20th May 2021

Do more motorways reduce congestion and emissions?

Prof Simon Kingham

Kaitohutohu Matua Pūtaiao | Chief Science Advisor
Te Manatū Waka | Ministry of Transport
Te Whanga-nui-a-Tara | Wellington
Aotearoa | New Zealand

Ahorangi, | Professor
Te Whare Wānanga o Waitaha | University of Canterbury
Ōtautahi | Christchurch
Aotearoa | New Zealand

Context and background

- Chief Science Advisor, Ministry of Transport, Wellington, NZ
  - 2 days a week
  - Secondment from UC
    - provide advice to the Ministry on areas that would benefit from scientific input
    - champions the Ministry's use of evidence throughout the policy process and its development of wider sector strategies.
- Professor of Geography, University of Canterbury, Christchurch, NZ
  - 3 days a week
  - Teaching and research

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Plan

1. Does a clear road keep traffic moving?
2. Cars and water?
3. How bad is congestion?
4. What is Induced (and suppressed) demand?
5. Where did the traffic go?
6. Road capacity, congestion and climate change?
7. Are there co-impacts of building more roads
8. What else can/should we do?

1. Does a clear road keep traffic moving?

- Not necessarily

Why do traffic jams sometimes form for no reason?

By Joseph Stromberg | Updated Aug 12, 2016, 1:21pm EDT

https://youtu.be/ZNLIoolCeKI

https://www.vox.com/2014/11/24/7276027/traffic-jam

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Autonomous vehicles?

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2. Cars and water?

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3. How bad is congestion?

- Occurs when transport networks can't accommodate volume of traffic
- Congestion varies spatially & temporally
- Affected by state of road network
  - old towns
  - towns not designed for lots of traffic
- Rapid growth of cars rarely accompanied by similar growth in roads

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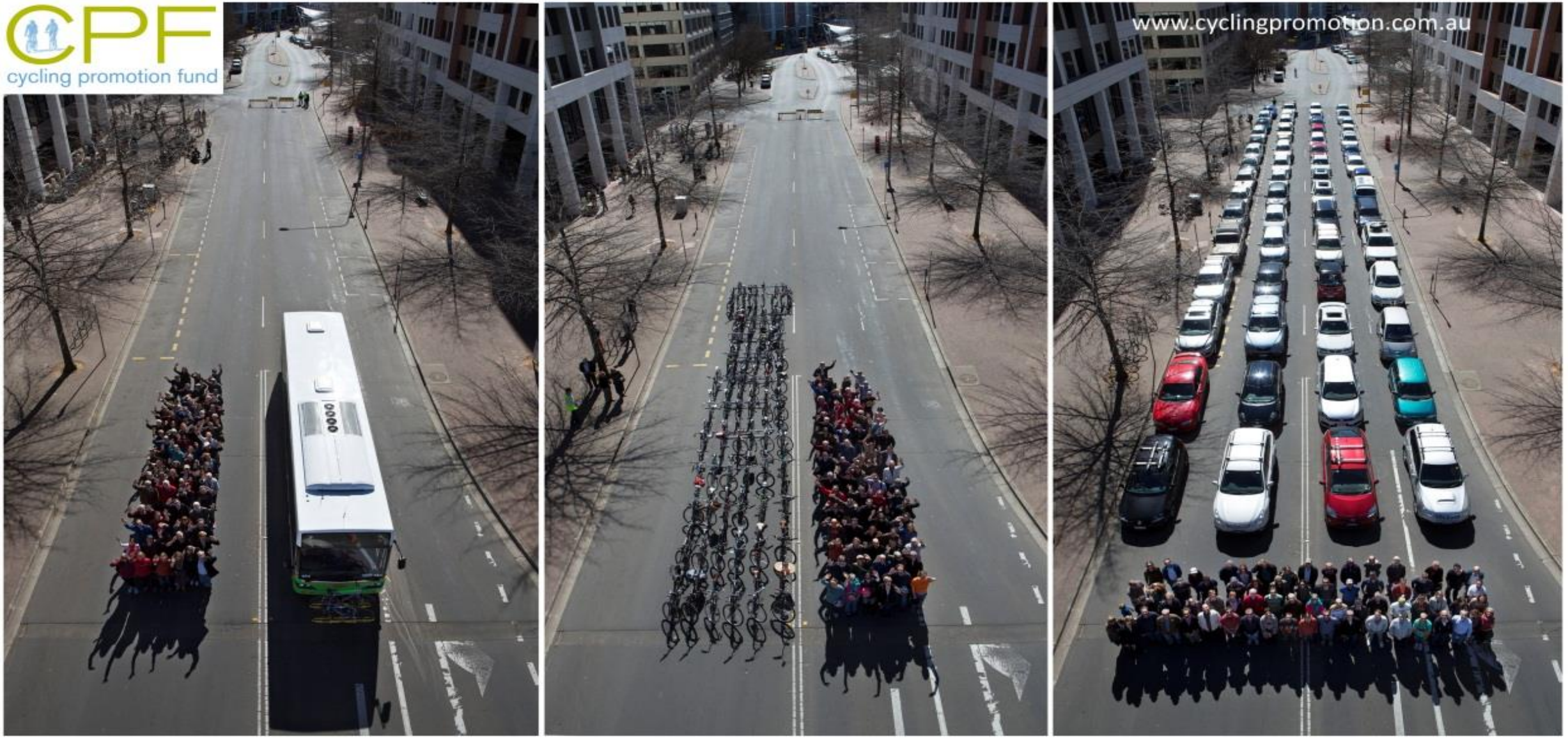

