Ministry of Infrastructure and the Environment

Induced demand: lower than previously found

according to a new study, more elaborated than previous studies, of KiM Netherlands Transport Policy Analysis

It is often suggested that: "a large portion of new road capacity is absorbed by induced demand and roads remain congested" *(Cervero, 2003)*. Analyses in the Netherlands suggest that induced demand is much lower.

Definition of 'induced demand'

"Increase in car use per day on the total road network, in terms of the vehicle kilometers resulting from new roads or adding lanes"
(Hills, 1996; Noland & Lem, 2002)

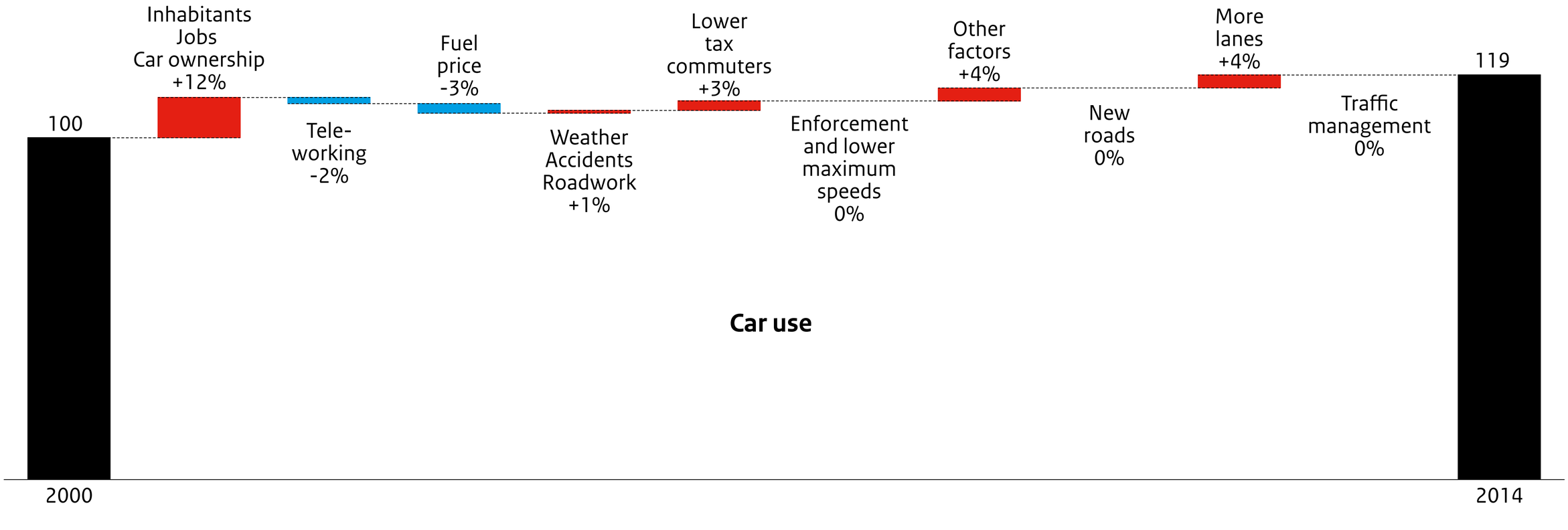
Previous studies

- Often conducted at state or county level
- Shifts in time and/or route were not measured
- Main focus on highways, less on primary and secondary roads

Netherlands study 2000-2014

- Analysis at the level of road stretches (of about 1 kilometer)
- Main Trunk Network 2000-2014 (3000 km) and arterials 2011-2014
- Impact of lanes added on 150 locations to Main Trunk Network 2000-2014 on car use
- Controlled for other factors: changes in population, jobs, car ownership, teleworking, fuel price, weather, accidents, roadworks, tax plans, traffic management and speed-related measures

Impact of lanes added on car use on Main Trunk Network Netherlands



Results

	Ratio of increase in car use (vehicle kilometers) to increase of lane kilometers	Ratio of increase of hours of delay to increase of lane kilometers
Study Fulton et al. (2000)	0.2 – 0.6	
Overview Noland & Lem (2002)	0.3 – 0.6	
Study Cervero (2003)	0.1 – 0.4	
Overview Goodwin (2003)	0.3 – 0.5	
Study Netherlands 2000-2014	**0.3**	**- 6.0**

Conclusion

If 'lane kilometers' +10% → 'car use' increases 3% and 'hours of delay' decreases 60%.

