

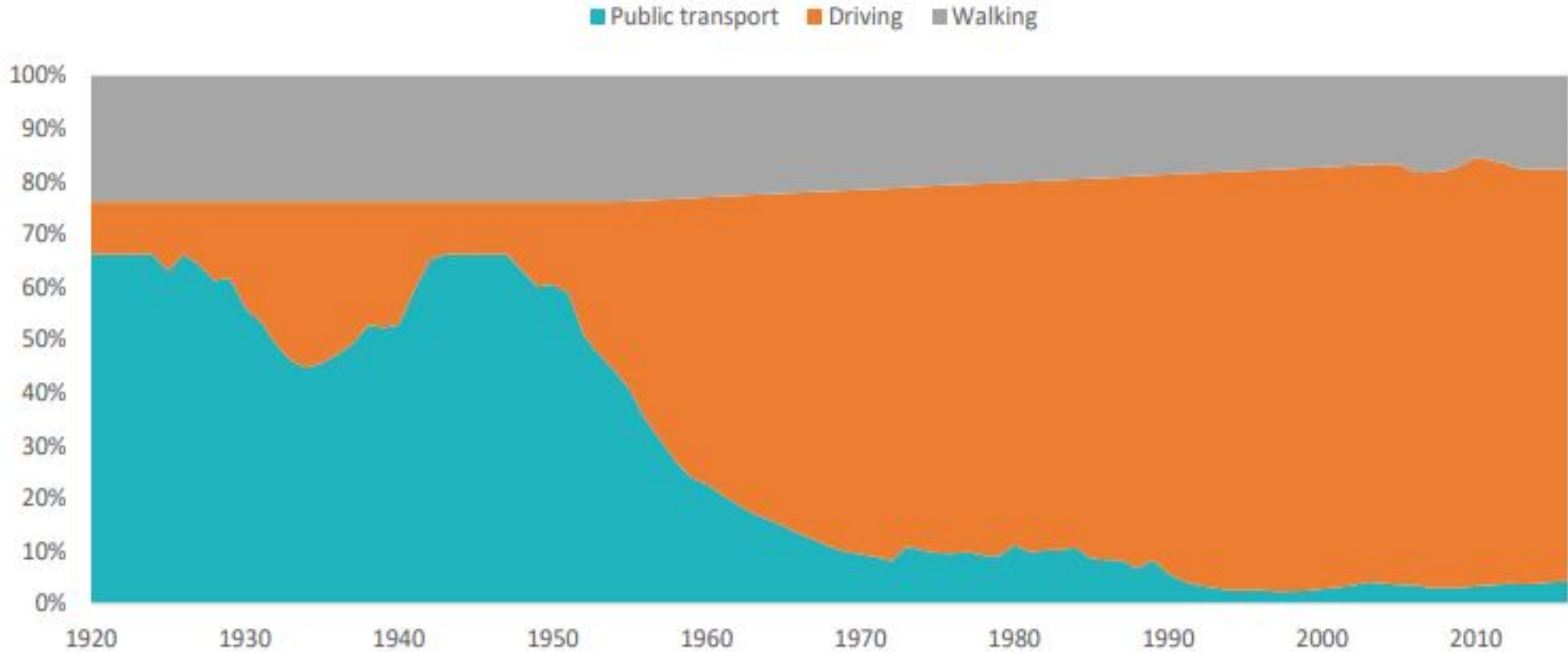


How do you travel and and who pays for it?

Prof Simon Kingham

Te Kura Aronukurangi | School of Earth & Environment,
Te Whare Wānanga o Waitaha | University of Canterbury
Kaitohutohu Matua Pūtaiao | Chief Science Advisor,
Te Manatū Waka | Ministry of Transport

Figure 22: Estimated mode share for household trips in Auckland, 1920-2016



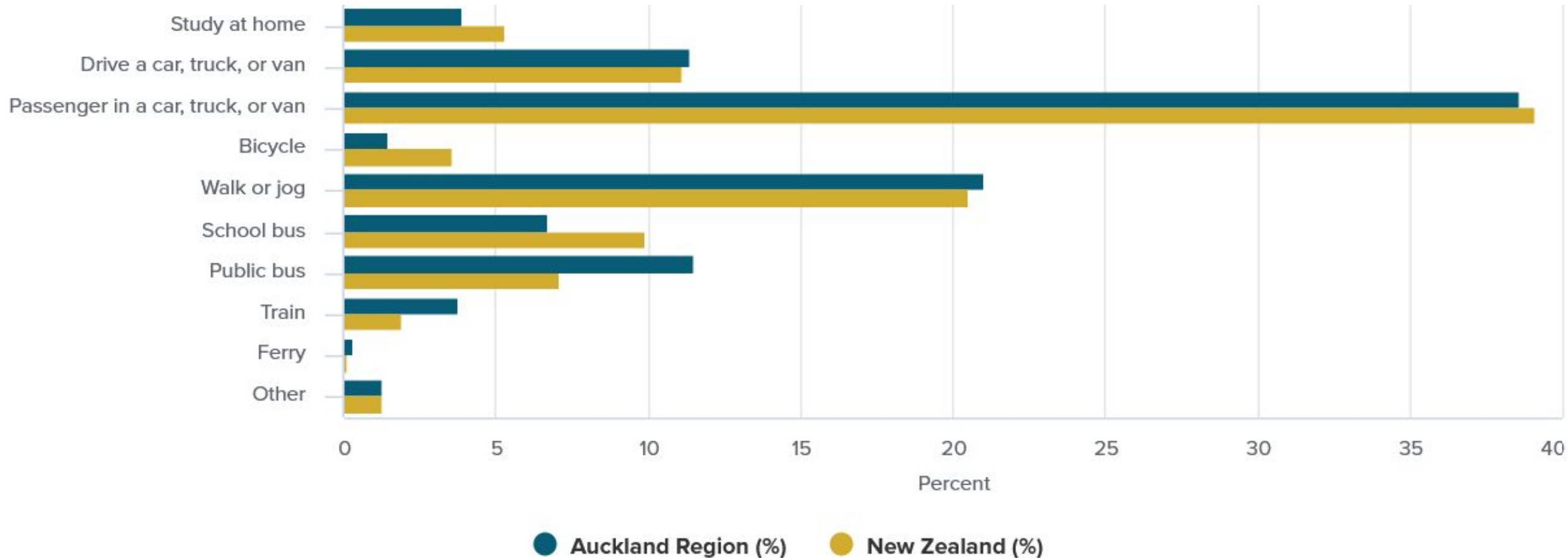
How Aucklanders travel - work

Main means of travel to work for people in Auckland Region and New Zealand, 2018 Census



