

ASSESSING INDUCED TRAVEL

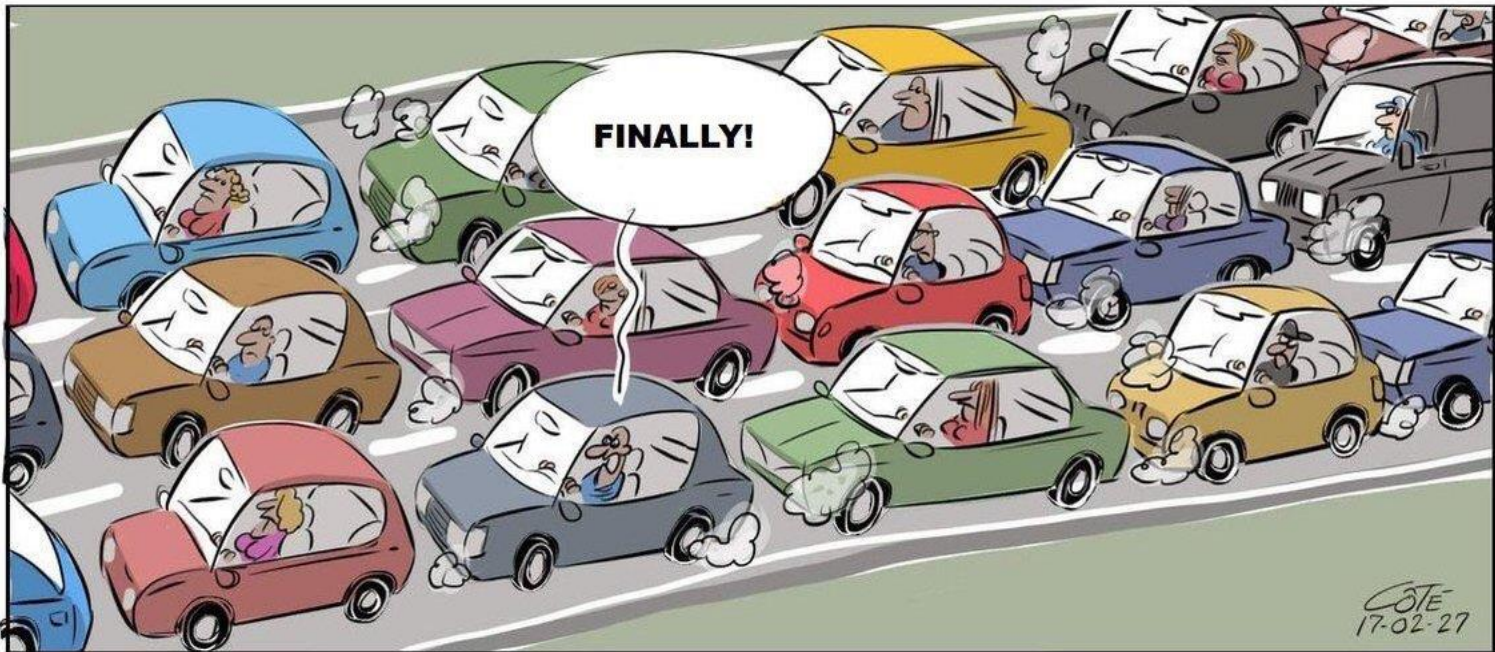


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California
Transportation
Commission
Meeting