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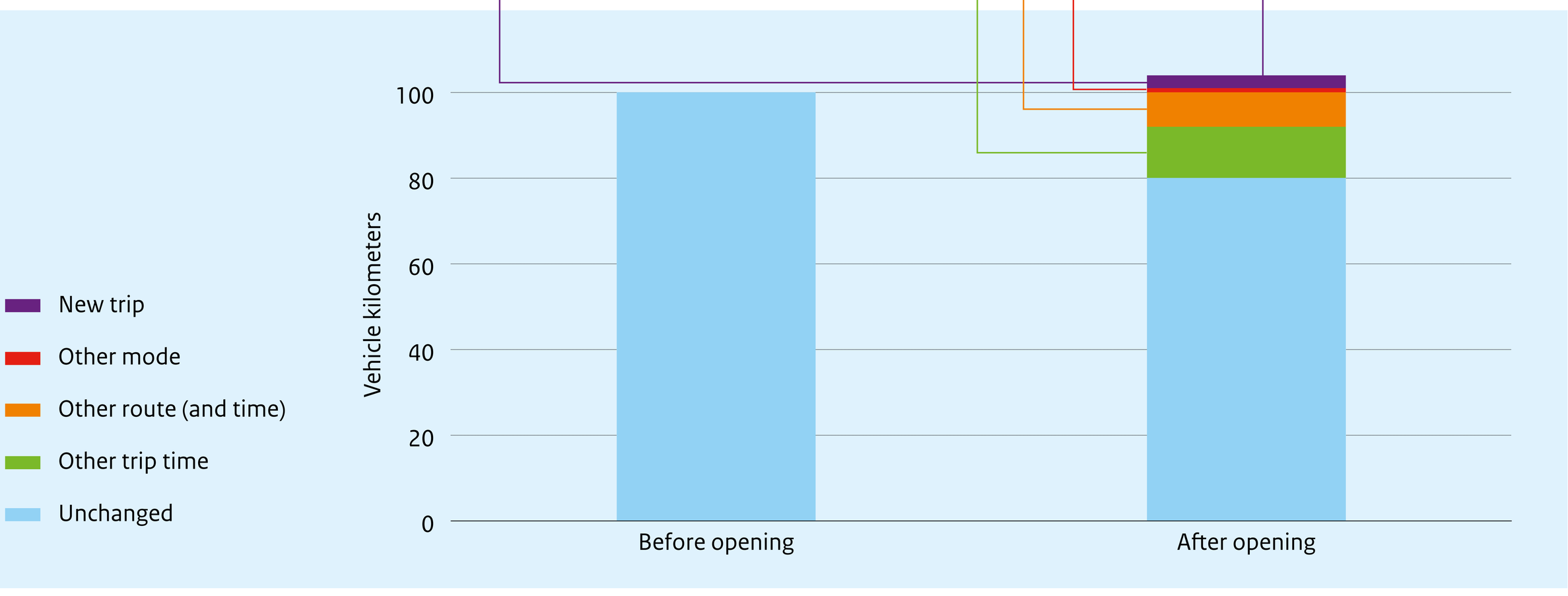
Little impact on new car use, but shifts to peak

The induced demand of road expansion appears to be lower than expected: increases of traffic by route and/or time shifts are interpreted as new car use.

Theory: behavioral reactions to road expansion *(reactions marked ✔ may lead to induced demand (modified from Hills,1996)).*

	Same destination						Other destination
	Same route, timing, vehicle-occupancy, mode and frequency	Other route	Other timing	Other mode	Lower vehicle-occupancy	Increase in frequency	
Same origin		✔		✔	✔	✔	✔
Other origin	✔	✔	✔	✔	✔	✔	✔

Empirical evidence



Impacts of new lanes on the Main Trunk Network on car use 2000-2014: shifts to the peak

	Morning Peak (07.00 to 09.00h)	Afternoon Peak (16.00 to 18.00h)	Off-peak	Daily
On stretches **Main Trunk Network** 2011-2014 on and around the new lanes	**10%**	**12%**	1%	5%
On stretches of **Arterials** 2011-2014 around the new lanes	-13%	-9%	-6%	-8%
Proportion of car use on Main Trunk Network from Arterials 2000-2014	22%	15%	99%	**27%**
On **NEW car use on stretches Main Trunk Network** 2000-2014 on and around the new lanes (without car use from Arterials)	8%	10%	0%	4%