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ONE LANE - people per hr:

- Freeway 2,500
- Busway 5,000
- Light Rail 10-20,000
- Train 50,000

Road space required to transport 69 people
(Source: Cycling Promotion Fund, Australia)

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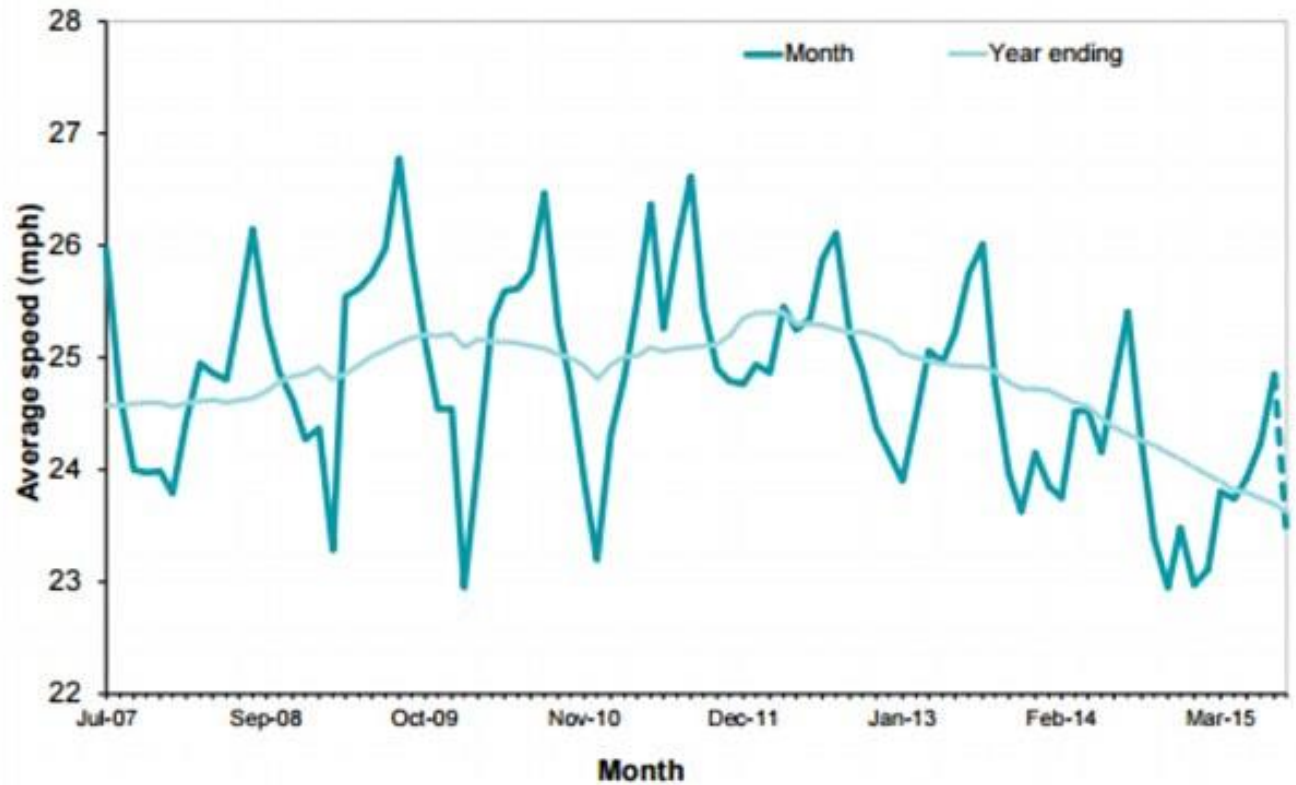
Commuters battle worsening traffic: Average speed at morning rush hour now slower than a WWII tank

