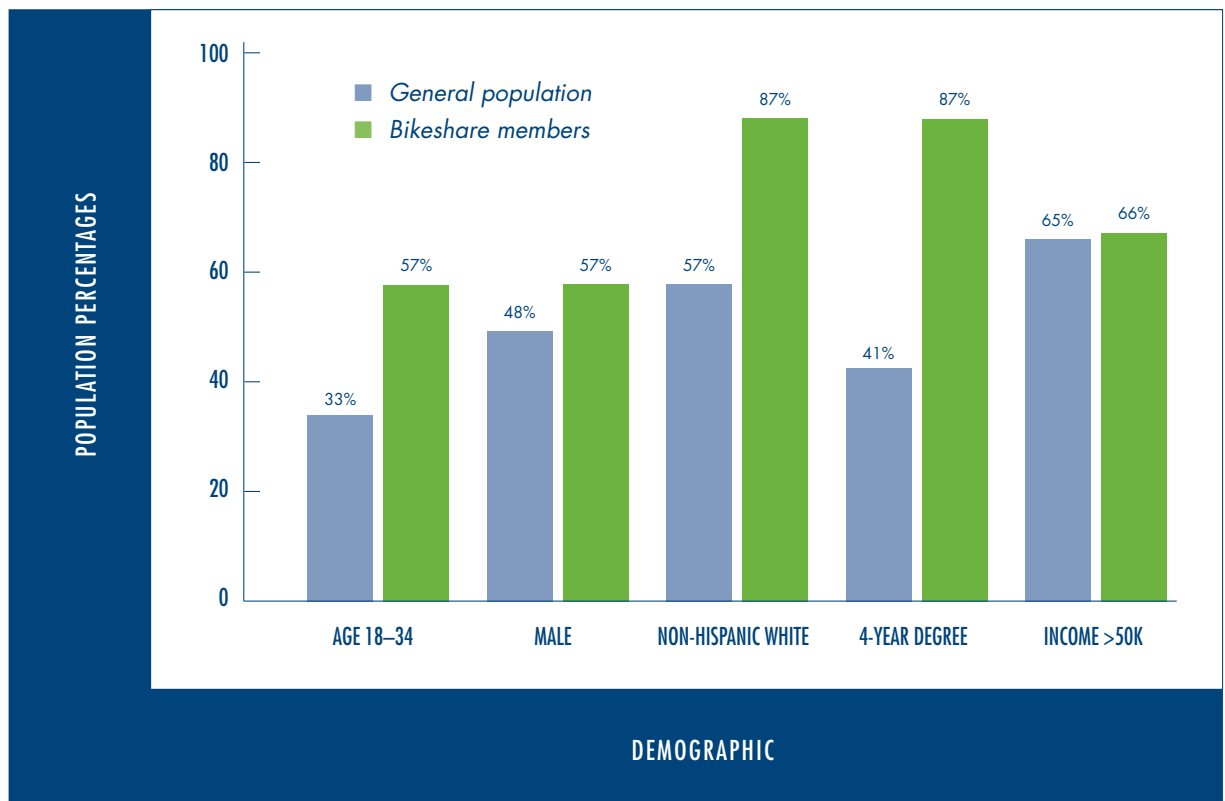
### DEMOGRAPHIC FINDINGS

Within the four cities, bikeshare members were younger, disproportionately male, more likely to be non-Hispanic white, and significantly more educated than the general population (Figure 1). This may reflect the initial placement of bikesharing stations within downtown cores with high levels of white-collar employment. It may also reflect characteristics of early adopters, such as access to credit/debit cards, which are typically required for system use.

### MODAL SHIFTS

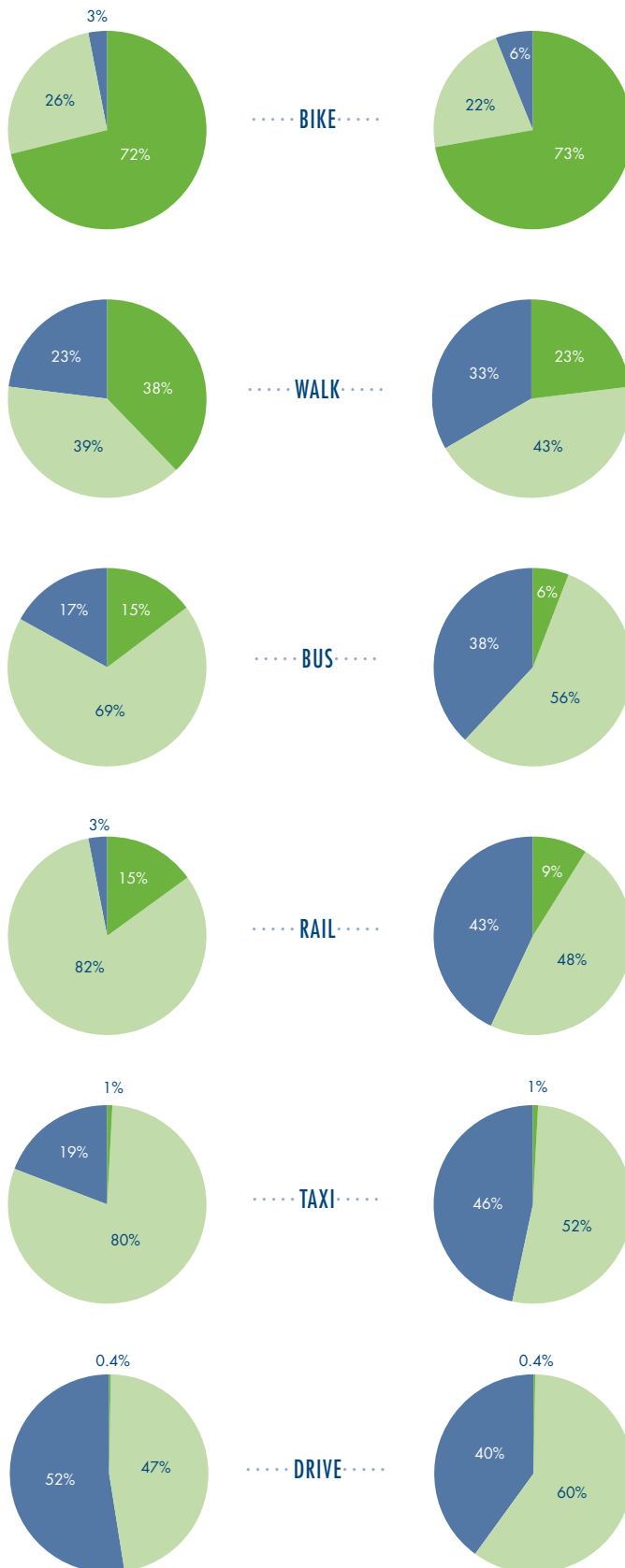
The survey responses suggest that bikesharing, especially its ease of one-way travel, results in different travel behavior than traditional cycling. Bikeshare members in Montreal, Toronto, and Washington, DC shifted away from cars, buses, and rail. In Minneapolis-Saint Paul, bikesharers shifted away from buses but toward rail: five times more bikesharers increased their rail travel than decreased it. And in contrast to members in the other cities, more bikesharers in Minneapolis-Saint Paul increased their number of walking trips (38 percent) than decreased them (23 percent). Figure 2 shows the >

**FIGURE 1**  
Demographic  
Attributes of  
Bikeshare  
Members



Minneapolis-Saint Paul

All Four Cities



**FIGURE 2**

Modal Shifts Resulting from Bikesharing

More  
No change  
Less

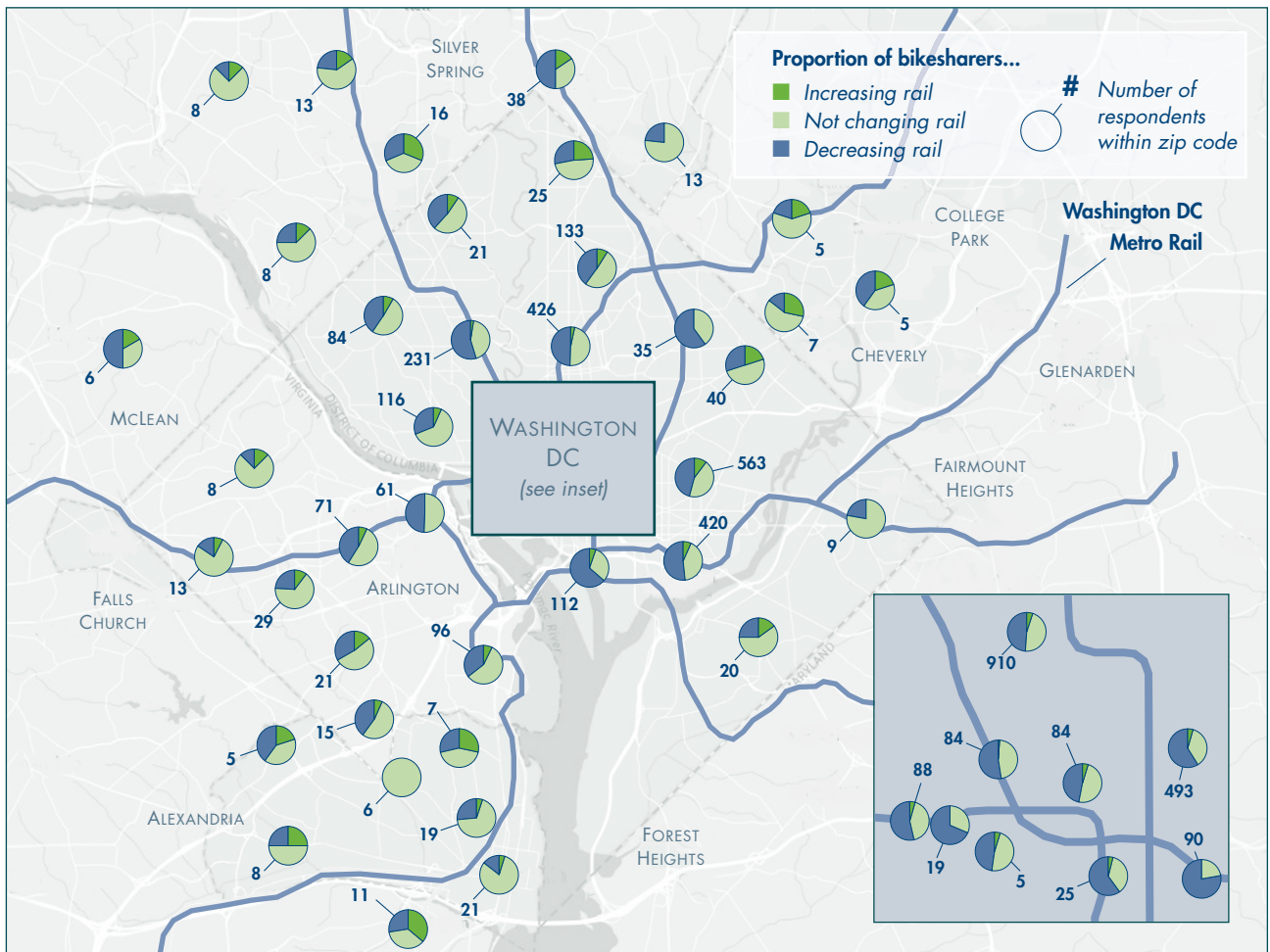
responses from Minneapolis-Saint Paul and the combined responses across all surveyed cities, which more reflect the mode shifts in the larger bikeshare systems.