Sacramento, CA

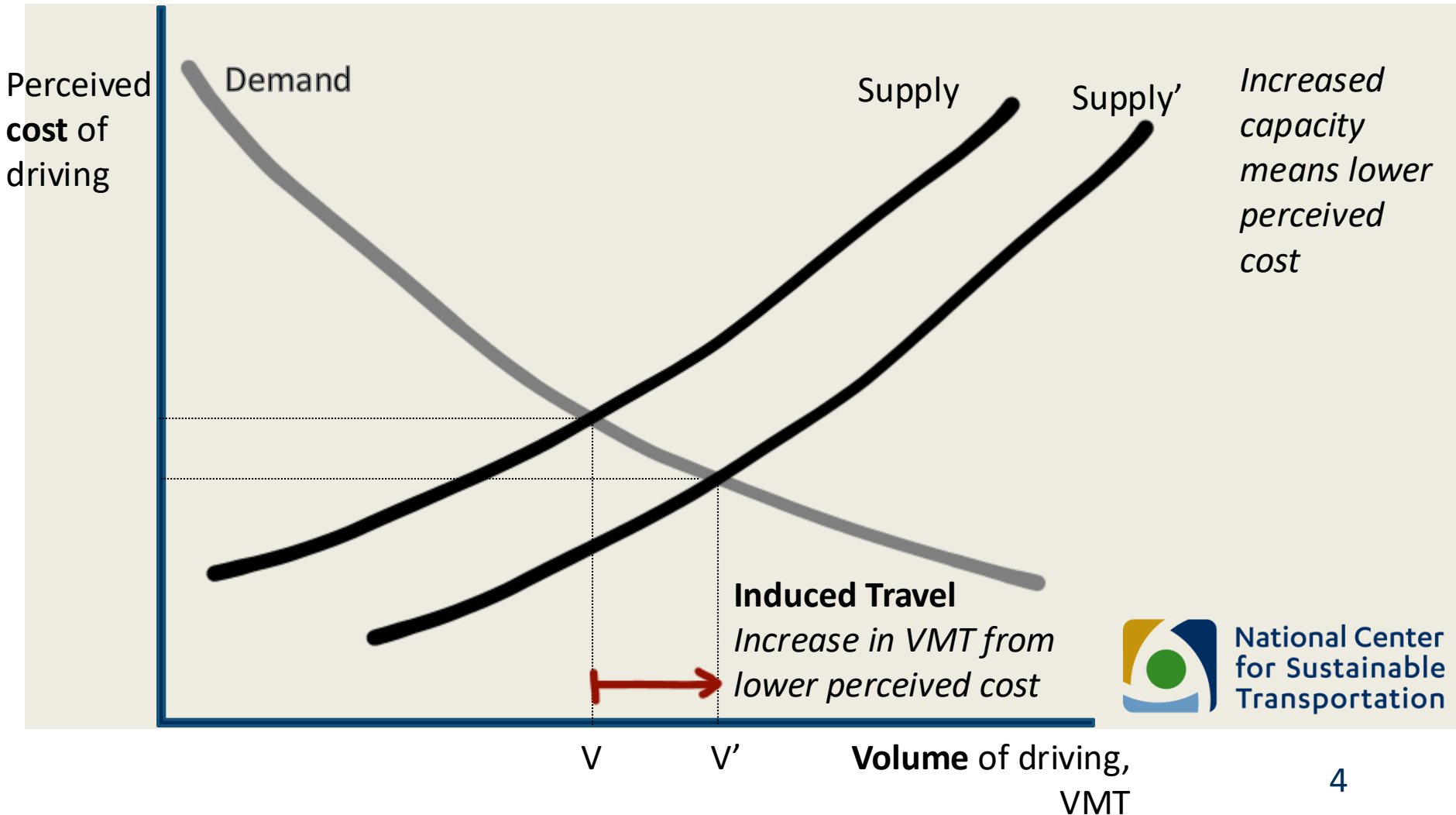
April 10, 2025



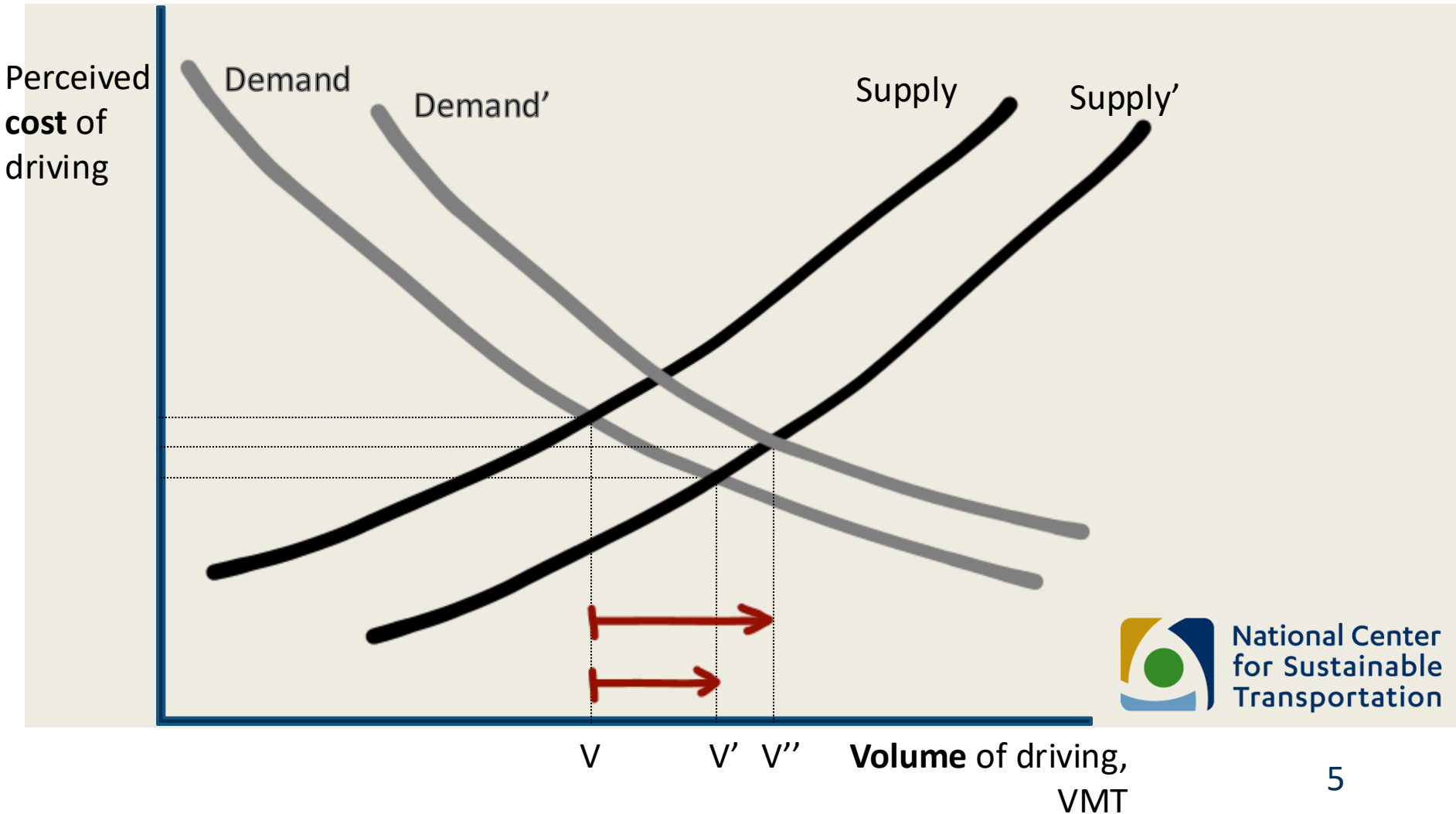
INDUCED TRAVEL EFFECT

- Adding roadway capacity can:
 - Increase the average travel speed (at least initially) on the roadway
 - Increase travel time reliability
 - Make driving on the roadway appear safer, feel more enjoyable, or feel less stressful
- This ***reduces the perceived “cost” of driving***
- When the price of driving goes down, ***vehicle miles traveled (VMT) go up***