How Aucklanders travel - education

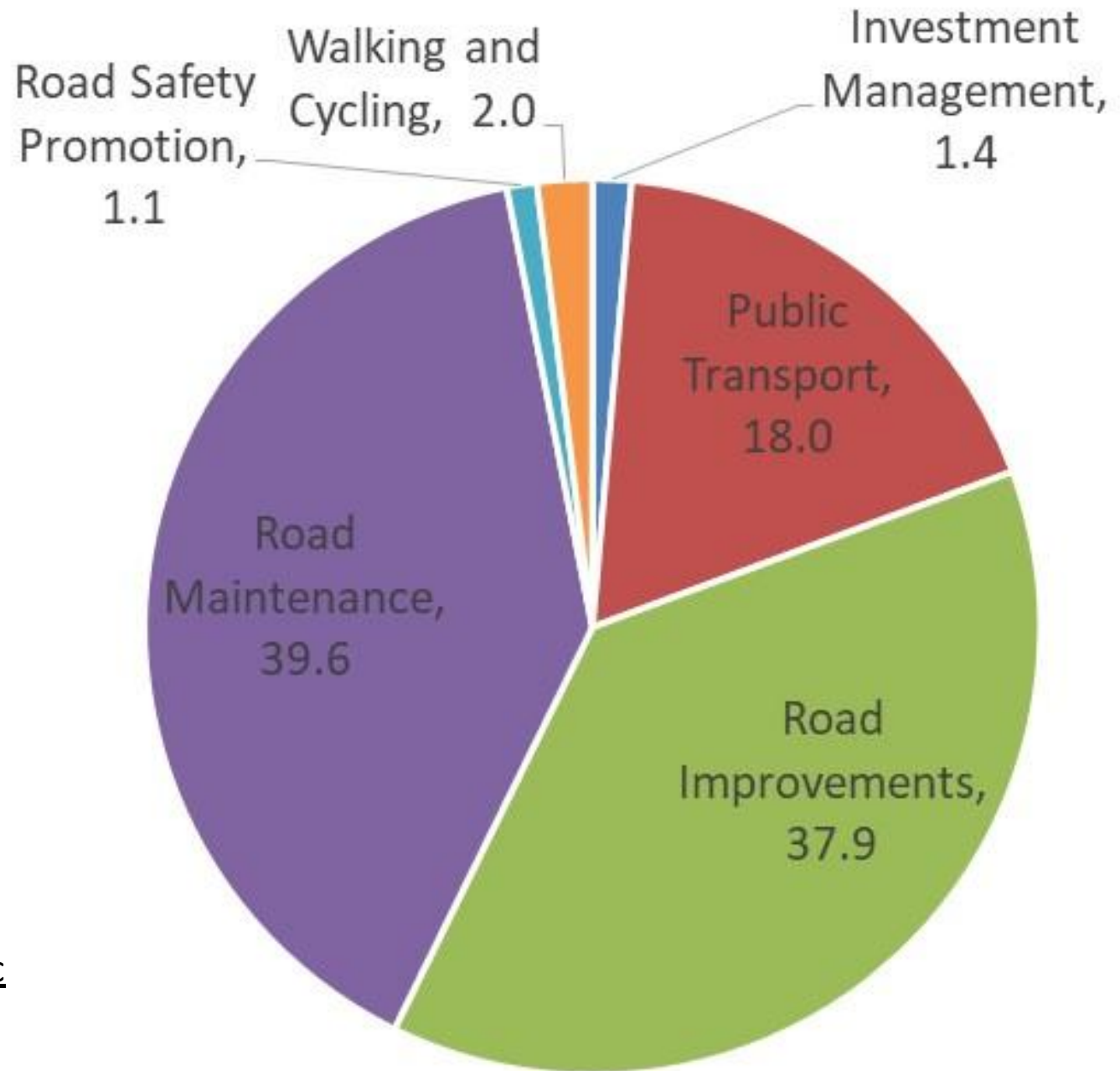
Main means of travel to education for people in Auckland Region and New Zealand, 2018 Census



● Auckland Region (%) ● New Zealand (%)

How do we spend our money?

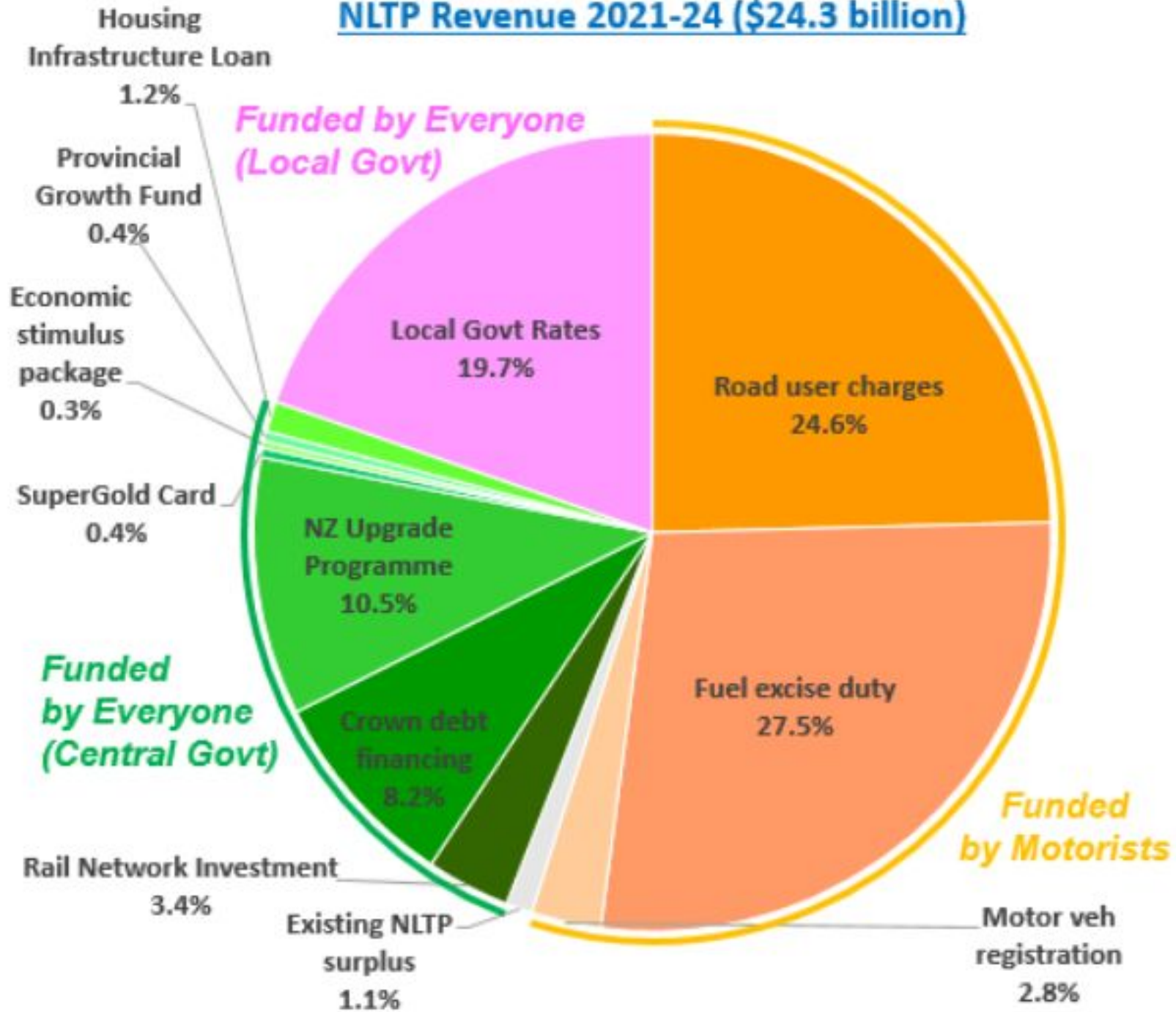
2021/22 Total = \$5.5bn



Data from <https://www.transport.govt.nz/area-of-interest/strategy-and-direction/government-policy-statement-on-land-transport-2024>

Transport Spending 2011-22 (% of total)

NLTP Revenue 2021-24 (\$24.3 billion)



How do we pay for transport?

