Southern California Environmental Report Card 2004

UCLA Institute of the Environment
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INTRODUCTION

Almost everyone complains about the traffic in Los Angeles, and for good reason. We hold the dubious honor of being the most congested and polluted region in the country. Pollution follows partly from congestion since cars, trucks, and buses are the primary sources of many air pollutants and gridlock exacerbates pollution by causing higher exhaust emissions than free-flowing roadways. In addition, our dependence on cars is said to isolate transit-oriented neighborhoods, rob us of exercise and time, and weaken social ties.

How did we get into this mess and what, if anything, can be done? The short answer is that the region’s economic success results in lots of people with lots to do. And, like people pretty much everywhere, they mostly do it by car. Southern California has the 10th largest economy in the world, containing 54% of California’s jobs. On the other hand, the state has less road capacity than all but 2 of the 65 largest U.S. regions. Absent more roads, this strained capacity can be relieved only by substantially less driving per person, many fewer drivers, or both.

Either solution would be a neat trick. Traffic is the product of complex interactions involving the level of economic activity, the region’s spatial structure, the design of the transportation network, and the choices facing individual travelers. As a result, there is no silver bullet for any one of the associated problems, however much we might wish otherwise.

We cannot do away with traffic and traffic problems altogether, but we can manage them better. So, while it is easy to complain, point fingers, and make promises, it is more useful to clarify our circumstances and opportunities, modest though they may be. To show this, we first look at how this region is performing comparatively, then discuss the policy options and, finally, grade the region’s progress in managing traffic problems.

COMPARSED TO WHAT?

Table 1 presents recent urban form and transportation data on four U.S. regions. New York and Chicago are comparable to Los Angeles in population size, while Houston has at times been ranked as the region with the worst air pollution, briefly replacing Los Angeles for this dubious distinction.

To begin, note that the reputation of Los Angeles as having extreme low-density sprawl is an urban myth. Los Angeles has a form typical of metropolitan areas that matured during the latter half of the twentieth century. Population density measured in persons per square mile here is low for the metropolitan area as a whole, particularly compared to the New York metropolitan area. Chicago, however, has a lower population density despite being an older region. And the density in Houston is only one-third of that for Los Angeles. When non-urban areas are excluded from the calculations for the larger urbanized complex, Los Angeles is actually more densely settled than the other three, including New York.

Another urban legend is that Los Angeles is disproportionately automobile-dominated. Although the number of personal vehicles per household in Los Angeles is twice as large as in New York, Houston has more cars per person and Chicago is close behind. Moreover, one in eight L.A. households does not own a vehicle. Indisputably, New Yorkers are in
a league of their own when it comes to shunning a car, and this is consistent with their extraordinary reliance on public transit. New York has a transit system that is a quantum leap more extensive than in any other metropolitan area in the U.S. Removing New York from the comparison changes the relative performance of Los Angeles. A respectable number of Angeleno workers share a ride in either a car pool or on public transit, for a combined rate that is similar to that for Houston and Chicago. The number of vehicle miles per person also indicates that Los Angeles is not at the extreme.

Finally, the Texas Transportation Institute consistently ranks Los Angeles as having the worst traffic congestion in the nation, but average commute time for its residents is considerably shorter than for New Yorkers, and roughly comparable to Chicago and Houston.

Despite the mixed results in the comparison of urban form and travel patterns, there is no disputing the air pollution problem in Los Angeles, which the EPA rates as the worst in the nation. Table 2 provides comparative statistics. In 2000, Los Angeles had 88 days of unhealthy levels of air pollution. While this is a dramatic improvement over 1993 (137 unhealthy days), Angelenos suffered noticeably more unhealthy days than their counterparts in the other three regions.

Mobile sources are a major contributor to air pollution, as the statistics for carbon monoxide (CO) emissions indicate, and cars contribute more to air pollution in Los Angeles than in the other three regions. The amount of CO produced by passenger cars per household in New York is the lowest because a smaller percent of New Yorkers own a car; but interestingly, the emissions per vehicle are the highest for New York, perhaps due to the way New Yorkers drive and/or higher emissions per vehicle. For the other three regions, this indicator is roughly comparable, with Houston faring the worst by a small margin.

Our comparison of urban form and travel patterns indicates that the severity of traffic and pollution problems in Los Angeles is not determined solely by population density or high car use. Other factors such as the physical geography contribute to the problems.