- Average speed on English A roads at peak weekday mornings is 23.6mph
- A Panzer III tank had a top speed of 24mph
- Commuting speeds have fallen since early 2012
- Influx of cars on the road due to improving economy

https://www.thisismoney.co.uk/money/cars/article-3315898/Average-speeds-morning-rush-hours-slower-second-World-War-tank.html

Average vehicle speeds during the weekday morning peak[1] on local 'A' roads: England, monthly and annual averages from 2006/07
(Table CGN0205)



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Buses in London are moving slower than chickens

https://www.timeout.com/london/blog/buses-in-london-are-moving-slower-than-chickens-022416

By Isabelle Aron Posted: Wednesday 24 February 2016, 12:18 pm

London traffic is so bad that buses are moving slower than a horse and cart

By Isabelle Aron Updated: Wednesday 19 October 2016, 3:00 pm

https://www.timeout.com/london/blog/london-traffic-is-so-bad-that-buses-are-moving-slower-than-a-horse-and-cart-101916

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Is congestion all bad?

New roads generate new traffic

SACTRA (1994) - UK govt advisory committee

Latent demand released - Congestion encourages people not to use cars, or not to travel at all (reduced mobility)

"Induced demand continues to occur and may be significant in some situations"

- WSP, 2018, Latest evidence on induced travel demand: An evidence review. Project No. 1-396. For UK Department for Transport. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/762976/latest-evidence-on-induced-travel-demand-an-evidence-review.pdf

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4. What is induced (and suppressed) demand?

- Induced demand
  - New roadspace attracts new users

- Suppressed demand
  - Removing road space suppresses demand due to increased congestion
  - Works best when good alternatives

Duranton, G., & Turner, M. A. (2011). The Fundamental Law of Road Congestion: Evidence From US Cities. American Economic Review, 101 (6), 2616-2652. http://dx.doi.org/10.1257/aer.101.6.2616

Before (http://www.kcet.org/socal/departures/landofsunshine/la-river/from-freeways-to-waterways-what-los-angeles-can-learn-from-seoul.html)

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http://www.kcet.org/socal/departures/landofsunshine/la-river/from-freeways-to-waterways-what-los-angeles-can-learn-from-seoul.html

