The Environmental Impact and Policy Implications of Supercommuting in the Northern California Megaregion

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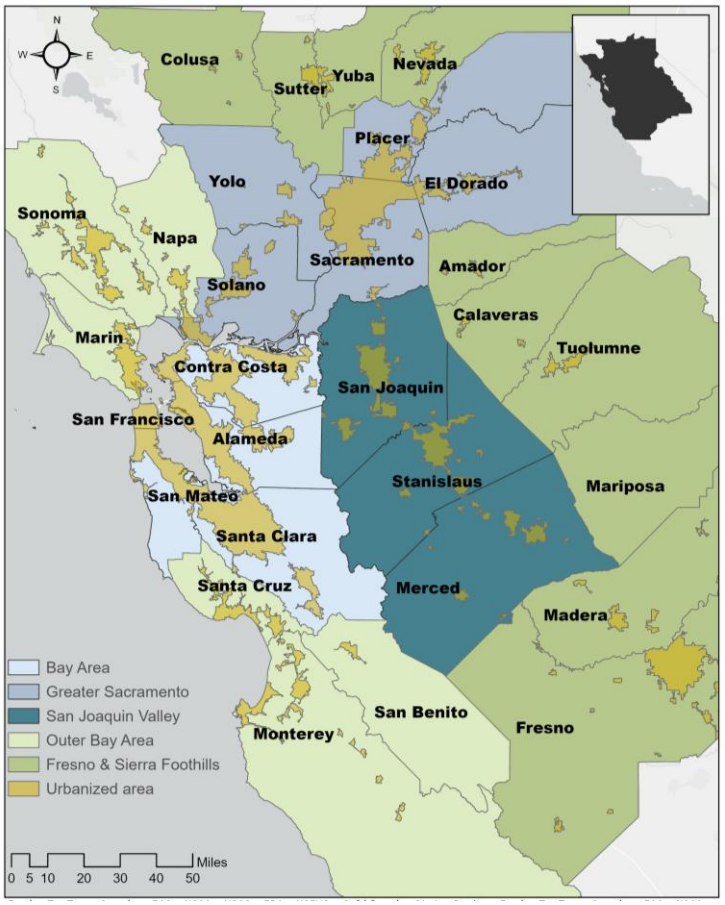
Project Objective

This project examined the environmental impact of long-distance commuting or supercommutes (commutes longer than 50 miles each way) based on an analysis of travel patterns in the Northern California Megaregion (see Figure 1). The analysis was the basis for three scenarios to assess the potential of electric and partial electric vehicles, remote work, and residential relocation, to mitigate the impact of long-distance commuting.

Problem Statement

Long distance commutes are uncommon, with estimates of their share of all commutes ranging from 3% to 12% (depending on the data source and definition) in the Northern California Megaregion in 2019. Despite the small share, the very long distances of these commutes relative to the average means that supercommuting accounts for a disproportionate share of all vehicle miles traveled and, therefore, contributes significantly to greenhouse gas emissions. The contribution to greenhouse gas emissions, however, can be reduced if supercommuters drive clean vehicles or commute by car fewer days a week and telecommute the rest of the week.

Figure 1 - The Northern California Megaregion



Research Methodology

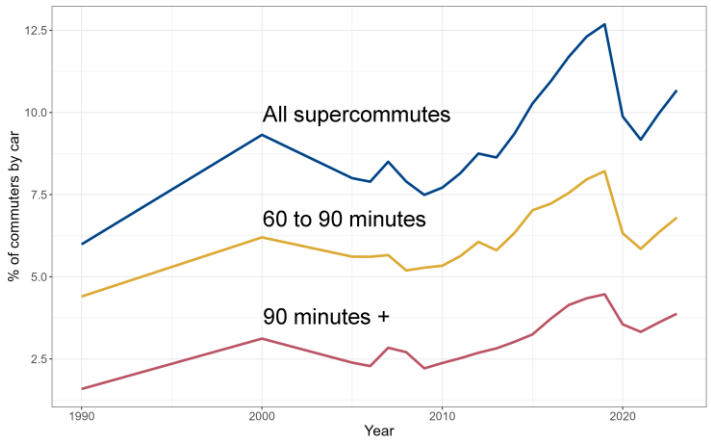
The project first evaluated several data sources to establish a baseline for the share of commutes that were longer than 50 miles. We used commute network distance from the LEHD Origin Destination Employer Statistics (LODES) as the primary data source due to the comprehensive nature of the data and availability. We complemented the LODES data with data from the US Census Public Use Microdata Samples and the National Household Travel Study to establish a relationship between time-based and distance-based commuting and analyze commuters' demographic characteristics. Using this combination of data, we developed a set of scenarios to assess the impact of different mitigation. Each scenario uses regressions and formulas to modify the baseline Vehicle Miles Traveled in the Emissions Factor Models (EMFAC) to estimate plausible reductions in CO_2 and $PM_{2.5}$ emissions associated with increases in the clean vehicle fleet, remote workers, and people moving closer to where they work (effectively making them no longer supercommute).

Results

Prevalence and impact of supercommuting

Our estimates, based on LODES data, is that 9% of commutes are longer than 50 miles each way in the Northern California Megaregion. This estimate includes all possible commutes, including telecommutes, but excludes commutes longer than 100 miles. Among people who drive to work, we estimate that at least 8% of car commuters supercommuted in 2019, the peak year (see Figure 2). Combining these figures with the distance supercommuters drive, we estimate that supercommuting accounts for 4-5% of all vehicle miles traveled in the megaregion.

Figure 2 - Share of car commuters who supercommute based on commute time.



Where supercommuters come from and where they travel to varies greatly over the region with some notable areas of concentration. Among origins (i.e., place of residence), the San Joaquin Valley (see Figure 1) has among the highest supercommuting rates in the nation which, combined with their large labor force, results in many workers commuting long distances. Based on LODES data, up to 29% of workers commute more than 50 miles each way. Many of these supercommuters travel to the Bay Area; close to 3 in 10 supercommute trip ends in one of the major Bay Area employment centers.

Scenario modelling

The three scenarios focus on possible mitigation strategies to reduce the emissions associated with supercommuting. We find that remote work has the greatest immediate impact on emissions (see Figure 3). This scenario assumes that all supercommuters who can shift to remote work would, thus removing many supercommuters from the road. While the emissions reduction associated with the growth in clean vehicles and residential relocation are lower, they reflect a one-year change. These reductions could be repeated over many years to achieve larger reductions. These strategies are not mutually exclusives, and the scenarios show that policies targeting supercommuting can have significant impact on overall emissions from the transportation sector.

Figure 3 - Reductions in CO_2 emissions under each scenario for four selected counties.

County	Scenario I: Clean vehicle adoption	Scenario II: Remote Work	Scenario III: Residential relocation
	Reduction if county annual growth in CV is extended one year	Reduction per additional day of remote work	Reduction if 5% of supercommuters move to the median commute distance of their work location.
Solano	0.35%	2.8%	1.1
San Joaquin	0.58%	3.4%	1.9
Stanislaus	0.26%	2.7%	1.8
Merced	0.15%	1.4%	1