### Table 1. Key indicators for metropolitan areas (2000)

<table>
<thead>
<tr>
<th>Urban Form</th>
<th>Los Angeles</th>
<th>Houston</th>
<th>Chicago</th>
<th>New York</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,000 units per sq. mile, metro area</td>
<td>0.81</td>
<td>0.27</td>
<td>0.62</td>
<td>3.22</td>
</tr>
<tr>
<td>1,000 units per sq. mile, urbanized area</td>
<td>2.40</td>
<td>1.11</td>
<td>1.49</td>
<td>2.04</td>
</tr>
<tr>
<td>% of units in 10+ Bldg</td>
<td>25%</td>
<td>23%</td>
<td>19%</td>
<td>50%</td>
</tr>
<tr>
<td>Highway Roadway</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lane Miles per 100 Households</td>
<td>1.64</td>
<td>3.50</td>
<td>2.01</td>
<td>0.74</td>
</tr>
<tr>
<td>Average number of lanes per direction</td>
<td>2.42</td>
<td>2.24</td>
<td>2.21</td>
<td>2.24</td>
</tr>
<tr>
<td>Travel Patterns</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work Commute</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car Pool</td>
<td>15.1%</td>
<td>14.2%</td>
<td>11.0%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Transit</td>
<td>6.6%</td>
<td>3.3%</td>
<td>12.5%</td>
<td>47.0%</td>
</tr>
<tr>
<td>Avg. Time (minutes)</td>
<td>29</td>
<td>29</td>
<td>31</td>
<td>39</td>
</tr>
<tr>
<td>Trip Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of VMT on Freeway</td>
<td>45%</td>
<td>42%</td>
<td>30%</td>
<td>36%</td>
</tr>
<tr>
<td>Congested Peak Vehicle-Miles</td>
<td>89%</td>
<td>68%</td>
<td>80%</td>
<td>69%</td>
</tr>
</tbody>
</table>


The reputation of Los Angeles as having extreme low-density sprawl is an urban myth.
concentrations of people (emerging towns) to where they wanted to go (jobs and commerce). In much earlier times, fixed rail and bus transit played dominant roles in these designs. However, the primary, almost exclusive, focus during the post-World War II era was to build street and highway systems to accommodate the most flexible and convenient mode, the car.

In doing so, planners reinforced patterns of urban and regional development that moved millions of residents and jobs away from the urban core to emerging centers throughout the region. It would be wrong to argue that freeways created the suburbs, but they worked hand in hand with a decentralized economic base, the rapid increase in women in the workforce (which complicates family commuting patterns and increases income availability for larger houses), the tax subsidy for home ownership, and the desire for a single-family home with a backyard.

Moreover, there seemed to be no downside to automobile dependence. Initially, the car was a huge environmental improvement over its predecessor, the horse, until air quality problems were conclusively linked to automobile travel in the 1950s. The displacement of residential neighborhoods and the impact on habitat were at best secondary concerns—at least in the public eye—until the 1960s.

We all know the urban population in Southern California rose rapidly through the last century, but urban travel grew even faster. In the last two decades, total region-wide “vehicle miles traveled” (VMT) nearly doubled while the population rose 44 percent. Capacity grew even less, with arterial and local lane-miles increasing by only 20 percent. Why? Key trends behind travel demand include the steady increase in women in the workforce, leading to more drivers per household; the growth in real incomes that raised car ownership levels and lowered the importance of transportation costs in choosing where to live; and the rising proportion of nonwork-related trips (now over 60% of all trips). On the supply side, California highway building became increasingly subject to a fiscal squeeze after the 1960s. Construction costs climbed, driven by escalating urban land prices, while real revenues fell as gasoline tax revenues failed to keep pace with VMT or even inflation.

As the gap between travel demand and roadway construction grew, so did regional congestion. Congestion cost Americans an estimated $70 billion in 2001, from lost time and extra fuel consumption. Public opinion polls show traffic congestion is often cited as one of the most pressing urban policy problems.