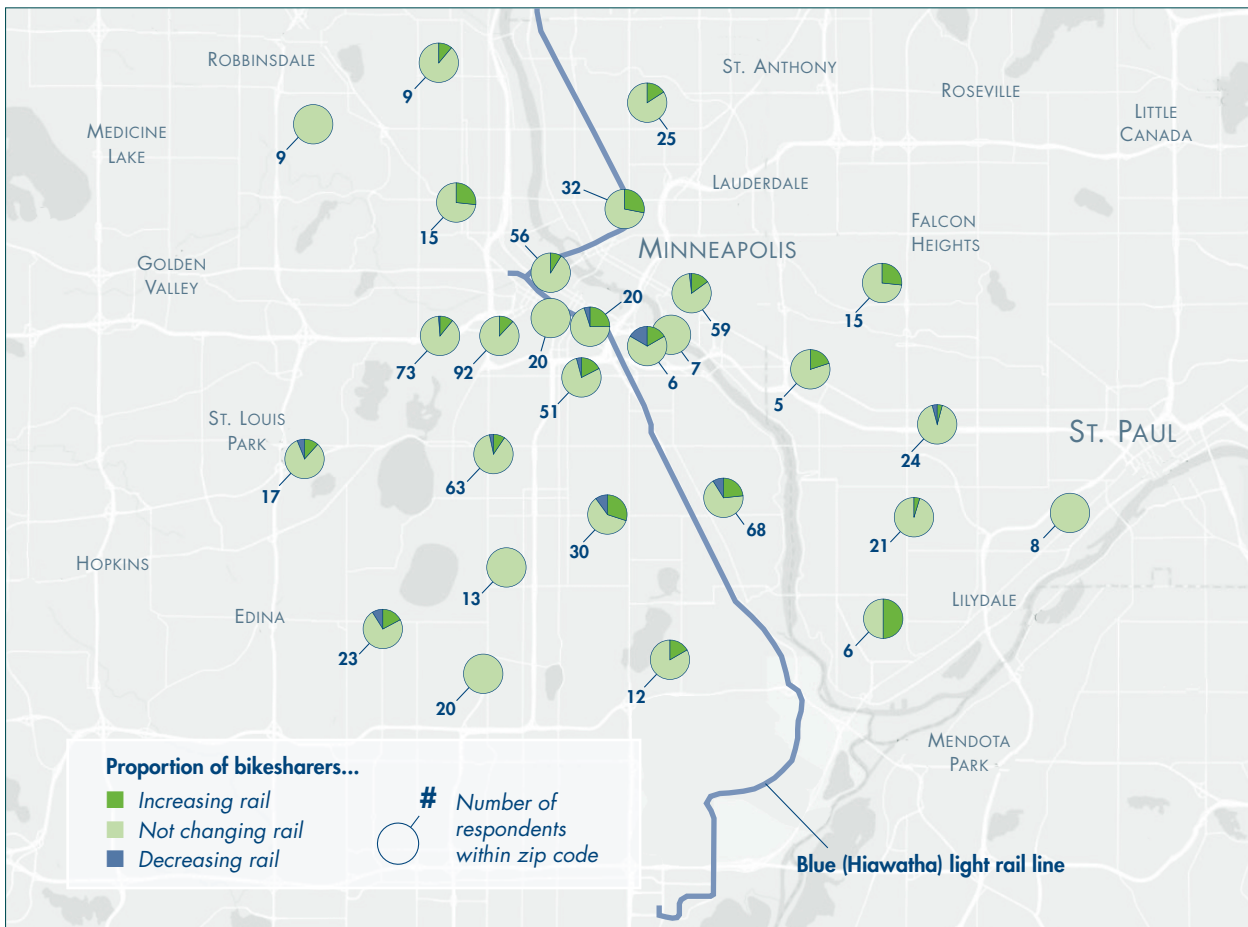
The differences in modal shift between Minneapolis-Saint Paul and the other three cities may stem from factors such as city size, population density, and the extent of the public transit system. Perhaps the greatest distinction with respect to rail shifts is related to the relatively small size of the Minneapolis-Saint Paul rail transit system. Although Minneapolis-Saint Paul opened a new light rail line in June 2014, the Blue Line was the only light rail transit in the region at the time of our survey. In contrast, rail systems in Montreal, Toronto, and Washington, DC are more extensive.

**SHIFTS IN RAIL: WASHINGTON, DC VS MINNEAPOLIS-SAINT PAUL**

We employed a geospatial analysis to more deeply assess the differences in modal shift between Washington, DC and Minneapolis-Saint Paul. We developed comparative maps of modal shift in both cities for rail and bus aggregated and grouped by zip code. Figures 3 and 4 illustrate the geographic distribution of modal shifts to and from rail among bikesharers in Washington, DC and Minneapolis-Saint Paul. The maps present pie charts for each zip code with segments to illustrate increased, constant, or decreased rail use. The number overlaid in each pie chart is the number of respondents in that zip code.

**FIGURE 3**  
Modal Shifts to and from Rail in Washington, DC





**FIGURE 4**  
 Modal Shifts to and from Rail in Minneapolis-Saint Paul

DC bikesharers are concentrated downtown, where bikeshare stations are abundant and the rail network is most congested. Shifts away from rail were highest around this area, suggesting that bikesharing may substitute for shorter trips previously taken on rail.

Reduced demand for rail transit among bikesharers, particularly in the city center, may benefit public transit operators during rush hours in large transit-intensive cities like Washington, DC. By adding transportation alternatives, bikesharing opens up additional capacity on congested bus and rail lines in the urban core. Indeed, one reason Capital Bikeshare was launched in Washington, DC was to relieve congestion on the subway system. Additionally, bikeshare systems in cities with developed rail systems can save people time by providing more direct routes between their destinations, as well as providing health benefits and cost savings.

In contrast to DC, the Minneapolis-Saint Paul bikesharers demonstrate a uniquely positive net shift toward rail. Figure 4 shows that the shift toward rail occurs both in the downtown core and in the suburbs. The simplest explanation may be the layout and extent of the rail network at the time of the survey. Minneapolis had a single, linear rail line compared to DC Metro’s multiple, interconnecting lines. In this linear system, bicycles did not offer any time savings over short rail trips that require transfers because transfers between rail lines did not exist at the time of the survey. ➤

Bikesharing's primary effect in Minneapolis-Saint Paul was to increase access to and from the lone rail line. The increased rail usage indicates that bikesharing provides an important first- and last-mile connection for users with origins or destinations beyond walking distance from rail stations. Consequently, in smaller, less transit-rich cities, bikeshare can provide a low-cost alternative to public transit expansion.

#### RIDING THE BUS

Bus ridership in Washington, DC shifted in the same way as rail ridership shown in Figure 3. Few respondents in the urban core of DC indicated increasing their bus use as a result of bikesharing. The respondents who did report increased bus use were primarily near the edges of the region.

In Minneapolis-Saint Paul, respondents were almost equally likely to increase their bus use (15 percent) as decrease it (17 percent). Like rail, the shift toward bus was distributed within the urban core as well as the suburban periphery. In contrast to DC, this may suggest that bikesharing in the downtowns of cities like Minneapolis-Saint Paul serves a more balanced role in both complementing and substituting for bus travel.

By adding transportation alternatives, bikesharing opens up additional capacity on congested bus and rail lines in the urban core.



## EFFECTS ON WALKING

The results for walking are somewhat different. More bikesharers increased rather than decreased their walking in Minneapolis-Saint Paul, whereas the opposite occurred in DC. But in both cities, the shares of those who increased and decreased walking are more balanced relative to shifts in other modes. That is, 17 percent of DC bikesharing members walked more while 31 percent walked less. For Minneapolis-Saint Paul, 38 percent walked more and 23 percent walked less. The broader conclusion from this is that bikesharing often complements walking in certain cities but is likely to be situation-specific. Some members in the suburbs may bikeshare instead of walking to/from public transit. Downtown users may walk more to the actual bikesharing stations but then use public transit less. These and other modal shifts invite further study across a wider variety of urban and suburban environments.

