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Title

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Permalink

<https://escholarship.org/uc/item/8xk456vf>

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Publication Date

2023

DOI

10.7922/G2125R09

Updating the Induced Travel Calculator

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January 2023

Issue

Expanding roadway capacity often leads to commensurate increases in vehicle miles traveled (VMT). This is the “induced travel” effect—a net increase in VMT across the roadway network due to an increase in roadway capacity. This increase in VMT erodes any initial reduction in congestion and causes increased greenhouse gas and local air pollutant emissions. Yet highway expansion projects continue to be proposed across the US, often using congestion relief—and sometimes greenhouse gas reductions—as a justification for adding lanes. The existence of these rosy projections about highway expansion projects indicates that the induced travel effect is often not fully accounted for in travel demand models or in the environmental review process for the projects, as prior research has shown.¹

With these problems in mind, researchers at the University of California, Davis developed and launched an online tool in 2019—the NCST Induced Travel Calculator—to help agencies estimate the VMT induced annually by adding lanes to major roadways in California’s urbanized counties. The Calculator estimates project-induced VMT using the following factors: project length entered by the user; lane mile and VMT data from Caltrans; and, from peer-reviewed studies, estimates of elasticities of VMT with respect to lane miles — i.e., the percentage change in VMT divided by the percentage change in lane miles. To estimate the induced VMT for capacity expansion projects, the Calculator solves the following equation based on the user-specified project geography and lane mile length:

$$\% \Delta \text{ Lane Miles} * \text{Existing VMT} * \text{Elasticity} = \text{Project-Induced VMT}$$

With Calculator use increasing, the UC Davis researchers initiated a project to update the Calculator and improve its functionality based on recent data and empirical research.

Key Research Findings

Extensive supporting documentation was added to the [Calculator website](#). The researchers conducted a targeted review of the induced travel literature, focusing on the magnitude of the induced travel effect and the impact on effect size of four factors that Calculator users frequently ask about (route substitution, existing congestion levels, rural versus urban context, and managed lanes). That literature review is now linked on the Calculator website, along with an expanded list of relevant studies and other resources. The researchers also added a Frequently Asked Questions (FAQ) page to the website to address common questions and clarify the scope and applicability of the Calculator.

Three more years of baseline VMT and lane mile data were added to the Calculator. The researchers added baseline lane mile and VMT data from 2017, 2018, and 2019. The Calculator previously relied solely on 2016 data. Users now have the option to select 2016, 2017, 2018, or 2019 data. Data from 2020 were excluded because of the shock to statewide travel demand that year from COVID-19 and the resulting risk that using 2020 VMT data in the Calculator would underestimate induced VMT from capacity expansion projects. Additional years of data will be added periodically as it becomes available and as travel demand rebounds to a new normal in the COVID-19 era.

The Calculator's induced VMT estimates are now reported with ranges. Previously, the Calculator only produced point estimates (see the above Equation). The Calculator now presents all estimates as a range (a point estimate +/-20%), reflecting the variation—a rough 95% confidence interval—around the average elasticities reported in the empirical induced travel studies.

Additional evidence supports using the Calculator to estimate induced VMT from adding high-occupancy vehicle (HOV) or high-occupancy toll (HOT) lanes. The researchers explored whether adding managed lanes causes more or less induced travel than general-purpose lane expansions and, if so, whether there was enough evidence to justify using different elasticities for HOV, HOT, and general-purpose lanes in the Calculator. The available empirical evidence suggests that new HOV and HOT lanes might have similar induced travel effects as general-purpose lane expansions. Using different elasticities for HOV, HOT, and general-purpose lane expansions is thus not justified at present. However, the empirical literature is limited, and more research is needed to better identify any possible differences.

Induced travel happens in rural and uncongested areas, too. The researchers investigated whether induced travel elasticities vary based on urban versus rural context or baseline traffic congestion levels and, if so, whether there was enough evidence to justify adjusting the elasticities used in the Calculator. With respect to congestion, the limited available evidence indicates that metropolitan areas with higher baseline congestion could potentially have lower elasticities than metro areas with less congestion. With respect to urban-rural differences, the research suggests that induced travel occurs in both contexts, but that the elasticities might be slightly smaller in rural areas, at least in the short run. Overall, there is not enough empirical evidence to justify using different elasticities

based on initial congestion levels or urban versus rural setting. That said, the Calculator remains limited to use in California's 37 urbanized counties (within metropolitan statistical areas [MSAs]), since urbanized counties, urbanized areas, and MSAs were the units of observation and analysis used in the most relevant studies.

Other Calculators

The researchers have helped develop other induced travel calculators for use elsewhere. The most notable of these is the [SHIFT Calculator](#). The SHIFT Calculator uses the same method as NCST's Calculator to estimate VMT induced by expanding major roadways in any MSA or urbanized county in the US, including Washington, DC and Puerto Rico, relying on data from the Highway Performance Monitoring System from the federal Department of Transportation. The researchers have attempted to ensure consistency between the national SHIFT Calculator and the NCST Calculator, particularly since both can be used to estimate induced VMT from roadway expansion projects in California.

More Information

This policy brief is drawn from "Updating the Induced Travel Calculator," a report from the National Center for Sustainable Transportation, authored by Jamey Volker and Susan Handy of the University of California, Davis. The full report can be found on the NCST website at <https://ncst.ucdavis.edu/project/induced-travel-calculator-improvements>.

NCST's Induced Travel Calculator can be found at <https://travelcalculator.ncst.ucdavis.edu>.

The SHIFT Calculator can be found at shift.rmi.org.

For more information about the findings presented in this brief, contact Jamey Volker at jvolker@ucdavis.edu.

¹ Volker, J., Lee, A., & Handy, S. (2021). *Environmental Reviews Fail to Accurately Analyze Induced Vehicle Travel from Highway Expansion Projects*. UC Davis: National Center for Sustainable Transportation. <https://escholarship.org/uc/item/14b0x0nm>

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