Main contributors at the national level

- Fuel Excise Duty (FED)
- Road User Charges (RUC)

Main contributors at the national level

• Fuel Excise Duty (FED)

- Currently 77 cents per litre (petrol)
- Collected at source (when refined fuel leaves refinery or is imported)
- FED is simple to collect, and difficult to dodge
- Amount of FED is related to the amount you travel and the fuel efficiency of your vehicle

• Road User Charges (RUC)

- applies to non-petrol vehicles e.g. diesel (and electric when exemption expires).
- distance based charge (licenses pre-purchased in blocks of 1,000 kms)
- Rates apply depending on vehicle size
- RUC has more difficult to manage \$ possible to dodge

... and some other things in the transport revenue space

- Tolling
 - additional charges for three specific roads
- Regional fuel tax
 - extra 10c/litre for petrol & diesel sold inside Auckland
 - goes to Auckland Council to fund agreed transport projects
- eRUC
 - RUC distance calculated using on-board GPS device
 - around 50,000 heavy vehicles

Issues with current system

- Does not include externalities
 - the cost or benefit that affects a third party who did not choose to incur that cost or benefit.

Social cost of road crashes and injuries

Last updated on: 30/04/2020

The *social cost of road crashes and injuries 2018 update* has now been published.

It finds that the total social cost of motor vehicle injury crashes in 2017 is \$4.8 billion (up by 15 per cent from \$4.2 billion in 2016) at June 2018 prices. This estimate covers all injuries recorded by NZ Police, hospitals and ACC.

Crashes
\$0

<https://www.transport.govt.nz/mot-resources/road-safety-resources/road-crash-statistics/social-cost-of-road-crashes-and-injuries/>

Pollutionwatch: transport's true cost to the environment

Our polluting behaviours are subsidised by taxes and a lowering of quality of life

Gary Fuller

🐦 @drgaryfuller

Thu 17 Jan 2019 21.30 GMT

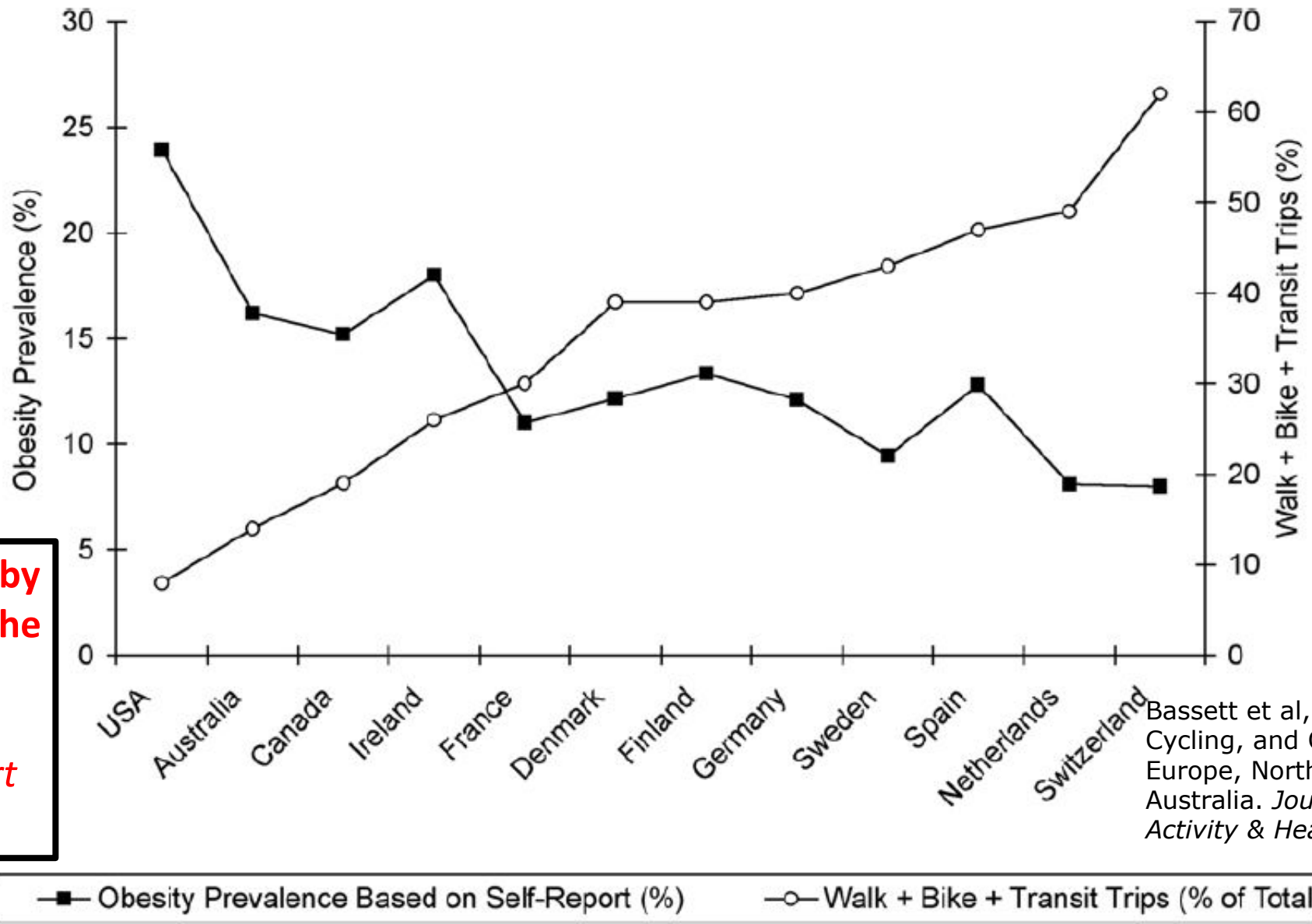


Pollution
\$0

Traffic pollution in NZ kills more than 2000 people and costs economy over \$10bn each year
Health and Air Pollution in New Zealand (HAPINZ) study.