## CONCLUSION

Bikesharing has grown rapidly in North America and has provided an innovative mobility option that can both substitute for and complement public transportation. In areas with more robust or congested transit networks, bikesharing may offer quicker, cheaper, and more direct travel over short distances that have traditionally been taken on foot or public transit. In areas with smaller public transit systems, bikesharing serves a greater role as a first- and last-mile connector. These promising findings show that bikesharing has notable potential to enhance urban mobility and reduce automobile use in a wide variety of North American cities. ♦

This article is adapted from "Evaluating Public Transit Modal Shift Dynamics in Response to Bikesharing: A Tale of Two U.S. Cities," originally published in the *Journal of Transport Geography*.

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# DOES TRANSIT-ORIENTED DEVELOPMENT NEED THE TRANSIT?

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DANIEL G. CHATMAN

**U**rban planners have invested a lot of energy in the idea of transit-oriented developments (TODs). Developing dense housing near rail stations with mixed land uses and better walkability is intended to encourage people to walk, bike, and take transit instead of driving. But TODs can also be expensive, largely because rail itself is expensive. In one study, the average cost for light rail construction was \$61 million per mile in 2009 dollars.

If rail access does reduce driving and the environmental problems caused by driving, then expensive rail investments may well be worthwhile. But the actual impact that TODs have on driving remains open to debate. Many studies have shown that households living near rail stations are more likely to use transit than other households. But using transit more is not the same as driving less. And even if people in TODs do drive less than people elsewhere, we cannot be sure that transit was responsible. Easy access to a rail station might encourage people to walk rather than drive—but so too might wider sidewalks, narrower streets, and closer destinations. Denser places also tend to have worse traffic and fewer places to park. In other words, TODs might discourage driving not by making rail travel easy, but by making driving less attractive. If this is the case, TODs may not need their “T” at all. The key to less driving in TODs may not be the presence of rail, but other factors like higher density, greater walkability, and less parking. >

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TODs may not need their “T” at all. The key to less driving in TODs may not be the presence of rail, but other factors like higher density, greater walkability, and less parking

There are few studies of whether people living in TODs own fewer cars and drive less than people living outside TODs. More than half of those studies found that rail access is associated with lower auto use. But usually the studies did not account for other important TOD characteristics, particularly parking availability. Extending on this prior research, how can we isolate rail transit’s influence on travel behavior and separate it from the influence of other attributes of TODs? To help answer this question, I conducted a mail survey of households within a two-mile radius of ten rail stations in New Jersey (Figure 1). Some of the households lived in purpose-built TODs and some didn’t, some lived in newer housing and some in older housing, and some were near rail while others were farther away. The selected stations provide excellent transit access to Manhattan through a mix of light rail, heavy rail, and high-frequency commuter rail service. My survey collected information on housing characteristics, on- and off-street parking, work and non-work travel, household characteristics, and residential location preferences. In addition to the household survey, I included existing neighborhood attribute data, as well as on-street parking data collected by on-foot observers.

#### HOUSEHOLD DIFFERENCES BY DISTANCE TO RAIL

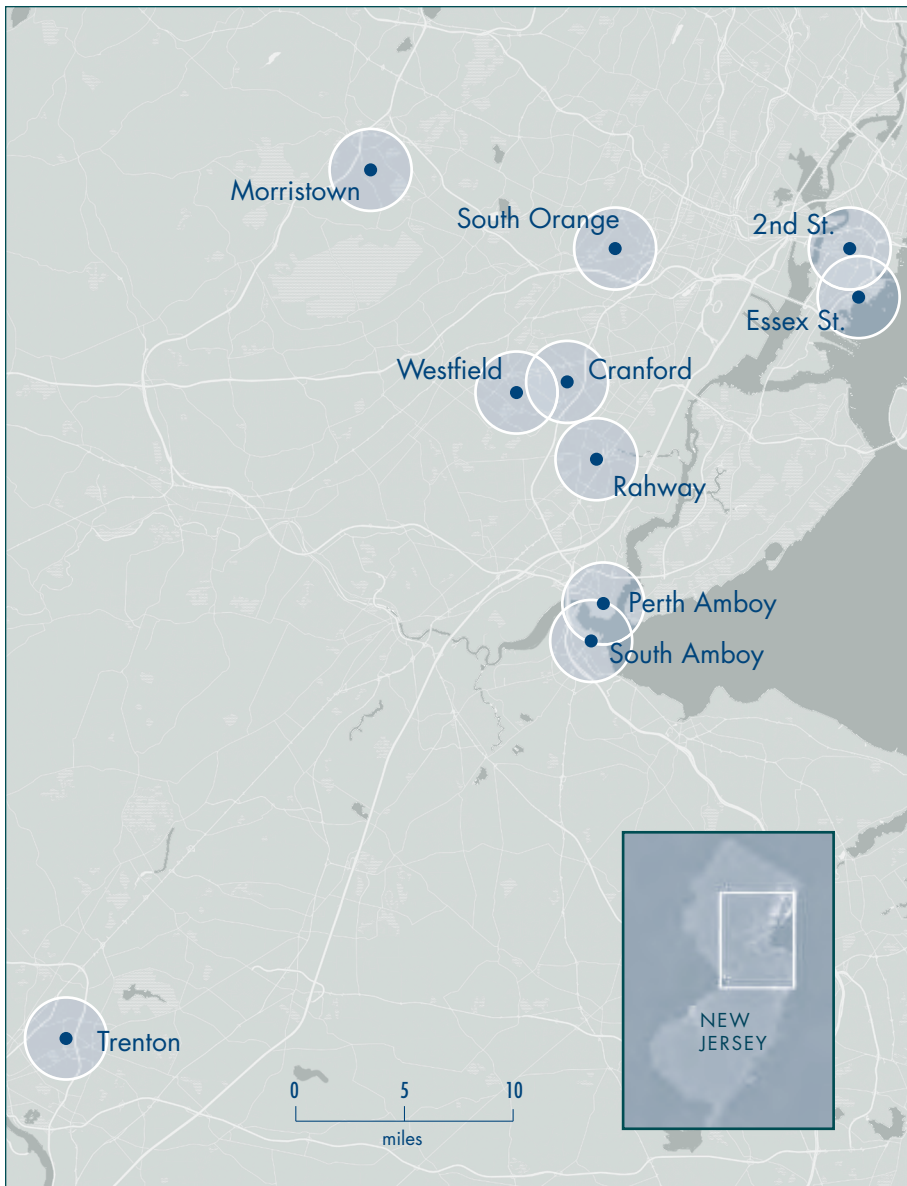
About 1,100 people responded to the survey; half lived within walking distance of rail stations (defined as a walk of 0.4 miles or less), and about 30 percent lived in new housing (defined as housing that was less than seven years old). Respondents living in new housing within walking distance of rail stations reported lower auto ownership, less auto commuting, and fewer weekly vehicle grocery trips than those living in new or older housing farther away.

These differences, however, may not be solely or even mainly due to rail access. A number of other factors associated with proximity to rail and age of housing may affect auto ownership and use. For example, both rental housing and smaller housing units may attract households who drive less because they are younger, earn lower incomes, or have fewer children. Respondents who lived in new housing near rail were much more likely to be renting and living in smaller units. Off-street parking was less available in new housing near rail than in housing farther away, although newer units had more on-street parking available. In addition, population density for both old and new housing near rail was much higher than new housing farther from rail. And in this sample, bus service was highest in new housing near rail because there was a substantial amount of new housing development in established urban centers.

#### DOES RAIL ACCESS REDUCE AUTO OWNERSHIP?

To investigate these potential alternative explanations, I first estimated how auto ownership related to the household’s distance to rail and the age of the house. When I looked at the simple relationship between rail access and auto ownership, ignoring other factors, each additional mile farther away from rail increased auto ownership by an average of a tenth of a car per mile. Living in a new house near a rail station was associated with 27 percent lower auto ownership per person compared to new housing away from rail.

These relationships, however, were misleading. Once I controlled for housing type, parking availability, population density, bus availability, and other built environment measures, the results were striking. Neither rail proximity nor housing age was an



**FIGURE 1**  
Selected Stations  
with Two-Mile  
Buffers

independently significant predictor of auto ownership. What was important? First, off-street and on-street parking were both highly predictive. Households with fewer than one off-street parking space per adult had 0.16 fewer vehicles per adult. Households with *both* low on- and off-street parking availability had 0.29 fewer vehicles per adult. The other significant variable was the number of bus stops within a mile of the home—a measure of general transit accessibility. Doubling the number of bus stops within a mile radius around the average home was associated with 0.08 fewer vehicles per adult. When the effects of more bus stops and low on- and off-street parking availability were combined, they reduce auto ownership by 44 percent. Most of this effect is due to parking availability. When all of these other factors were considered (bus access, parking availability, job and population density, and housing type), rail access had no effect on auto ownership. ➤



#### WHAT ABOUT DRIVING TO WORK?

I carried out a similar analysis for the share of respondents who said they drove alone to work. When I controlled for other factors, the apparent effect of rail access on auto commuting vanished entirely. Instead, off-street parking, job density, bus stop density, and distance to downtown were all highly predictive. Scarce off-street parking (having less than one parking space per adult in the household) was associated with a 40 percent reduction in auto commuting, while a 25 percent increase in bus stop density was associated with a 5 percent reduction in auto commuting. Each additional mile from the central business district was associated with a 2 percent increase in auto commuting. And an increase of 1,000 jobs within a half-mile of home was associated with a 1 percent reduction in auto commuting.