Conclusion

- **Adding lanes results in a small increase of new car use.**
- **Omission of route shifts in research design overestimate the amount of induced demand.**

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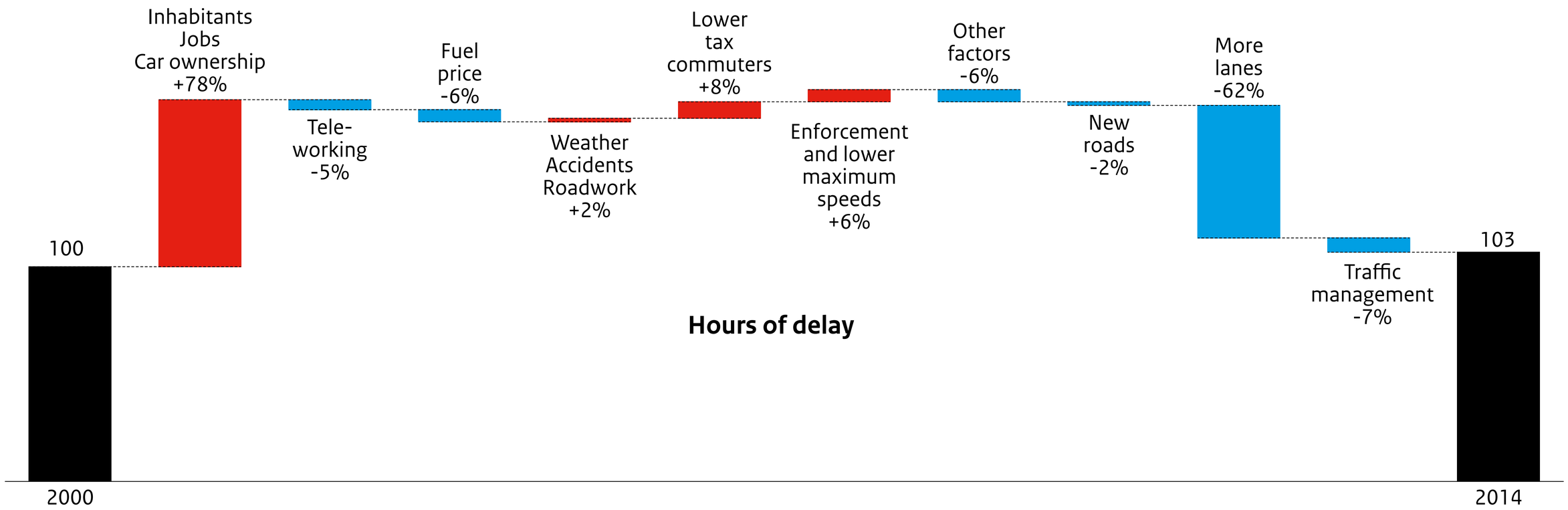
Economic evaluation of lanes added

For users the benefits of adding lanes include improvements in travel time and travel time reliability and these benefits can be measured empirically.

Impact of lanes added on congestion on Main Trunk Network Netherlands



Benefits for users per added lane kilometer in 2014

	Passenger		Freight		Total
	Travel time	Reliability	Travel time	Reliability	
Hours (per lane kilometer)	33,000	5,100	2,700	400	
Value per hour (2010)	€ 12.50	€ 8.90	€ 45.07	€ 16.60	
Benefits	€ 413,000	€ 45,000	€ 122,000	€ 7,000	€ 587,000

Current evaluations of road investment plans in the Netherlands

- Estimate improvements in travel time and travel time reliability with and without alternative investments for existing, new and 'shifting' travellers (destination, route, time and mode).
- New and 'shifting' travellers are estimated to receive half the benefits of existing travellers ('rule of half').
- Travellers shifting from off-peak to peak are estimated to benefit from less travel time, but not from travelling at the preferred time.

Authors of the paper for TRB 95nd Annual meeting, Washington, January 10-14, 2016:
Han van der Loop and Jan van der Waard, *KiM Netherlands Institute for Transport Policy Analysis, Ministry of Infrastructure and the Environment*
Rinus Haaijer, *MuConsult*
Jasper Willigers, *Significance*

The KiM Netherlands Institute for Transport Policy Analysis

Conclusion

If data on car use per road stretch are available, induced demand can be measured empirically.
In the Netherlands induced demand appears to be lower than previously found.