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www.lafoundation.org

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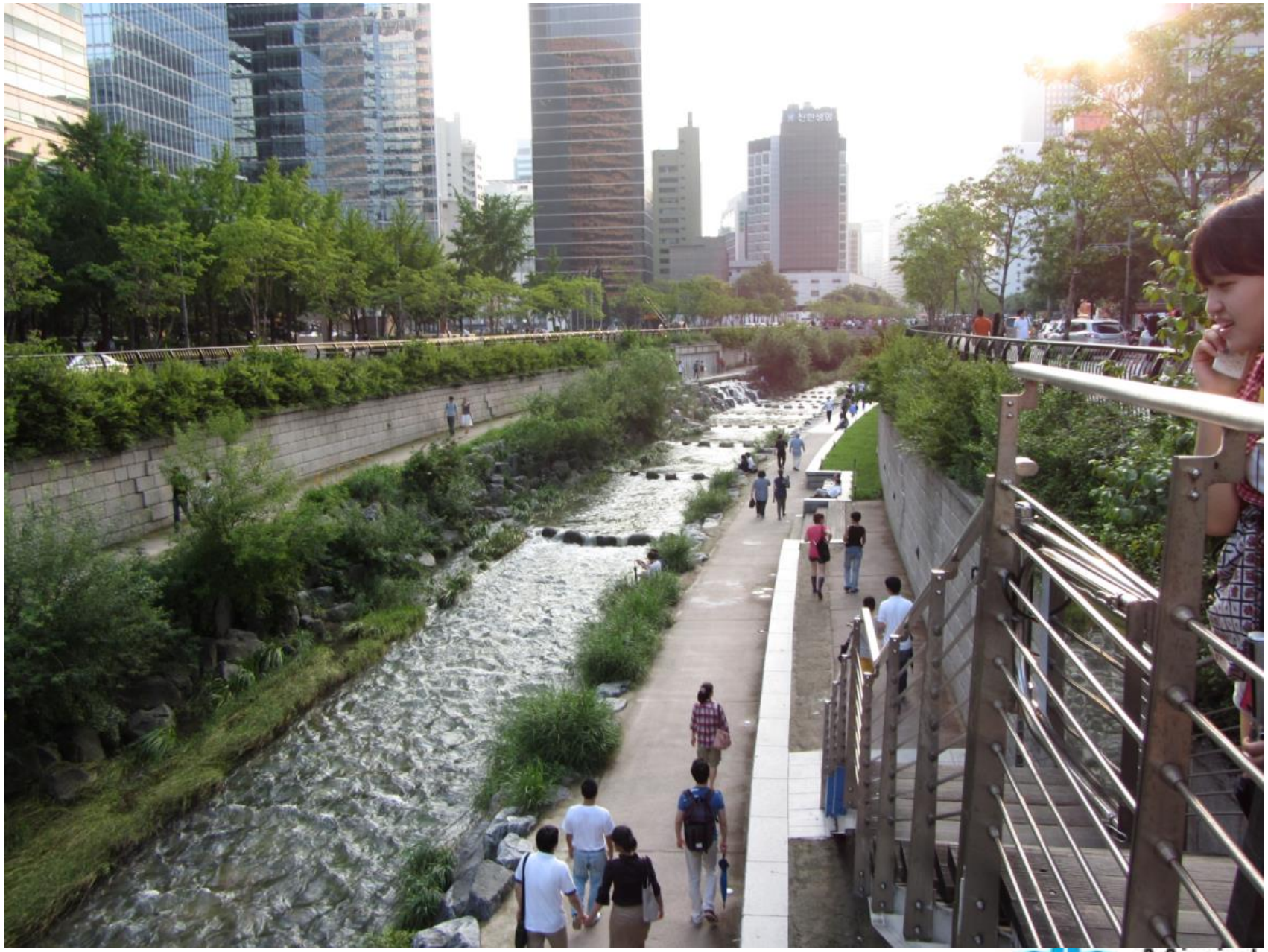

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award in

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5. Where did the traffic go?

“It just disappeared” - Prof Jeff Kenworthy

Traffic Evaporation: What Really Happens When Road Space is Reallocated from Cars?

By Darío Hidalgo February 18, 2021

https://thecityfix.com/blog/traffic-evaporation-what-really-happens-when-road-space-is-reallocated-from-cars/

Reduced demand is just as important as induced demand

It's time to use the idea of reduced demand where it has the potential to improve a city's economy, society, and mobility.

ROBERT STEUTEVILLE MAR. 19, 2021

https://www.cnu.org/publicsquare/2021/03/19/reduced-demand-just-important-induced-demand

Remove car lanes, restrict vehicles and improve transit to reduce traffic congestion

December 5, 2019 4.41am AEDT

https://theconversation.com/remove-car-lanes-restrict-vehicles-and-improve-transit-to-reduce-traffic-congestion-127873

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6. Road capacity, congestion and climate change

Increased roadspace

=

increased vehicles

=

increased greenhouse gas emissions

Unless all new vehicles are electric vehicles?