#### HOW ABOUT GROCERY VISITS?

Buying groceries is one of the most common trip purposes. Thus I also estimated how rail access and other TOD characteristics affected the frequency of car trips to buy groceries. Again, when controlling for parking supply, housing, and built environment characteristics, neither housing age nor walking distance to rail showed any association with the frequency of auto grocery trips. What was important? The number of grocery stores nearby, the job density and bus stop density near the home, the home's distance to downtown, and the parking. Each additional grocery store within a quarter mile of the home reduced the number of auto trips for groceries by about 5 percent. Households with both scarce on- and off-street parking took substantially fewer auto-based grocery trips, a reduction of about 25 percent. Note that neither on-street nor off-street parking was *independently* significant. This makes sense, because carrying groceries is inconvenient on foot or via transit, so only significant impediments to auto ownership and use are likely to make a difference.

## CONCLUSIONS

Developing high-density, mixed-use housing near rail stations may reduce traffic congestion and auto pollution, slowing the growth of greenhouse gas emissions caused by cars. But there is a huge caveat: those benefits may not depend much on rail access. In this study, lower auto ownership and use in TODs was not from the T (transit)—or at least, not from the R (rail). What does reduce car ownership and use? Lower parking availability, better bus service, smaller housing units, more rental housing, more destinations within walking distance, better proximity to downtown, and higher population and employment density all reduce car ownership and use. When controlling for these other factors, rail was not significant except in one limited but important case: when combined with low parking, rail did reduce automobile ownership but even then it did not reduce automobile trips for commuting or grocery trips.

Though rail service undoubtedly attracts auto users in a way that buses do not, in some contexts it may also siphon off bus riders, walkers, and bikers. To test this hypothesis in the case of the commute to work, I estimated additional commute mode regressions. Controlling for other factors, rail station distance was positively correlated with rail commuting, but *negatively* correlated with other forms of commuting (such as by bus, walking, biking, or taking the ferry). Rail station distance was also negatively correlated with working at home. In other words, rail does not seem to draw its users from the ranks of auto commuters. This helps explain why rail access doesn't seem to affect auto use and why it affects auto ownership only in combination with other factors like scarce parking.

What does this mean for policy? Developers are aware that public opposition is often lower near rail stations, and policy makers and urban planners believe that rail access will mitigate traffic impacts. But such a policy will not improve long-term sustainability when rail investments and rail-proximate housing, in and of themselves, make little difference in auto ownership and use.

Current sustainability policies are often focused on investing in rail and developing housing near rail stations. Take California Senate Bill 375, a widely observed and admired attempt to incorporate climate planning in regional transportation and land use planning. SB 375 gives special consideration to “transit priority projects,” which are dense housing developments located within a half-mile of a major transit station or high-quality transit corridor. But focusing primarily on TODs to reduce greenhouse gases could be a great mistake. A better strategy would be to provide incentives for building smaller rental units with less on- and off-street parking in locations with better bus service and higher employment density. At the very least, TODs should be developed with less parking. If they are not, they will not reduce auto use.

If access to rail is not a primary factor in reducing auto use, it could be a blessing, not only because rail infrastructure is expensive, but also because the amount of available land near rail stations is limited. That said, allowing higher housing density and scarce on- and off-street parking everywhere could increase congestion if not carefully managed. Negative local impacts cause cities to frown on dense developments and neighbors to protest them. How can urban planners bring about a more widespread relaxation of parking regulations, height limits, floor-area ratios, and the general plans that restrict the form and location of development and redevelopment? This planning puzzle deserves our focused attention. The pursuit of rail-oriented development may be a distraction from it. ♦

This article is adapted from “Does TOD Need the T? On the Importance of Factors Other Than Rail Access,” originally published in the *Journal of the American Planning Association*.

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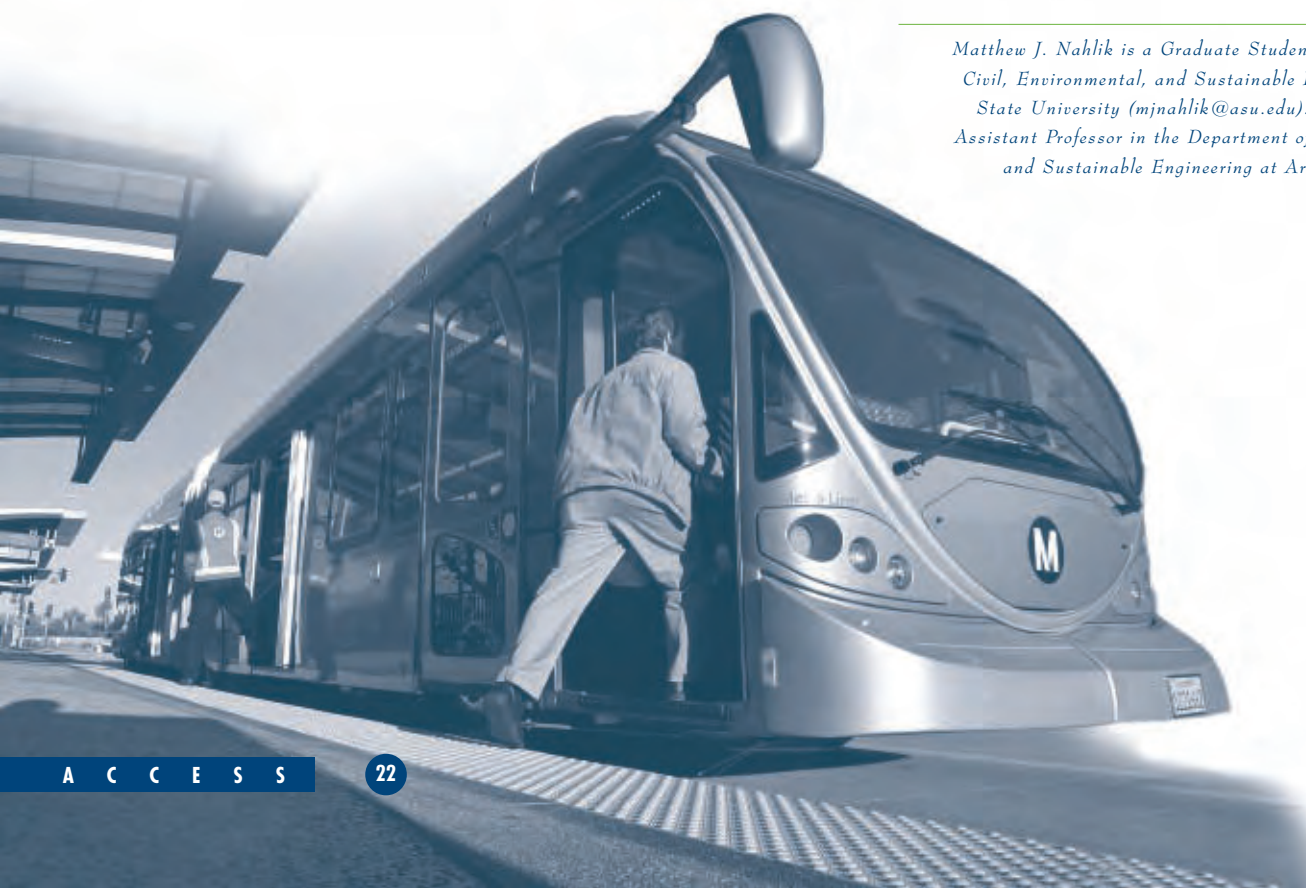
# LIFE-CYCLE IMPACTS OF TRANSIT-ORIENTED DEVELOPMENT

MATTHEW J. NAHLIK AND MIKHAIL V. CHESTER

**T**here is a growing interest in pedestrian and transit-oriented development as a way to reduce the cost of transportation and home energy use. Yet there is little knowledge of how much alternative travel modes and compact developments reduce environmental impacts and household costs. As US cities begin to rethink their growth, city planners need better tools to measure the environmental and economic effects of infrastructure redesign.

We have developed a life-cycle assessment framework that helps planners understand how energy use, air pollution, and household costs change when integrating transportation and land use planning around high-capacity transit. Using this framework, we can evaluate emissions from the construction and rehabilitation of buildings around transit, changes in household energy use within these neighborhoods, and reductions in automobile use as households shift some of their travel to alternate modes. We compare transit-oriented households to households that do not have access to high-capacity transit. Using Los Angeles's Gold Line (light rail) and Orange Line (bus rapid transit) as case studies, we assess how these variables changed with development around those lines.

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## HIGH-CAPACITY TRANSIT IN LOS ANGELES

The Los Angeles County Metropolitan Transportation Authority (LA Metro) operates one of the largest urban bus systems in the United States, in addition to a growing number of high-capacity bus and rail lines. The LA Metro system of high-capacity transit (HCT) comprises six rail lines and two bus-rapid-transit lines that run on dedicated routes, have short wait times, and carry large numbers of passengers. In addition, LA Metro plans to spend \$14 billion to expand HCT lines. The growth of physical infrastructure has been accompanied by impressive ridership increases on all HCT lines, as many residents—particularly those living near transit stations—have chosen to change their travel habits and adopt transit.

We developed a case study of the environmental and economic effects attributable to future redevelopment around LA Metro's Gold and Orange transit lines. We focused on these two transit systems because they are old enough to have established ridership, yet young enough that land use around the lines has not changed drastically. The Gold Line opened in 2003 and was extended twice to now include 21 stations and almost 20 miles of rail from East Los Angeles through downtown to Pasadena. The Orange Line began operation in 2005 and follows an old railroad right-of-way in the San Fernando Valley. Metro expanded the Orange Line in 2012 to include a total of 18 stations and over 18 miles of dedicated busway (Figure 1). In many places, the busway runs parallel to a greenbelt with a bike and pedestrian path. We found potential for higher density redevelopment around both lines and explored how the land could be repurposed. We then estimated the potential changes to energy consumption, air emissions, and household costs. ➤

**FIGURE 1**

Map of the Orange and Gold Transit Lines in Los Angeles





Environmental assessments should include the life cycles for every part of the transportation system and the buildings, and should include the consequences of changing the area's physical composition.