Physical inactivity \$0

“Lost production caused by physical inactivity costs the New Zealand economy \$2.3 billion a year”
WHO Global Status Report on Physical Activity 2022

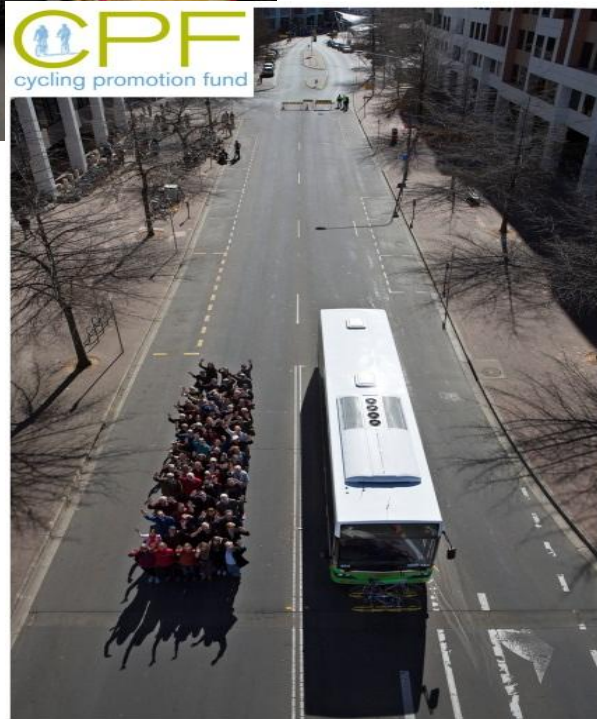


Bassett et al, 2008, Walking, Cycling, and Obesity Rates in Europe, North America, and Australia. *Journal of Physical Activity & Health* 5 (6):795-814.

Figure 2 — Obesity (BMI $\geq 30 \text{ kg} \cdot \text{m}^{-2}$) prevalence and rates of active transportation (defined as the combined percentage of trips taken by walking, bicycling, and public transit) in countries of Europe, North America, and Australia. BMI was computed from self-reported height and weight. Data were obtained from national surveys of travel behavior and health indicators conducted between 1994 and 2006 (see text for details).

Noise
\$0





**Congestion
\$0**

Community severance

\$0

LIGHT (< 500 vpd)



5.1 average connections

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

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”

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

MODERATE (1400-2500 vpd)



5.9 average connections

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

Climate Change: Implications for Transport

Climate Change
\$0



Key Findings from the
Intergovernmental Panel
on Climate Change
Fifth Assessment Report



Motorists Should Pay Full Costs Of Road Pollution, Deaths And Damage, Says EU Transport Commissioner



Carlton Reid Senior Contributor ⓘ

Transportation

I have been writing about transport for 30 years.

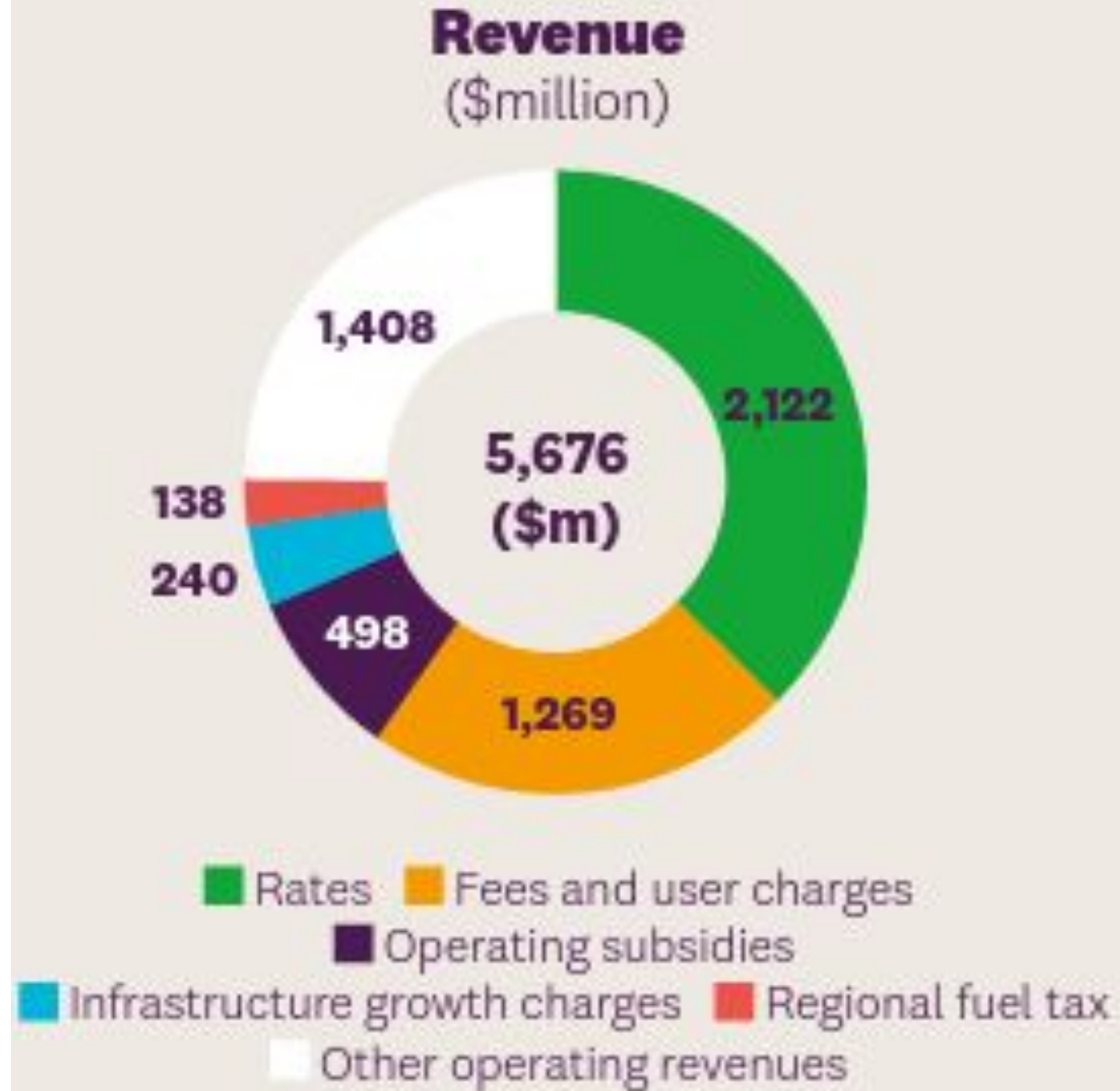
<https://www.forbes.com/sites/carltonreid/2019/01/24/motorists-should-pay-full-costs-of-road-pollution-deaths-and-damage-says-eu-transport-commissioner/#1f816942c0b3>

Other issues with current system ...

- EVs are exempt, so revenue declining
- Based on more travel = more revenue
 - But we are trying to reduce travel for many other reasons e.g. GHGs
- Every kilometre on the network priced at the same rate
- Current / proposed tolling systems are expensive to run
- Local charging is difficult and expensive e.g. Regional Fuel Tax

Who pays for transport?