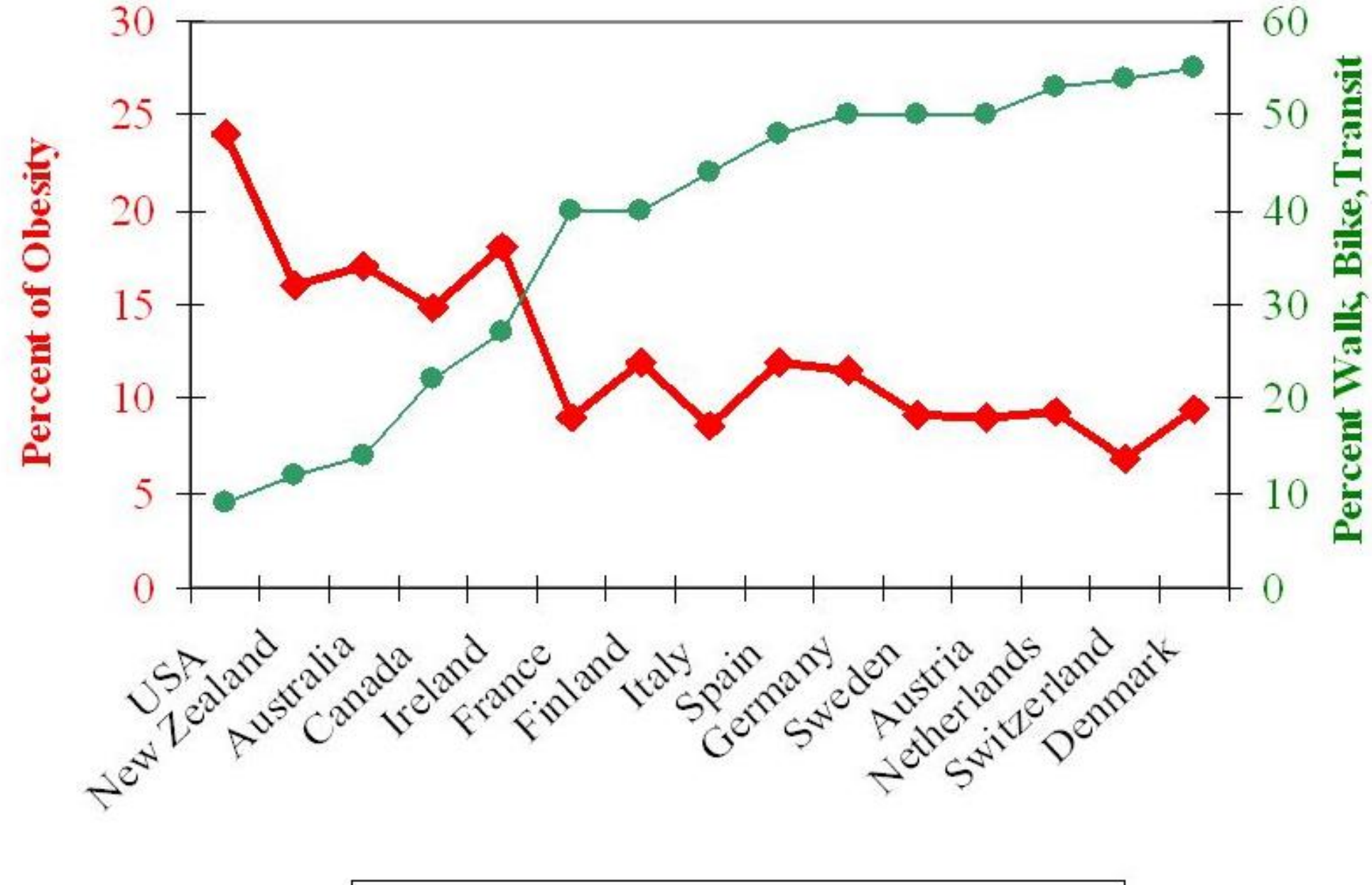
Build more and populate with EVs?

- Why not just build roads and rely on electric vehicles?

- Too slow
  - Not enough supply
  - Ageing fleet
- Too unequitable
- Too many other negative impacts

7. Co-impacts of building more roads

- What else happens if we build and invest in more roadspace?
- Negative impacts if we build more roads
- Uses resources
  - Space
  - $$
  - Ongoing maintenance
- Disincentives walking, cycling and public transport
  - Makes it too easy to drive
  - Generally subsidises driving
  - Cycling and walking more attractive away from traffic



Bassett et al, 2008, Walking, Cycling, and Obesity Rates in Europe, North America, and Australia. *Journal of Physical Activity & Health* 5 (6):795-814.