In addition to all these demand and supply factors, which often reflect larger demographic and economic trends, we as a society fail to hold individuals responsible for the traffic costs they impose on others. Both air pollution and congestion

### Table 2. Air pollution indicators for metropolitan areas

<table>
<thead>
<tr>
<th>Source</th>
<th>Los Angeles</th>
<th>Houston</th>
<th>Chicago</th>
<th>New York</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Quality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unhealthy days</td>
<td>88</td>
<td>53</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>CO dominant days</td>
<td>32</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Source of CO Emissions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onroad Vehicles</td>
<td>84%</td>
<td>62%</td>
<td>65%</td>
<td>69%</td>
</tr>
<tr>
<td>Passenger Vehicles</td>
<td>43%</td>
<td>33%</td>
<td>35%</td>
<td>38%</td>
</tr>
<tr>
<td><strong>Passenger Car CO Emissions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Tons Per Household</td>
<td>0.26</td>
<td>0.30</td>
<td>0.26</td>
<td>0.17</td>
</tr>
<tr>
<td>Annual Tons Per Personal Vehicle</td>
<td>0.16</td>
<td>0.18</td>
<td>0.17</td>
<td>0.22</td>
</tr>
</tbody>
</table>


Another urban legend is that Los Angeles is disproportionately automobile-dominated.
are classic cases of market failures that create social cost for others, often known formally as *externalities*.

The costs of automobile emissions include the impact on the health of those along the roadways, in the region, and ultimately throughout the world. The cost of congestion is more localized to the extra time that others must spend on the road. Each additional car slows traffic, and while the impact on any one other car is tiny, it adds up when summed across thousands or millions of delayed travelers. All of us ignore how much we slow other cars down, which is at the heart of the problem.

To summarize, pollution is explained by the amount and congestion of traffic. Volume growth is explained by demographic and lifestyle changes and economic development. Congestion, in turn, is both a capacity and an incentive problem. In particular, while we should expect some congestion as evidence of a successful economy, there will always be *too much* when individual drivers ignore the costs they impose on society.

**POLICY STRATEGIES**

Solving our traffic problems is difficult because they are nuanced, moving targets. One should be leery of simplistic solutions. When stuck in traffic, for example, the knee-jerk reaction is to argue for more road capacity. While understandable in light of the regions’ low road and highway investments in recent decades, finding funds for new construction is extremely problematic. Moreover, more capacity will not by itself substantially reduce congestion. Urbanist Anthony Downs once famously stated that travel demand on freeways rises to meet capacity. If new lanes are added, congestion problems might be lessened in the short run. But that reduced congestion will attract drivers who previously used other routes, traveled at different times of the day, used other modes, or drove less or not at all. New roads and lanes do provide additional mobility and other transportation benefits, but increased road capacity provides less congestion relief than one might expect.

Policymakers must perform a balancing act, addressing air and other environmental concerns without excessively sacrificing the ability to get where we need and want to go. Ideally, achieving one of the objectives should not come at the expense of the other. Feasible approaches include increasing carpooling (including vanpooling), shifting trips to mass transit, adopting efficient pricing, and altering land-use.

“Travel demand management” is one attempt to increase the number of passengers per car. One notable experiment in this vein is the trip reduction policy of the South Coast Air Quality Management District (SCAQMD), adopted in the late 1980s. The initial attempt to increase ridesharing was controversial because many firms argued the regulatory burden was unjustifiably burdensome.

**We all know the urban population in Southern California rose rapidly through the last century, but urban travel grew even faster.**
and expensive. Moreover, only small driving reductions were credited to the early years of the program, which is now voluntary. An alternative strategy is rewarding carpooling by establishing high-occupancy-vehicle (HOV) lanes, which allow eligible vehicles to travel at higher speeds. The hope is that people will respond to the time savings by forming more carpools. Unfortunately, the evidence suggests that dedicated lanes for car-poolers stimulate only a small increase in ride sharing. The average number of occupants per vehicle (about 1.2) is little more than it was twenty-five years ago, before the widespread introduction of HOV lanes.

A second major strategy is to shift trips to mass transit. Intuition suggests that better routes and more comfortable trains and buses will encourage more transit use, thus getting drivers out of their cars. The question here is not the absolute benefits of transit investments, but identifying the most effective use of public funds. In a select few Los Angeles corridors, where the density of both population and destinations assures high ridership, providing heavily subsidized rail transit trips is reasonable in comparison to other congestion-relief and mobility programs. It is wishful thinking, however, to believe this is true for much of the region because most parts of L.A. do not have the density to support rail transit. More sensibly, Los Angeles should enhance its bus service, including express buses, modernizing and expanding the bus fleet, improving the management of the numerous transit systems, and coordinating services across agencies.