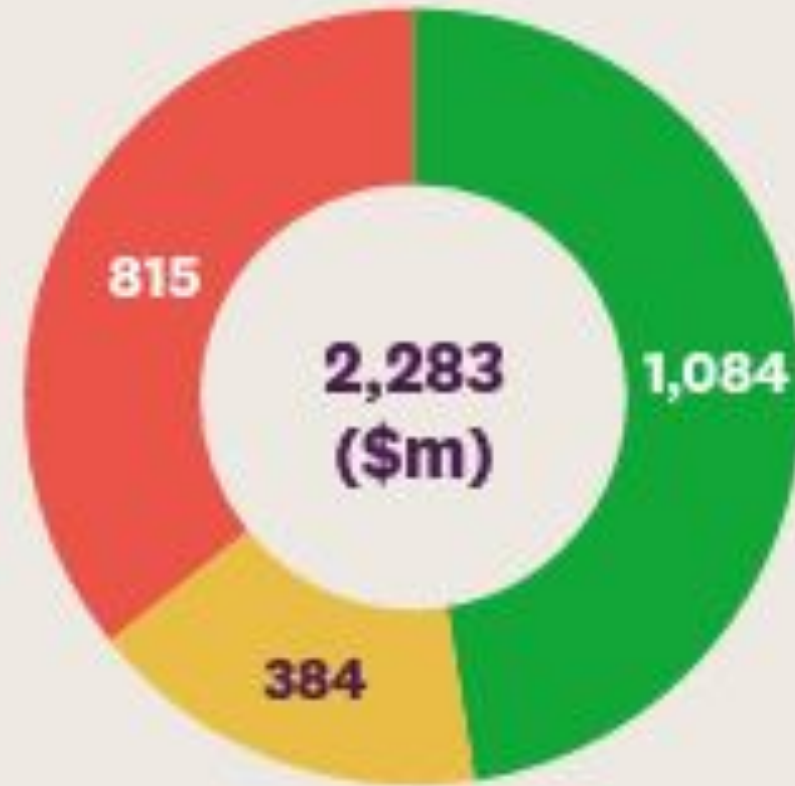
Auckland only



<https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-annual-reports/Pages/current-annual-report.aspx>

Auckland only

Capital investment 2021/2022 (\$million)



- Roads and public transport assets¹
- Other assets
- Three waters assets

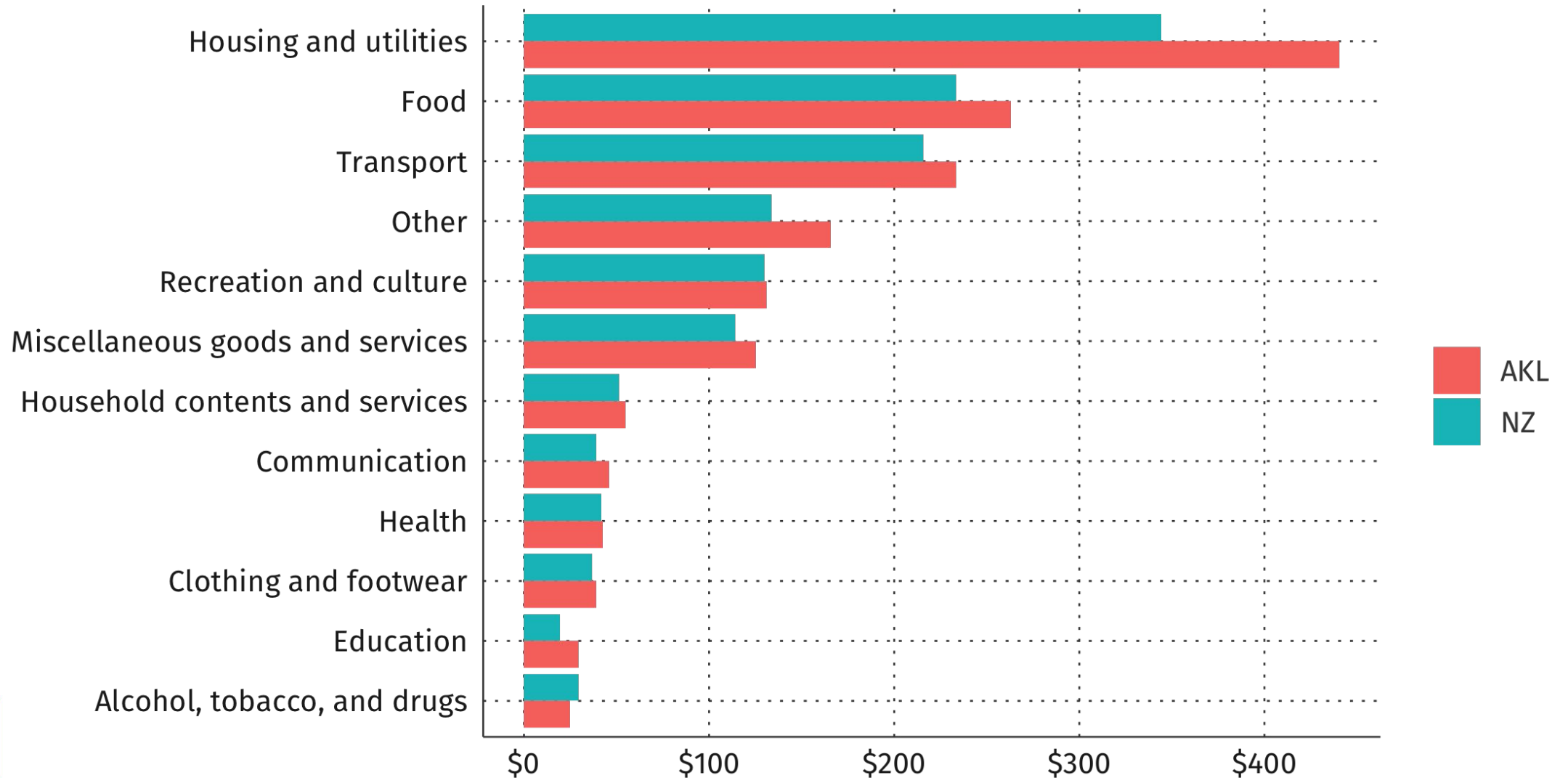
¹ The total includes \$428 million CRL capex

<https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-annual-reports/Pages/current-annual-report.aspx>