Credit: John Pucher

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Driving Is Why You're Fat

Our car culture may be to blame for skyrocketing obesity rates.

https://www.fastcompany.com/1678016/driving-is-why-youre-fat

Using public transportation reduces obesity and makes people healthier

Driving around all day is pretty bad for your health -- and for the environment.

https://www.zmescience.com/medicine/public-transportation-vs-obesity/

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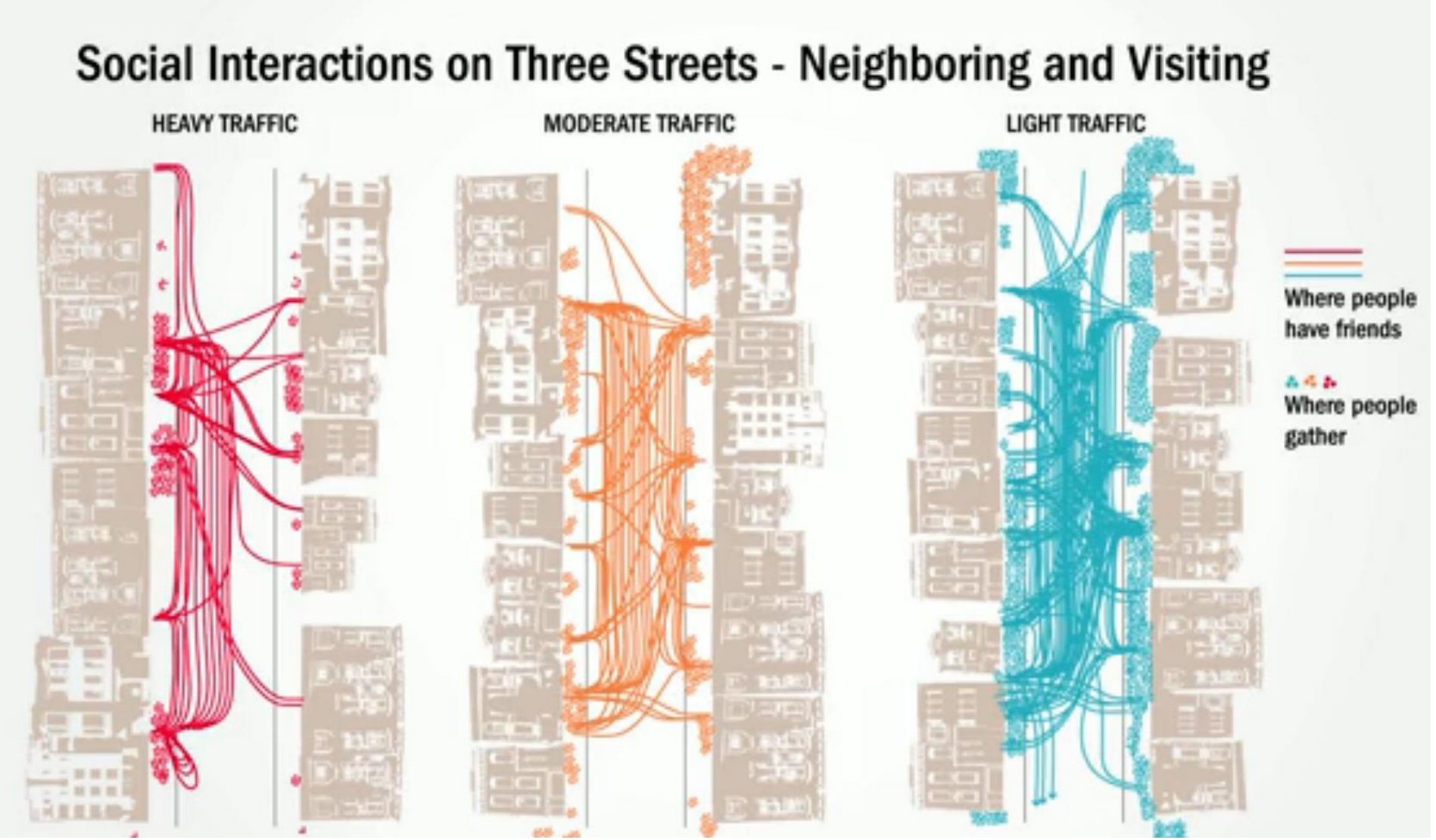
Community



Traffic levels: 16,000, 8,000 and 2,000 vehs per day

Figure 1: This image shows how community ties can actually be knit together by a street that is livable and inviting — or torn apart when auto traffic noise, pollution, and threats dominate the street environment.