#### SMART GROWTH AROUND TRANSIT STATIONS

Many people are beginning to demand cities that support convenient and cost-effective multi-modal transportation. Creating mixed-use residential and commercial space that encompasses a supportive mix of office space, entertainment, retail, and public areas, all within walking distance of a transit station, can attract residents who are willing to pay for the convenience of nearby amenities. In the long-term, these mixed-use spaces have the potential to reduce greenhouse gas emissions and household costs by reducing vehicle travel and increasing the energy efficiency of buildings.

We identified five square miles of land that could be used for smart growth development within one half-mile of Gold and Orange Line stations. We focused primarily on vacant parcels of land and dedicated surface parking lots, which are the most underused space around high-capacity transit. Second, we considered parcels of land with existing structures, but that were also underused. We assigned these parcels to one of two reuse plans: 1) demolish existing small structures on large parcels and construct larger buildings; or 2) adapt existing large buildings for reuse. A land parcel was considered to be underused if the value of the land was greater than the value of the existing structures on the land, a common occurrence when an old building exists on a piece of land where the value has recently increased. Adaptive reuse of existing buildings means that the building shell is kept while the inside is remodeled. Both HCT lines in our study offered a mix of residential and commercially zoned parcels that could be redeveloped.

#### INTEGRATING LIFE-CYCLE ASSESSMENTS

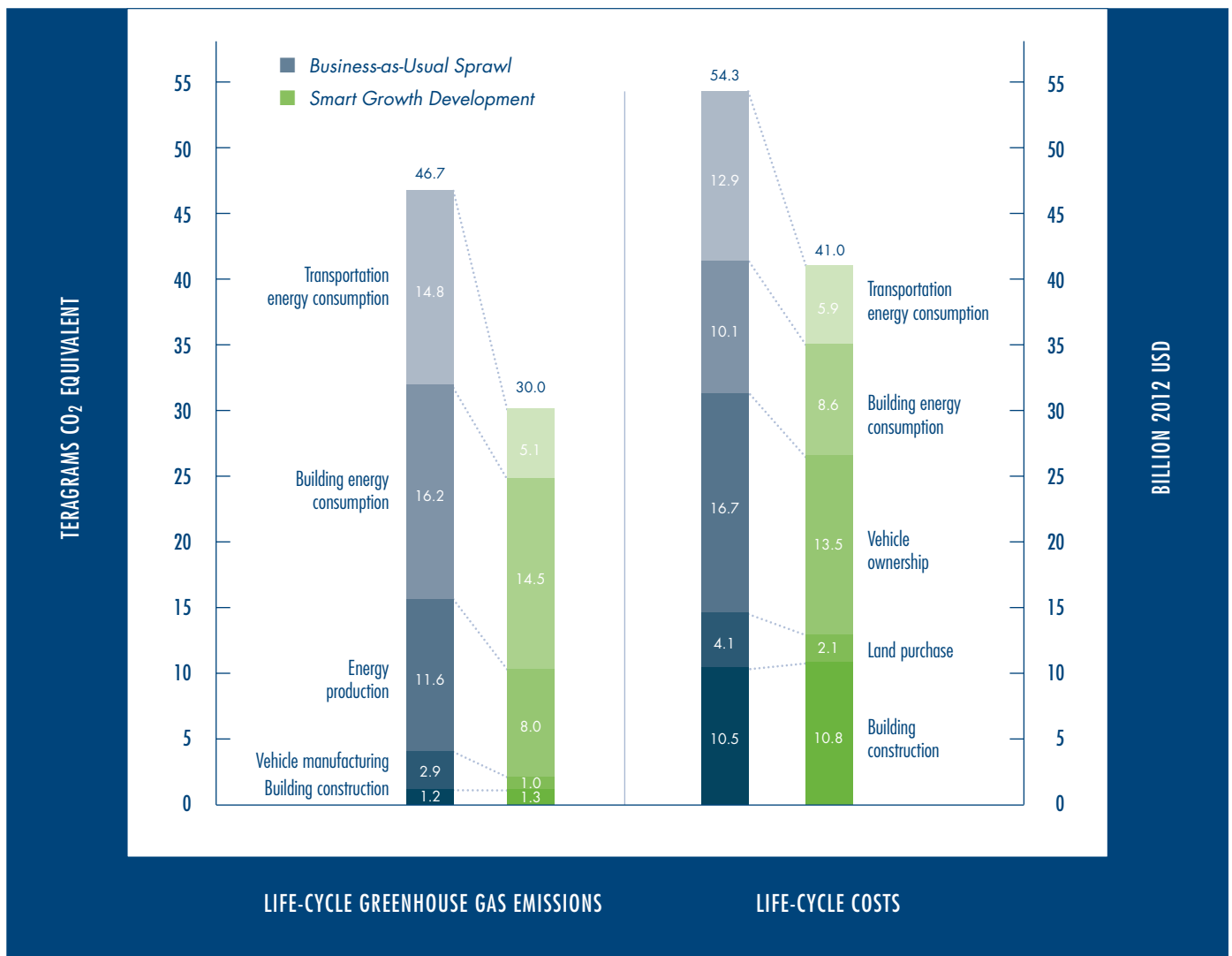
To estimate how energy consumption, air emissions, and household costs would change due to constructing smart growth around the Gold and Orange Line Stations, we first examined the available land and buildings for each parcel. Next, we estimated the environmental and economic impacts from redevelopment. Finally, we created a household and transportation behavioral assessment that integrates the entire life cycle of the system. Emissions assessments often focus on the use of vehicles and buildings while overlooking the production of these vehicles and buildings. Environmental assessments should instead include the life cycles for every part of the transportation system and the buildings, and should include the consequences of changing the area's physical composition. By expanding the boundary of our analysis, we created an integrated life-cycle assessment of transportation and land use that can estimate all sources of emissions and all costs of redevelopment.

Our model estimated changes in energy consumption, air emissions, and costs from constructing walkable, mixed-use developments. Life-cycle estimations for each building included materials, construction activities, energy production, and energy consumption within the building. For some developments, remodeling older buildings would generate fewer emissions than constructing an entirely new building because parts of the old building would be reused. According to the National Household Travel Survey, residents living near high-capacity transit use automobiles less but walk, bike, and ride public transit more. We also found that households living around transit stations may take the same number of trips compared to others, but these trips tend to be shorter because destinations are closer. Additionally, residents are likely to purchase fewer automobiles over time because they drive fewer miles than people living an auto-dependent lifestyle. Based on these travel characteristics, residents who live near HCT lines reduce their transportation energy consumption and household costs.

**ENVIRONMENTAL IMPACTS AND HOUSEHOLD COSTS**

Smart growth redevelopment around transit stations requires initial monetary and greenhouse gas (GHG) expenditures, but has the ability to reduce life-cycle costs and emissions when compared to business-as-usual developments. Smart growth around the Gold Line would cost an additional \$260 million for redevelopment and create an additional 100,000 metric tons of GHG emissions during construction (Figure 2). However, over a 60-year period, each household could avoid emitting as many as six metric tons of GHG each year, which would more than offset the initial construction emissions. When considering all households combined, the proposed mixed-use developments around the Gold and Orange lines could reduce GHG emissions by over 35 percent compared with business-as-usual developments. Similar reductions are also found for energy consumption, particulate matter emissions, and the potential for smog formation. On average, high-density TOD requires less land per person and leads individuals to reduce their transportation-based emissions by as much as 70 percent through changed travel habits. The upfront cost to construct a transit line and the cost of higher density development around stations are offset by emission reductions over time from residents who are able to change their behaviors and break away from car-dependent habits. ➤

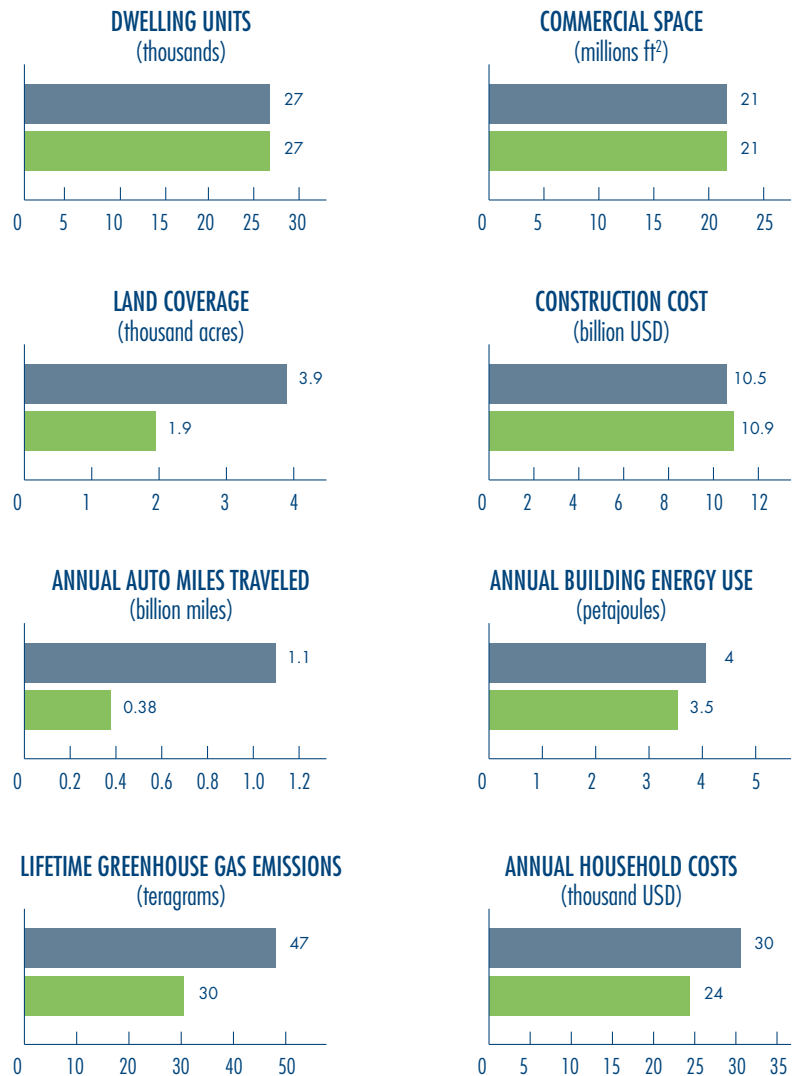
**FIGURE 2**  
The Potential Life-Cycle Impacts of Transit-Oriented Development along LA's Gold Line



Over a 60-year timeframe, people using more energy-efficient transportation modes and less energy at home will generate fewer emissions than people living an auto-dependent lifestyle. But this wouldn't be possible without the upfront monetary investment to construct HCT and mixed-use developments, and the initial increase in GHG emissions from their construction. The process of constructing higher density buildings around transit requires more concrete, steel, and the operation of construction equipment, which produces more GHG emissions than construction of lower-density, business-as-usual developments. Despite requiring more money to construct higher density buildings, the overall cost for developing land around transit would be cheaper than a similar sprawling development because purchasing less land for higher density development is substantially cheaper than purchasing more land to enable low density building construction. Developers would likely charge higher rents to tenants in TODs because of higher construction costs and prime locations. But residents can actually save money over time by reducing their costs for transportation and energy consumption in buildings. Figure 3 shows the potential benefits of smart growth around the Gold Line compared to an equal amount of business-as-usual development.