Transport is the third largest household expense

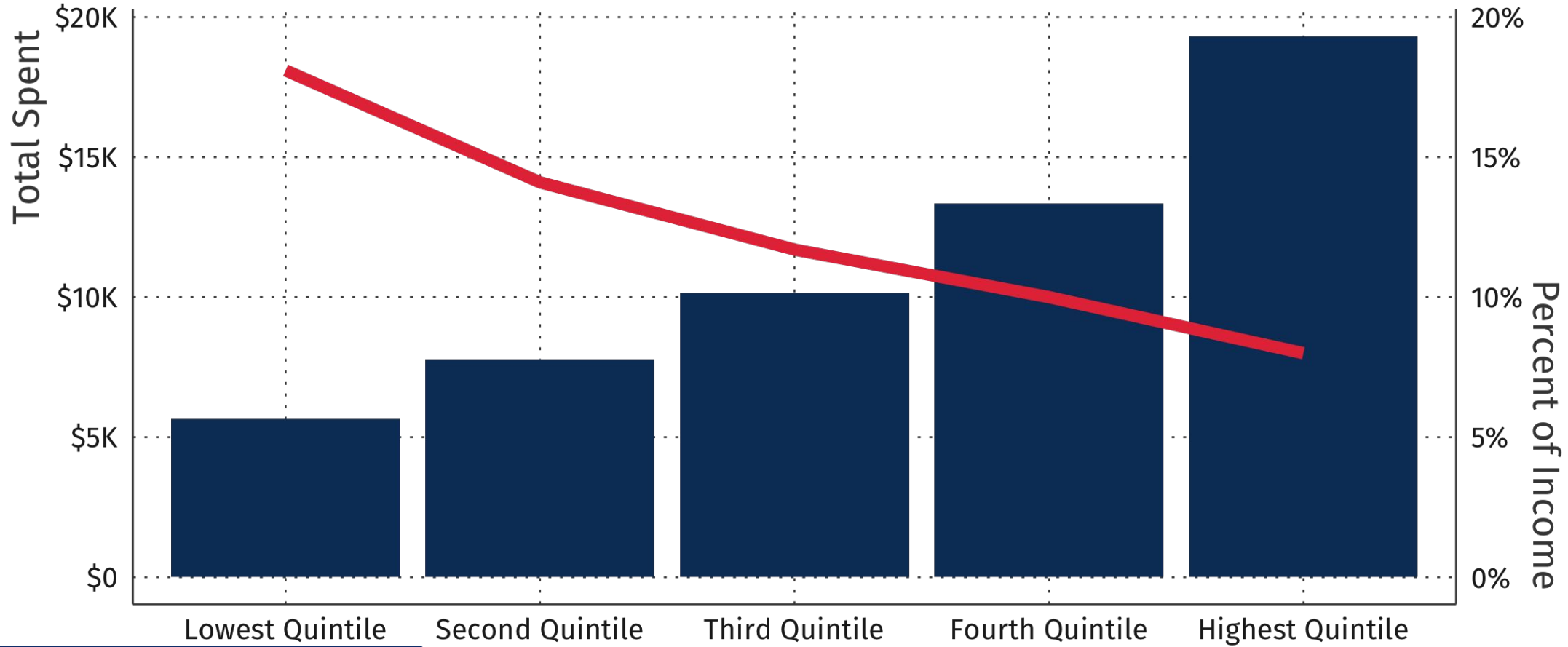
Average Weekly Household Expenditure

2019



Average Household Transport Expenditure

By Income Group



Those with higher incomes spend more on transport

But those with lower income spend a greater %

■ Total Spent (2019) ■ Av % of Income (2010-2019)

How do we measure value

- Benefit-Cost ratio

Benefit Cost Ratios

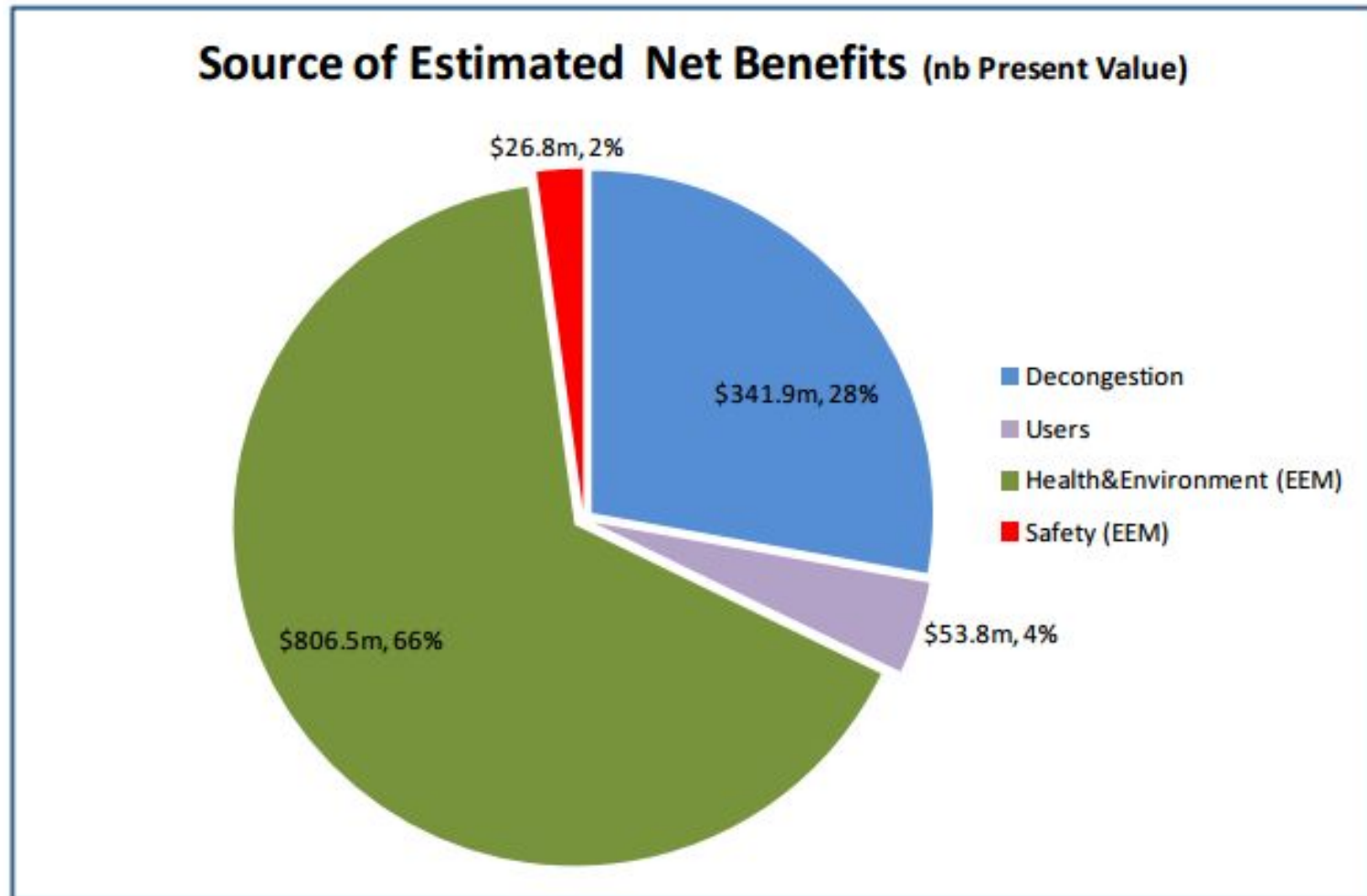
Table 3: BCRs of the roads of national significance, 2011

Project	BCR	BCR plus WEBs*
1. Puhoi to Wellsford	0.8	1.1
2. Auckland Western Ring route	2.1	2.7
3. Victoria Park Tunnel	3.2	n/a
4. Waikato Expressway	1.4	1.8
5. Tauranga Eastern Link	1.4	1.8
6. Wellington Northern Corridor	1.1	1.4
7. Christchurch Motorways	2.0	2.4
Simple average (all)	1.7	n/a
Simple average (all except 3.)	1.5	1.9

* wider economic benefits

Benefit Cost Ratios

- Christchurch Major Cycleways
- Benefit cost ratio of 8!