*Source: Figure 3, page 21, **Livable Streets**, Donald Appleyard, University of California Press, 1981.*

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Re-working Appleyard in a low density environment: An exploration of the impacts of motorised traffic volume on street livability in Christchurch, New Zealand.

Wiki J., Kingham S., and Banwell K.

World Transport Policy and Practice
Volume 24.1 Mar 2018

LIGHT (< 500 vpd)

5.1 average connections

"We have great neighbours and live in a safe street"
"I enjoy talking with my neighbours"

MODERATE (1400-2500 vpd)

5.9 average connections

"Most people get out and about and talk on the street"
"Family-orientated and friendly"

HEAVY (8,400-14,000 vpd)

2.1 average connections

"My street is a car thoroughfare"
"Lived here over 35 years, a decline in people talking to neighbours and children playing"

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Suburban

City's Annual Cost, per Household

$3462
(Total)

- Parks & Recreation **$129**
- Solid Waste **$185**
- Fire Department **$406**
- Governance **$297**
- Police **$360**
- Transportation **$171**
- Libraries **$72**
- School Bussing **$87**
- Culture / Economy **$36**
- Roads **$280**
- Transfers to Provinces eg. School Boards **$435**
- Sidewalks & Curbs **$194**
- Storm & Waste Water **$613**
- Water **$197**

SP | Sustainable Prosperity

For more data and more reports, visit thecostofsprawl.com
Data based on Halifax Regional Municipality

Urban

City's Annual Cost, per Household

$1416
(Total)

- Parks & Recreation **$69**
- Solid Waste **$185**
- Fire Department **$177**
- Governance **$158**
- Police **$192**
- Transportation **$91**
- Libraries **$38**
- School Bussing **$13**
- Culture / Economy **$19**
- Roads **$26**
- Transfers to Provinces eg. School Boards **$232**
- Sidewalks & Curbs **$27**
- Storm & Waste Water **$147**
- Water **$42**

SP | Sustainable Prosperity

For more data and more reports, visit thecostofsprawl.com
Data based on Halifax Regional Municipality

https://i0.wp.com/usa.streetsblog.org/wp-content/uploads/sites/5/2015/03/sprawlurban.jpg