**FIGURE 3**  
Gold Line TOD Comparison

■ Business-as-Usual Sprawl  
■ Smart Growth Development



Along two of LA's eight HCT lines, enough land exists to support 96,000 dwellings and 32 million square feet of commercial space in mixed-use developments. Construction of these buildings for smart growth can produce up to 15 percent more initial GHG emissions than constructing a comparable sprawling development near the urban core. While upfront emission expenditures may not be attractive to policy makers, they enable overall emission reductions from the entire transportation and land use system by up to 35 percent over 60 years. These reductions comprise three primary factors: 1) greater household mobility options that reduce automobile reliance; 2) concentrated pockets of residential and commercial space that reduce trip distances; and 3) households moving into smaller, more energy efficient dwellings that also benefit from reduced electricity use. The life-cycle assessment framework for integrating transportation and land use planning isolates the primary drivers of environmental impacts and monetary costs, and can better inform policy and planning goals.

### EFFECTIVE PLANNING TO REDUCE LIFE-CYCLE IMPACTS

Planning policies that facilitate smart growth need to be in place at various stages of development to realize the full potential of transit-oriented neighborhoods. Transit-oriented district planning and relaxed parking requirements can encourage developers to create TODs by reducing the time and financial costs involved in complex zoning requirements. Allowing denser development, encouraging mixed-use spaces, and pricing parking appropriately can encourage people who live in smart growth neighborhoods to reduce energy consumption and automobile travel. Together, these policies can reduce the upfront barriers to creating livable, walkable communities around high-capacity transit.

### CONCLUSION

Pairing infrastructure construction with transportation changes shows how the initial higher costs from smart growth are far outweighed by the long-term improvements. Our framework can be used to show policymakers the benefits of smart growth across a wide suite of environmental and economic indicators. The combined assessment of transportation and land use provides a link between land development and behavioral changes that can be used to advise policymakers and planners throughout the development process. ♦

This article is adapted from "Transit-Oriented Smart Growth Can Reduce Life-Cycle Environmental Impacts and Household Costs in Los Angeles," originally published in *Transport Policy*.

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# Changing Lanes

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JOSEPH F. C. DIMENTO AND CLIFF ELLIS

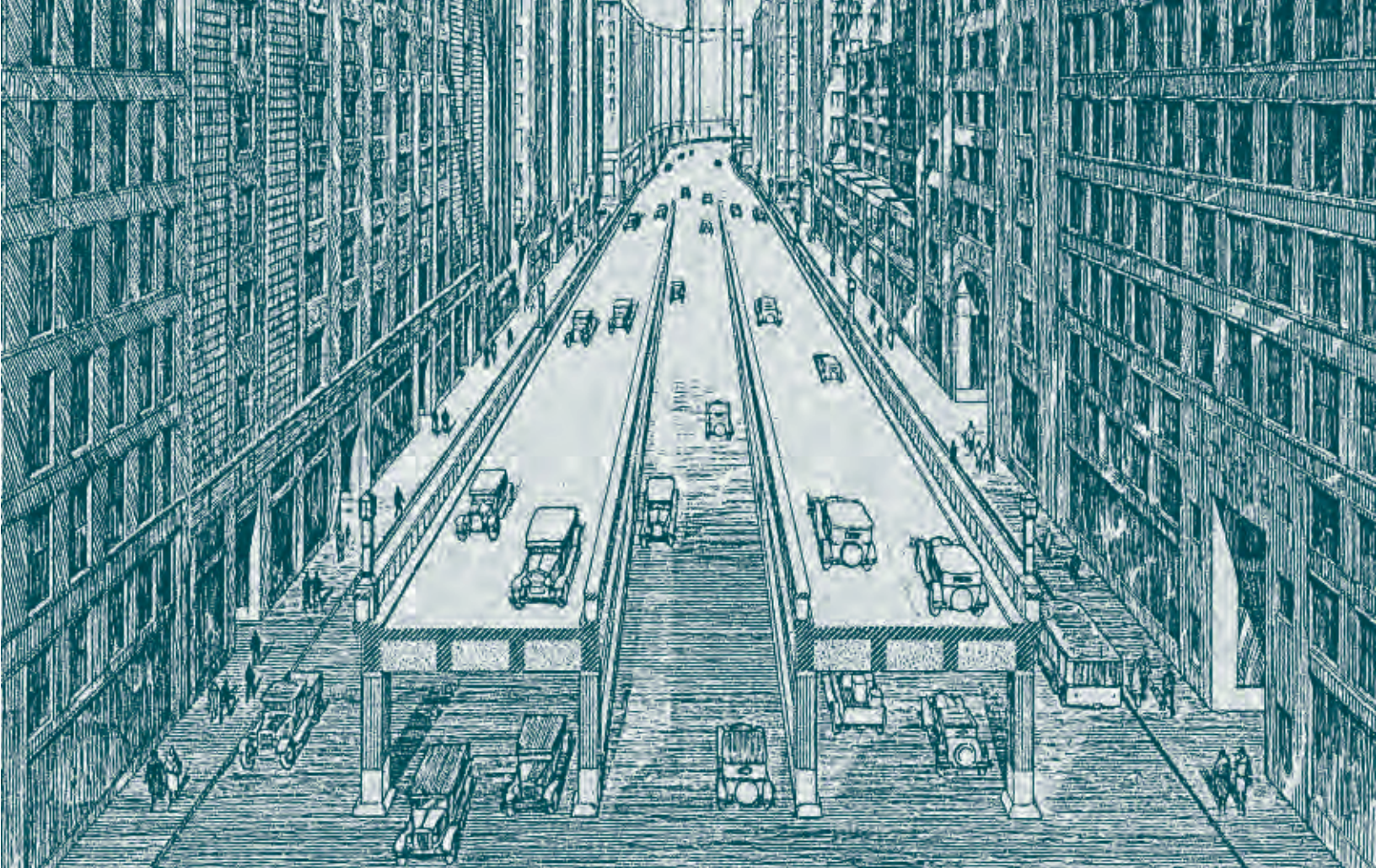
**F**ew planning decisions have affected American cities as much as those involving urban freeways. Massive freeway infrastructure projects have reconfigured urban form, supplanted neighborhoods, displaced tens of thousands of people, and cost billions of dollars. Congress and state legislatures passed important new laws that guided where freeways could be built, what funds were available, which types of consultation and analysis should be conducted, and what impacts were permissible. Lawmakers and courts required that projects be planned and completed with maximum sensitivity to the environment, with concern for relocating displaced residents, and with active citizen participation.

This article is based on the book, *Changing Lanes*, published by the MIT Press in 2013. Both the book and the article tell the story of those freeways, recounting America's original love affair with them and the controversies that emerged during their construction in dense urban areas.

The professionals involved in this story include highway engineers in the leading role, as well as urban planners, landscape architects, and architects. Here we review the evolution of freeway design as professionals responded to significant social changes in the United States. We then examine changes in the regulatory environment of freeway construction. Finally, we focus on urban freeway controversies and give special attention to three famous cases—Los Angeles, Memphis, and Syracuse—each with very different histories and outcomes.

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### ORIGINS OF URBAN FREEWAY DEVELOPMENT

Professionals and politicians viewed urban freeways from different angles and tried to shift freeway policies to match their own priorities. As a result of the varying perspectives, urban freeways filled divergent roles: traffic conduits, tools of economic redevelopment and social policy, and components of national defense.

Highway engineers led the process of urban freeway construction, displaying great confidence in their ability to assess traffic demand, analyze alternatives, and construct elaborate infrastructure. City planners developed a more complex understanding of freeways with a focus on long-term guidance of urban physical change, but played a subordinate role in the process. Landscape architects pioneered parkway design during the 1920s and 1930s, but became peripheral actors when freeways were scaled-up to handle massive urban traffic loads. Architects generated many imaginative designs for urban freeways, but were only brought in for consultation during the freeway controversies of the 1960s.

Between 1939 and 1945, the nation moved from economic depression to war. A vision of the rational, modernized city replaced the 1930s view of urban parkways compatible with existing urban design. The newly imagined modern city radiated only positive symbolisms: elevation, clarity, hygiene, speed, rational order, and the beneficent use of state power. In contrast, the old city was cloaked in negative images of disorder and decay.