For most economists, the Holy Grail for traffic-related problems is charging drivers the costs (externalities) they impose on others. When forced to pay the real price of travel, some individuals would reduce their driving, share the cost through carpooling, and find other means of making trips. Unfortunately, imposing such a charge has not been politically feasible because drivers vehemently oppose paying for previously un-priced travel. With minimal popular support, the pricing solution has been tried in a very limited fashion to address congestion but not environmental externalities. Despite the limited application, the results are revealing.

One example of congestion pricing is the establishment of toll lanes down the median of State Route 91 in Orange County. The franchise for this venture was granted to a private contractor, and the current tolls vary by time of day according to demand. This application of congestion pricing never met with serious opposition because the toll lanes provided new capacity immediately adjacent to existing free lanes. Travel time in the free lanes dropped by as much as twenty minutes as some traffic diverted to the new capacity. This project demonstrates two important points: (1) In a highly congested corridor, people will pay to reduce their travel time, and (2) Even those who do not wish to pay are made
Policymakers must perform a balancing act, addressing air and other environmental concerns without excessively sacrificing the ability to get where we need and want to go.

better off by the toll facility when traffic is diverted from existing free lanes.

There are two other promising ideas. The first is creating high occupancy toll (HOT) lanes. Because the high occupancy vehicle lanes on the Interstate 15 north of San Diego had been underused, local officials allowed single occupancy vehicles to “buy into” the carpool lanes, initially with the purchase of a monthly pass. The revenues from this project are used, in part, to finance express bus service along the corridor, thus alleviating some of the concern that pricing projects inherently favor upper income individuals who can afford to pay for faster travel. The other promising idea comes from abroad. Singapore and London have implemented congestion pricing—charging more for driving at peak hours—for their central business districts, and this has produced popular results in relieving downtown and regional congestion, and generating revenue for public transit.

Finally, many planners promote various urban design strategies to reduce car use, alternatively known as the New Urbanism, Transit-Oriented Planning, or Smart Growth (see RC 2003 article). These vary in their details, but the idea is that denser and more-mixed use urban development, especially if focused around transit systems and stations, will both reduce VMT and increase walking and transit use. However, these proposals face two uncertainties: the best recent research does not consistently support either claim, and the higher densities could generate yet more congestion. Nonetheless, some project details hold promise, and may well deliver benefits in certain cases.

Each of the above strategies provides only partial solutions. The lesson is that policy responses should be multi-faceted because there is no monolithic monster to blame for our traffic ills. More effective use of road pricing can better align individual behaviors with the social costs of traffic, as can more strategic investment in road capacity and express bus systems. The benefits from these actions can be enhanced through better land-use planning and urban design.

Randall Crane studies travel behavior, the causes and impacts of sprawl, housing markets, the public finances of developing countries, and environmental governance initiatives such as smart growth. His most recent book is, “Travel by Design: The Influence of Urban Form on Travel,” Oxford, co-authored with Marlon Boarnet. He also serves on a National Academy of Sciences panel of experts looking at how the built environment influences travel and public health.

At UCLA, Crane is professor of urban planning, associate director of the Institute of Transportation Studies, and director of undergraduate programs in the School of Public Affairs. He teaches courses on environmental policy, transportation policy, sprawl, and cities in developing countries. Abroad, he has consulted for the World Bank, USAID, and the governments of Guyana, Indonesia, Kenya, Mexico, Thailand, and Yemen. Crane’s Ph.D. is from M.I.T.
Policy responses should be multifaceted because there is no monolithic monster to blame for our traffic ills.

**GRADING**

*Investment in road capacity:* The road network has not kept pace with growth, leaving the region with close to the least capacity per driver in the nation. **Grade: D**

*Investment in and management of transit:* Unproven and expensive rail investments have been at the expense of proven bus service. The good news is that Los Angeles now has more express bus routes with dedicated lanes, and is purchasing more buses, albeit under court order. **Grade: C-**

*Pricing:* California is experimenting with congestion pricing on freeways, but its application is extremely limited and mostly outside of this region. **Grade: D+**

*Land use planning:* Los Angeles works reasonably well as a car-based system of relatively dense subcenters. Sprawl complaints lack hard evidence, and the region compares well by national standards. The challenge is balancing high-density in-fill, such as Playa Vista, with mixed uses while conserving open space and managing congestion. **Grade: B-**

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**DATA SOURCES**

American Public Transportation Association, Public Transportation Fact Book
Texas Transportation Institute, 2003 Urban Mobility Study
U.S. Bureau of Transportation Studies, Highway Performance Monitoring System (HPMS)
U.S. EPA, Air Quality System and National Emission Inventory

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