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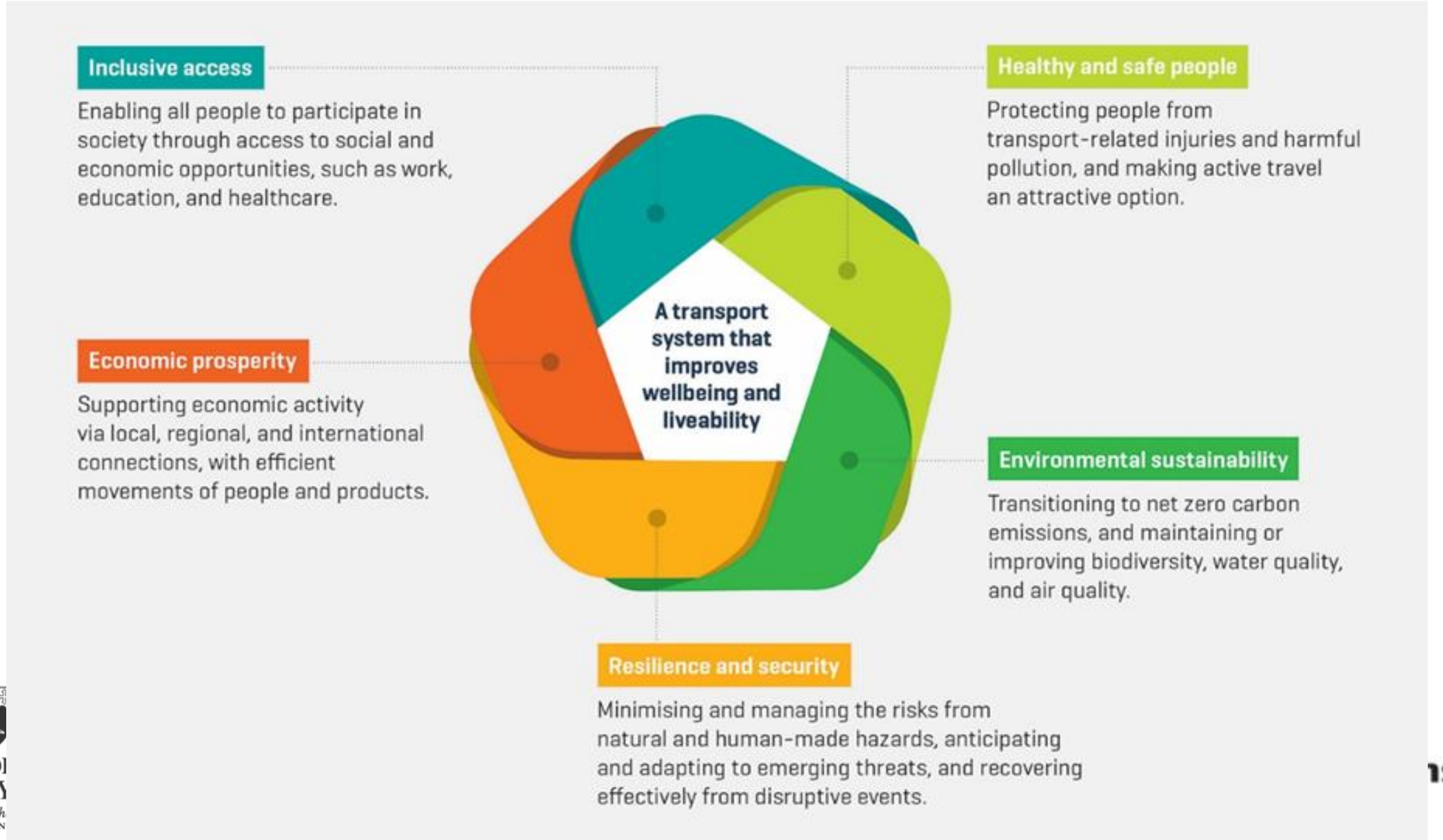
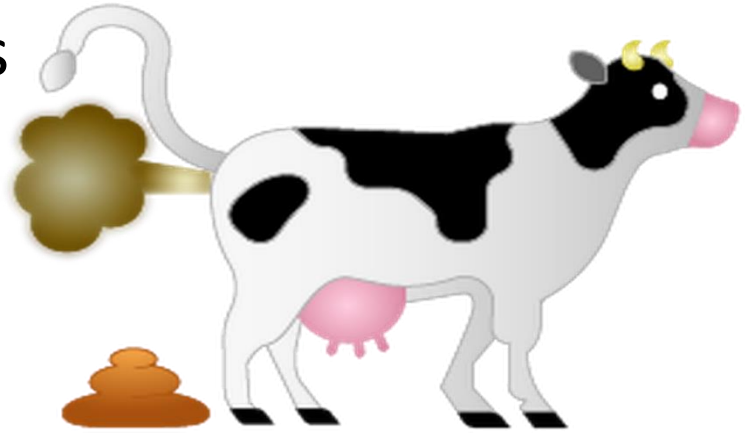
NZ Ministry of Transport – Outcomes Framework



8. What else can/should we do?

In NZ

- Transport is responsible for 47 % of CO2 emissions
  - Per capita 4 x India and China
  - 19.7 % of greenhouse gas emissions (GHG) in Aotearoa



- Ministry of Transport's '*Hīkina te Kohupara – Kia mauri ora ai te iwi* - Transport Emissions: Pathways to Net Zero by 2050'
  - *Lifting of the toxic mist: And behold the breath of life*.
  - https://www.transport.govt.nz/consultations/hikina-te-kohupara-discussion/

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Avoid-Shift-Improve Framework in Support Low Carbon Mobility

39%

61%

Avoid

Avoid and reduce the need for motorized travel

Shift

Shift to more environmentally friendly modes

Improve

Improve energy efficiency of transport modes

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Summary

- Cars are not like water
  - Increased roadspace induces traffic
  - Reducing roadspace suppresses traffic
- Increasing roadspace will increase greenhouse gas emissions
- Multiple co-disbenefits of building more roads
- Need to Avoid and Shift not just Improve

Thanks

Prof Simon Kingham

Tari Mātai Matawhenua | Dept of Geography

Te Whare Wānanga o Waitaha | Uni of Canterbury

simon.kingham@canterbury.ac.nz

Kaitohutohu Matua Pūtaiao | Chief Science Advisor

Te Manatū Waka | Ministry of Transport

s.kingham@transport.govt.nz

@SimonKingham

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