As production shifted to war goods after 1941, highway construction was curtailed. During this lull, however, state and federal officials forged the freeway plans that would >

*Some urban planners warned that no amount of freeway building would ever solve the urban traffic problem. These voices, however, were drowned by massive federal subsidies for freeway construction.*

shape postwar America. Diverse strands of thought about urban freeways were united into two key federal documents: *Toll Roads and Free Roads* (1939) and *Interregional Highways* (1944). In these documents, highway engineers and city planners endorsed “radial-concentric” freeway patterns. These patterns entailed new urban freeways that would penetrate the urban core and be used to clear out slums and blighted areas. Inner beltways were envisioned around renewed central business districts. Alongside these visions of urban freeways, the Federal-Aid Highway Act of 1944 gave the federal government and the state highway departments additional power to shape urban freeway patterns in postwar America.

Some urban planners warned that no amount of freeway building would ever solve the urban traffic problem. These voices, however, were drowned by massive federal subsidies for freeway construction. The passage of the Interstate and Defense Highway Act of 1956, which provided states with a 90 percent federal match for all construction costs, removed all fiscal obstacles to metropolitan freeways. The urban freeway program would now be fueled with billions of federal dollars, an irresistible force pushing old doubts and questions aside. Urban freeway designs that were developed during the previous three decades became the blueprints for actual construction from 1956 to 1970. State highway engineers, with the support of local growth coalitions, pushed radial freeways and inner beltways through old neighborhoods and industrial districts, linking central business districts with emerging regional highway networks.

Urban renewal seemed to promise revitalization through clearing decayed central slum districts. Planners and other growth coalition members saw transportation improvements as a critical element of central city revitalization. New highways would allow middle- and upper-class white-collar workers and shoppers to speed in and out of central business districts.

By the late 1960s, however, citizen protests over redevelopment and political stalemates over controversial freeways forced public officials to reassess the complex effects of large-scale infrastructure projects. The blind acceptance of urban freeways as emblems of growth and prosperity gradually began to wane. Freeway protests grew louder, and pressures for reform led to a wave of legislation curbing the construction of new freeways.

The evolution in urban highway planning was both reflected in and fostered by changes in the regulatory framework in which planning decisions were made. Environmental legislation in the late 1960s and early 1970s armed citizens and local governments with legal tools to challenge unpopular freeway segments. These pieces of legislation had teeth and, by providing opponents with a basis for litigation, they pushed the balance of power in freeway controversies toward citizens and local governments. Table 1 lists some of the key pieces of legislation.

#### **URBAN FREEWAYS: IMPACTS AND CONTROVERSIES**

Occurring in dozens of cities, freeway controversies revolved around a wide range of topics: aesthetics, commercial interests, transportation system efficiency, environmental protection, historic preservation, and race concerns.

Syracuse, Memphis, and Los Angeles provide a temporal cross-section of the freeway revolts. Syracuse embraced urban freeways early on but paid a steep price in quality of life. The city is now involved in very tense decision making about whether to demolish sections of freeways within its central business district. Meanwhile, Interstate 40 in Memphis was stopped in its tracks, and the Century Freeway in Los Angeles was heavily modified from its original plan.

YEAR	LEGISLATION	IMPORTANCE
1962	The Highway Act	Required the integration of highway planning with metropolitan planning
1963	The Clean Air Act	Required each Air Quality Management District to develop plans to meet national standards for criterion pollutants, and provided a means for citizen law suits if those standards weren't met
1966	The formation of the US Department of Transportation	Consolidated national transportation policies and programs into a single cabinet-level agency overseeing federal highways, urban mass transit, railroads, maritime transportation, and aviation
	The National Historic Preservation Act	Required federal agencies to evaluate the impact of their projects on historic sites
1970	The National Environmental Policy Act and its state versions	Required agencies to use a systematic approach to environmental planning
	The Federal-Aid Highway Act	Authorized states to use urban area highway funds for traffic-reduction projects and addressed the need to improve air quality
	The Uniform Relocation and Real Property Acquisition Policies Act	Required that states ensure "fair and reasonable" relocation payments, operate a relocation assistance program, and ensure that adequate relocation housing is available
1973	The Federal-Aid Highway Act	Allowed cities to substitute transit projects for withdrawn interstate portions

**TABLE 1**

Key Highway Legislation in the 60s and 70s

**SYRACUSE: "THE BEST THING SINCE THE ERIE CANAL!"**

Interstates 81 and 690, which now traverse the heart of Syracuse, were first conceived in the 1940s. In 1944, the Syracuse-Onondaga County Post-War Planning Council envisioned a modern highway network for the city. The plan aimed to decrease congestion and traffic accidents and, in doing so, help maintain the city's economic vitality.

There was little controversy about whether the urban freeway plan should go forward. All Syracuse mayors and most planners, businesses, industries, and major local employers supported the plan. There was a bit more controversy over design, but even that was relatively muted, and some of it didn't occur until after construction.

By the mid-1960s, overhead interstate highways running north-south and east-west divided the center of Syracuse. They displaced and dispersed Italian-American, Jewish-American, African-American, and other ethnic neighborhoods. The city's subsequent decline cannot be attributed only to choices about urban freeways, but these decisions reinforced the effects of industrial relocation and of economically and racially motivated suburbanization. ➤



*Occurring in dozens of cities, freeway controversies revolved around a wide range of topics: aesthetics, commercial interests, transportation system efficiency, environmental protection, historic preservation, and race concerns.*

#### MEMPHIS: INTERSTATE 40 DEFLECTED AROUND OVERTON PARK

I-40 begins in Barstow, California. Coursing eastward and partially following old Route 66, it connects cities from Flagstaff, Arizona, to Durham, North Carolina. By the mid-1960s, it was mostly complete except for a few short sections. One of these sections was a four-mile stretch in the central part of Memphis that includes Overton Park, a large, publicly owned park located within an affluent, predominantly white residential area.

Memphis officials began to consider a highway in and around Overton Park in 1953. In 1955, the planning firm Harland Bartholomew and Associates was employed to study interstate highway routes. Memphis and Shelby County adopted the basic transportation system plan that resulted from this study. In the plan, the east-west interstate was routed through Overton Park.

In 1956, the Bureau of Public Roads approved the corridor alignment of I-40 through the park. Controversy arose almost immediately. Opponents were initially disorganized but, between 1961 and 1964, opposition became unified and coordinated. It resulted in the landmark US Supreme Court case, *Citizens to Preserve Overton Park v. Volpe*, which saved the park and helped establish the current framework for court review of transportation agency decisions.

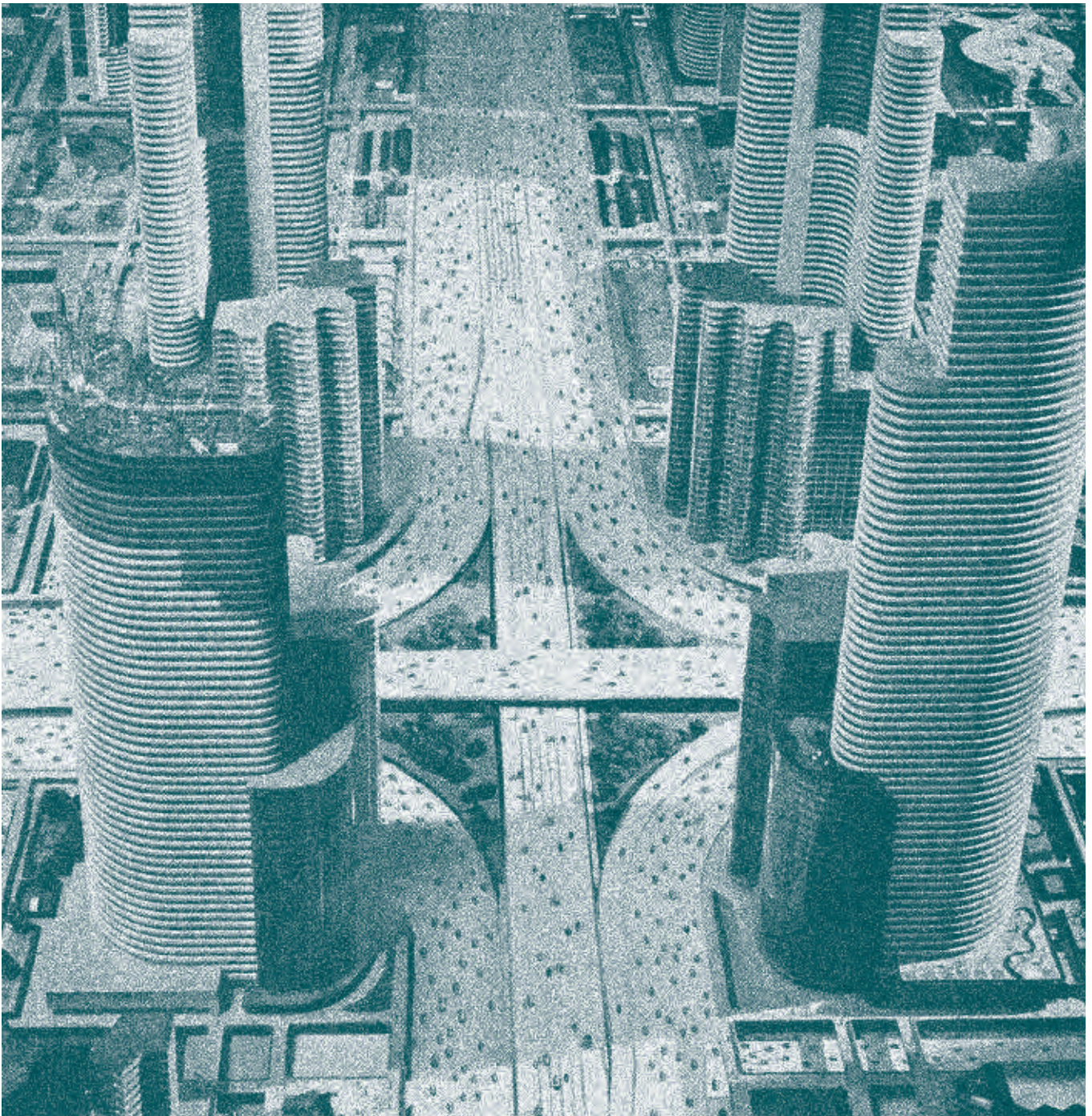
#### LOS ANGELES: THE FREEWAY WITH A HEART

In 1959, the California legislature created the California Freeway and Expressway System, authorizing a grid-like network of freeways overlaying the entire Los Angeles basin. This network included a segment known as the Century Freeway, a standard ten-lane highway. More than twenty interchanges were planned to service local arterials in the ten jurisdictions the freeway traversed. Construction was to begin in 1972, and the freeway was scheduled to open in 1977. But building the \$500 million project would displace an estimated 21,000 people living in the freeway right-of-way.