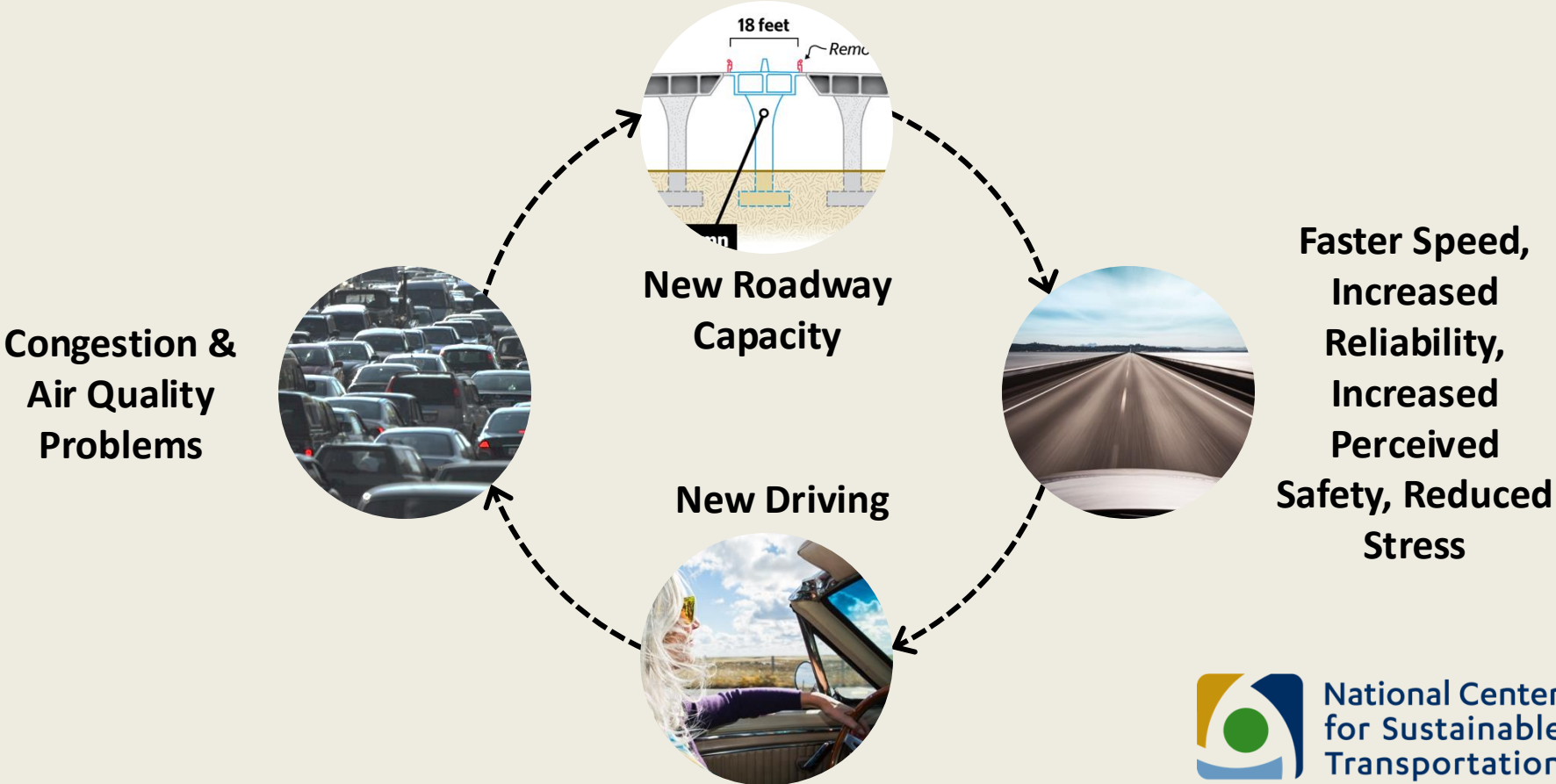
INDUCED TRAVEL EFFECT: SHORT RUN



INDUCED TRAVEL EFFECT: LONG RUN



INDUCED TRAVEL EFFECT



MEASURING INDUCED TRAVEL

- Induced travel is not directly observed – can't be derived by just comparing VMT and lane miles at two points in time
- VMT affected by many factors:
 - Roadway network
 - Population
 - Economy
 - Weather
 - Topography, etc.
- Empirically estimating induced travel requires robust statistical methods

MEASURING INDUCED TRAVEL: ELASTICITIES

$$\textit{Elasticity} = \frac{\% \textit{ Change in VMT}}{\% \textit{ Change in Lane Miles}}$$

MEASURING INDUCED TRAVEL: EVIDENCE FROM THE RESEARCH

- Key takeaways from the literature
 - Long-run (3+ years) elasticities ~ 1.0 for expansions of class 1-4 roadways; short-run elasticities $\sim 0.3-0.8$
 - Minimal substitution effect – the additional VMT on a new or expanded roadway is an overall increase in VMT across the roadway network, not just a shift in VMT from one roadway to another
 - Similar long-term elasticities in urban and rural areas
 - Rural elasticity $\sim 90\%$ of urban elasticity (Noland, 2001)
 - Managed lanes induce travel, too

MEASURING INDUCED TRAVEL: EVIDENCE FROM THE RESEARCH

Authors	Elasticity	Roadway Types	Methodology (Estimator)	Study Location	Study Years
Duranton & Turner (2011)	1.03 (10 year)	Interstates	2-stage least squares regression with instrumental variables	United States (metropolitan statistical areas)	1983–2003
Melo et al. (2012)	0.98 (~10 year)	Arterials	Generalized method of moments	United States (urbanized areas)	1982–2010
Graham et al. (2014)	0.77 (~10 year)	Freeways and arterials	Propensity score	United States (urbanized areas)	1985–2010
Hymel (2019)	0.89–1.06 (5 year)	Freeways and other limited-access roads	2-stage least squares regression with instrumental variables	United States (urban areas)	1981–2015

MEASURING INDUCED TRAVEL: EVIDENCE FROM THE RESEARCH

Authors	Elasticity	Roadway Types	Methodology (Estimator)	Study Location	Study Years
Hsu & Zhang (2014)	1.24-1.34 (3-5 year)	National expressways	2-stage least squares regression with instrumental variables & limited-information maximum likelihood	Japan (urban employment areas)	1990-2005
Chen & Klaiber (2020)	0.99 (short run)	Urban roads (excludes highways)	2-stage least squares regression with instrumental variables	China (prefecture-level cities)	2011–2014
Garcia-López et al. (2020)	1.21 (~5 year)	Freeways and arterials	Limited-information maximum likelihood	Europe (functional urban areas in 29 countries)	1985–2005

ESTIMATING VMT AT THE PROJECT LEVEL

- Two primary options
 - Travel demand models
 - Elasticity-based estimation

	Fully captures sources of induced VMT	Accounts for local context
Travel Demand Models		X
Elasticity-Based Estimators	X	

TRAVEL DEMAND MODELS

	Route diversions	Time-of-day shifts	Mode shifts	Longer trips	Newly generated trips	Increased auto ownership	Added freight travel	Land use development
4-Step Trip-Based Model	X		X	X				
ABM	X	X	X	X	X	X		
With Advanced Freight Model							X	
With Integrated Land Use Model								X

Overview

This calculator allows users to estimate the VMT induced annually as a result of adding general-purpose lane miles, high-occupancy vehicle (HOV) lane miles, or high-occupancy toll (HOT) lane miles to publicly owned roadways, like those managed by the California Department of Transportation (Caltrans), in one of California's urbanized counties (counties within a metropolitan statistical area (MSA)). The calculator applies only to facilities with Federal Highway Administration (FHWA) functional classifications of 1, 2 or 3. That corresponds to interstate highways (class 1), other freeways and expressways (class 2), and other principal arterials (class 3).

How to Use

To obtain an induced VMT estimate for a roadway capacity expansion project, enter the project length (in lane miles added), the geography (MSA for additions to interstates; county for additions to other Caltrans-managed class 2 or 3 facilities), and the base year (2016, 2017, 2018, or 2019). The base year indicates which year of VMT and lane mile data will be used to estimate the induced VMT.

[More about this calculator](#)

Calculator

1. Select Year



NCST INDUCED TRAVEL CALCULATOR

- A “back of the envelope” calculator using peer-reviewed elasticity estimates
- Provides an order-of-magnitude estimate of induced travel – additional VMT per year
- Applies to projects:
 - In California’s 37 urbanized counties
 - That would add general-purpose, HOV, or HOT lane miles to interstates, other freeways or expressways, or principal arterials

OUTSTANDING QUESTIONS

- Capturing context and facility-level differences, e.g.:
 - Existing congestion levels and setting (e.g., rural v. urban)
 - Lane type – managed lanes, auxiliary lanes, etc.
 - Facility design
 - *Project-level studies are critical*
- Exploring prioritization of transportation funding, e.g.:
 - Roadway expansion in rural areas versus providing lifeline-type on-demand transit services (e.g., CalVans)
 - Roadway expansion versus roadway maintenance and rehab

OTHER RESOURCES

- Volker & Handy (2025) – [Induced Travel Primer](#)
- Volker & Handy (2022) – [Updating the Induced Travel Calculator](#) report
- Manville (2024) – [Induced Travel Estimation Revisited](#)
- NCST [Induced Travel Calculator](#)
- [SHIFT Calculator](#)
- USDOT [Climate Strategies that Work Playbook](#)

THANK YOU!

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