Almost from its inception, the Century Freeway was controversial. As land acquisition and freeway design progressed, opponents organized. By 1972, however, more than 35 percent of the needed parcels had been acquired, and another 35 percent had been cleared. About 11,000 homes and apartments were taken.

In February 1972, one month prior to the planned start of construction, a newly created public interest law firm, the Center for Law in the Public Interest, filed a federal lawsuit on behalf of four couples living within the proposed freeway right-of-way. Several national civil rights and environmental activist organizations were also parties to the suit, including the NAACP, the Sierra Club, and the Environmental Defense Fund. Even the City of Hawthorne joined the suit which sought to prevent the state from acquiring property until Environmental Impact Statements were approved. The suit also alleged inadequate relocation assistance, denial of equal protection to minorities and poor residents in the corridor, inadequate public hearings, and violation of due process.

In July 1972, federal district court judge Harry Pregerson ordered the state to stop work on the Century Freeway. The preliminary injunction called for preparation of a formal Environmental Impact Statement, additional hearings focusing on noise and air pollution concerns, further studies on the availability of replacement housing for those displaced by the project, and specific assurance by the state that it could provide relocation assistance and payments to those displaced by the freeway's construction. The decision was upheld on appeal. Work on the Century Freeway would be halted for the next nine years.



Only in 1993, following the requirements of a landmark consent decree, did the “freeway with a heart,” “the intelligent freeway,” and “the most costly freeway ever built” finally open. It was built with heavy landscaping, HOV lanes, extensive housing made available to the displaced residents, and metered transition ramps. Plans for newly mandated transit, now the Green Line light rail, were later realized. From inception to completion, the project spanned more than 30 years—nearly triple the time normally required to construct a freeway. ➤

*A narrow mode of highway planning was used instead of multimodal transportation planning, and we have been struggling with the consequences even since.*

## CONCLUSION

Jane Jacobs argued that cities are a problem of “organized complexity.” If that’s true, then their evolution must be guided by ideas in proportion with that complexity. In the middle of the twentieth century, the construction of a new generation of high-capacity roads for American cities should have been guided by a strong and well-developed understanding of how cities work. Transportation planners, land use planners, environmental planners, and urban designers should have worked together in an equal partnership. Planning for roads and public transit should also have been integrated into a single process. Unfortunately, this did not happen. Instead, a narrow mode of highway planning was used instead of multimodal transportation planning, and we have been struggling with the consequences even since. Instead of producing the gleaming, healthy, modernized cities portrayed in the utopias of the 1930s, auto-centric freeways produced a polarized urban landscape, troubled inner cities, and fragmented sprawl.

In the last few years, however, many cities across the nation have proposed, approved, and begun demolishing urban highways, replacing them with housing, parks, bicycle paths, commercial buildings, and traditional city streets. One reason is that many highways constructed during the postwar era are approaching the end of their useful lives (approximately 40 years). But another reason is that there is an increasing perception that urban centers provide creative development potential. Hopefully, the future will see greater modal balance with transit, walking, and cycling integrated into mixed-use, environmentally sustainable regions.

Although not a panacea for our transportation problems, transit-oriented development does provide an alternative to more freeway building within metropolitan areas. In contrast to freeway systems, transit systems do not destroy the urban fabric since they can be placed on narrow rights-of-way, located underground, or operated on existing streets (as with streetcars, trolleys, and buses). Furthermore, transit systems can be integrated with well-designed, walkable city streets. It’s time for a new direction that places less emphasis on new infrastructure for the motor vehicle and more emphasis on multimodal transportation as we design our urban fabric for high accessibility. ♦

This article is a brief summation of the book, *Changing Lanes*, published by the MIT Press in 2013.

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# Common Ground

KAREN TRAPENBERG FRICK

**W**ith political polarization hindering progress in public policy and meaningful engagement at all levels of government, now is a good time to reflect on how we run public participation processes. How do legislative requirements—like those for the regional planning process in California—help or hinder meaningful public engagement? What are the biggest challenges and opportunities for improving public engagement?

Public process design is critical when participants are ideologically divided and do not trust each other or the public agencies in charge. In these cases, it is important to seek common ground. For example, all participants in a process may not agree on whether climate change exists, but they might agree that electric and hybrid vehicles should pay their fair share of road costs. They may not be able to agree on whether high-density development is beneficial, but they could pursue joint fact-finding to assess its effects on property rights, property values, and public services like schools, police and fire departments. ➤

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In the course of my research on contested planning issues in the San Francisco Bay Area and Atlanta, Georgia, surprising areas of convergence emerged. These convergences arose despite staunch disagreement over which transportation, housing, and land use strategies would support prosperity in the region. In the Bay Area, the Metropolitan Transportation Commission and the Association of Bay Area Governments held meetings aimed at developing the region's first Sustainable Communities Plan, known as *Plan Bay Area*. Tea Party and property rights activists came in force to block these meetings and were not alone in their opposition. Plaintiffs from across the political spectrum filed four lawsuits against the plan: two lawsuits had connections to Tea Party and property rights activists; one was brought by the building industry; and one was filed by environmental organizations. In the progressive left stronghold of Marin County, citizens not affiliated with Tea Party or property rights groups also strongly opposed the regional plan, which allowed cities to access regional funds if they adopted higher density development areas.

In Atlanta, Tea Party and property rights activists led the opposition to a 2012 regional sales tax proposal. The measure would have dedicated half of the new tax revenue to public transit projects. A loose, unexpected coalition of strange bedfellows emerged: Sierra Club and NAACP leaders joined the opposition, in part because they felt the proposed transit projects were not the ones the area needed. Although it is hard to say what effect the coalition had on the measure, the tax measure failed decisively with 63 percent of votes in opposition.

#### POINTS OF CONVERGENCE

When examining the two contentious regions, I found four points of convergence between conservative activists and planning scholars, largely over transportation policy and process. These convergences warrant planners' attention because they unite participants coming from different vantage points.

First, the most surprising area of agreement was in Atlanta, over a vehicle-miles-traveled (VMT) fee. Some conservative activists supported this fee as a replacement for the gas tax if major administrative and privacy challenges were overcome. Like researchers who argue for fees based on VMT, conservative activists are concerned that drivers of electric and hybrid vehicles are not paying their full share of transportation system costs. Progressives often advocate for this fee transition as well, but with the hope that funding could be directed to transit, bicycle, and pedestrian projects.

Second, conservative activists in both the Bay Area and Atlanta questioned the wisdom of running costly rail lines in low-density areas. Here again, they align with researchers who caution that mass transit needs a sufficient density of residents and jobs to generate significant transit ridership. These conservatives, researchers, and progressives also viewed Bus Rapid Transit service as a viable lower-cost option, particularly in areas that do not have the density to support rail. Thus, while we may think that conservative activists oppose transit outright, those I interviewed offered a more nuanced understanding. Like researchers, they looked to development densities for ridership generation and found it important in weighing project costs.

Third, conservative activists in both regions questioned the authenticity of the planning process, suggesting that planners merely went through the motions to arrive at a predetermined outcome. The involved planners likewise questioned the conservative activists' motivations and actions. Corroborating this skepticism, planning scholars and

progressive activists have debated for decades whether large-scale planning processes with public meetings and hearings are meaningful formats for gaining genuine public input.

Fourth, in Atlanta, activists across the political spectrum opposed the 2012 sales tax proposal because they viewed it as a regressive across-the-board tax rather than a user fee. Transportation scholars similarly caution against sales taxes to fund infrastructure. They also argue that in California, where local sales taxes for transport run rampant, the state should move to a user fee system.

## POSSIBILITIES

When the public is ideologically divided over planning issues, a way to move forward could be by seeking areas of common ground like the ones outlined above.

Planners could draw from the political theory of agonism to reframe their approach to civic engagement. In agonistic contexts, participants come to consider their opponents as legitimate adversaries rather than as enemies unworthy of engagement. In such moments, people retain their core values and identities, but they may also find common ground with others or agree to disagree. Group consensus is not the goal, but compromise through bargaining and negotiations may occur. Debates can be informed by analyses jointly developed between activists and planners that examine, for example, the range of potential property rights impacts and full life-cycle costs of projects and plans.

While challenging, it would be worthwhile to establish the long-term objective of transitioning from highly antagonistic, counterproductive encounters to interactions of agonistic debate. Such an objective—with its focus on convergence among opposing parties—may serve states and regions well as they assess their public participation and planning requirements. Current law and practice can push agencies to adopt plans supported only by weak consensus. Such plans may be vulnerable to lawsuits and fail to hold together over time. We wouldn't ship a package long distance in crumpled wrapping paper and fraying tape. Likewise, we need solid community negotiations to keep plans from coming apart. ♦

This article is adapted from "Can Planners Find Common Ground with Tea Party and Property Rights Activists on Means even if They Don't Agree on Ends?" originally published in the *California Planning and Development Report*. <http://www.cp-dr.com/node/3536>

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