Christchurch Major Cycleway Routes Updated
Funding Assessment. February 2015

Summary

- Transport is not cheap
- Road Users don't pay for it all
- Regular tax and local rates also spent
- We don't pay for externalities

Extra slides – just in case

Strategic Investment Package

Key projects 2023 to guide National Land Transport Programme development

Warkworth to Whangārei – SH 1

Auckland Northwest Rapid Transit
Auckland Rail Third and Fourth Mains Expansion
Avondale to Onehunga rail link
Auckland Metropolitan Level Crossing Upgrade and Removal Programme

Cambridge to Piarere – SH 1

Tauranga to Tauriko – SH 29

Napier to Hastings – SH 2

Wellington CBD – Second Mount Victoria tunnel and upgrades to Basin Reserve/Arras Tunnel – SH 1
Wellington CBD to Island Bay – Mass Rapid Transit
Wellington Metropolitan Level Crossing Upgrade and Removal Programme

Nelson (Rocks Road) shared path – SH 6
Nelson – Hope Bypass – SH 6

Kerikeri

Whangārei

Mangawhai

Warkworth

Auckland

Hamilton

Tauranga

Rotorua

Gisborne

New Plymouth

Whanganui

Palmerston North

Napier

Nelson

Wellington

Greymouth

Kaikōura

Christchurch

Ashburton

Christchurch Northern Link – SH 1

Ashburton Bridge – SH 1

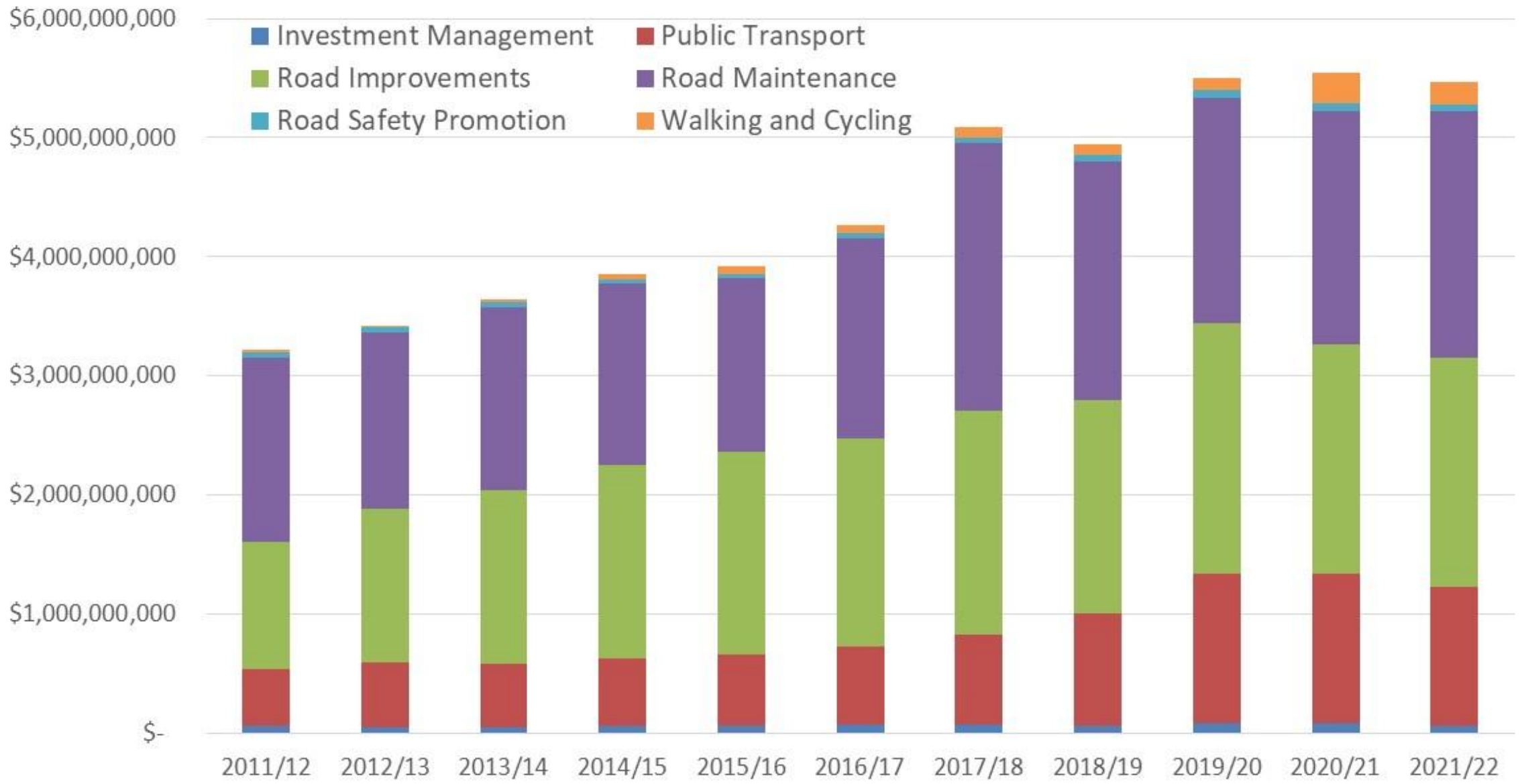
Queenstown

Dunedin

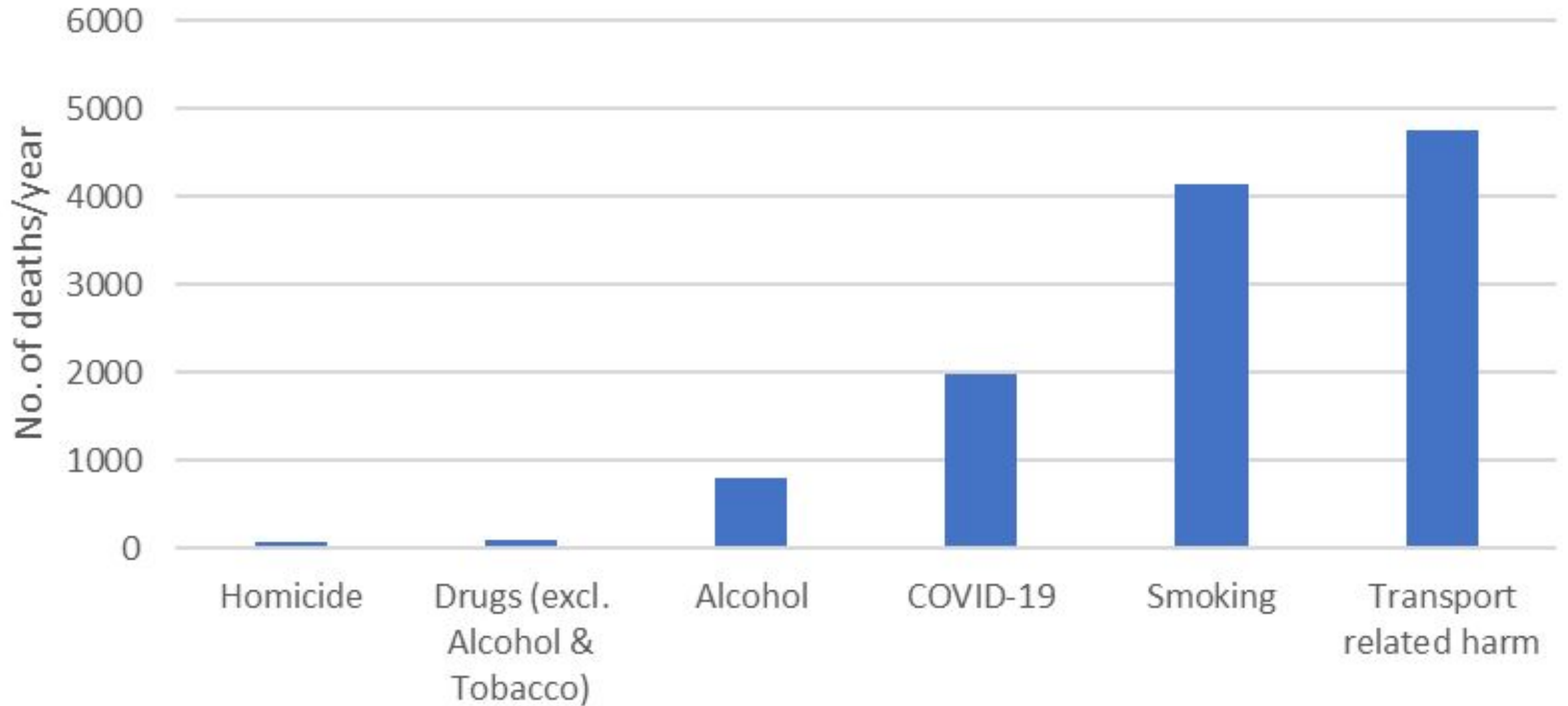
Invercargill

<https://www.transport.govt.nz/assets/Uploads/A3-Draft-GPS-2024.pdf>

Average annual transport spending in NZ 2011-22

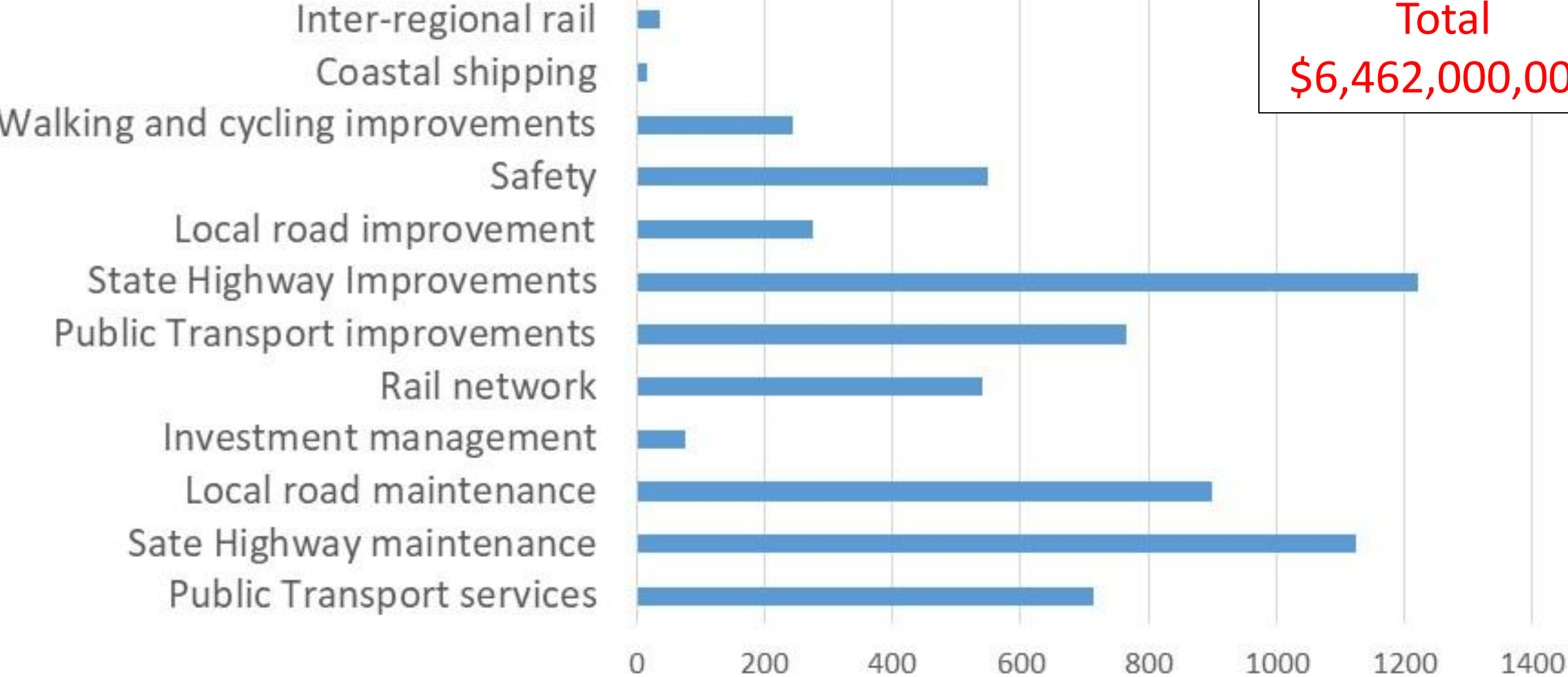


Causes of premature death in Aotearoa New Zealand



Budgeted spending 2024/25

Total
\$6,462,000,000



Talk 2

Strategies/interventions brief overview: - Simon Kingham

- Improved travel options
- Land use management
- Incentives to shift travel mode

How (and what) do we plan for transport?

Prof Simon Kingham

Te Kura Aronukurangi | School of Earth & Environment,
Te Whare Wānanga o Waitaha | University of Canterbury
Kaitohutohu Matua Pūtaiao | Chief Science Advisor,
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Predict and Provide

- Model behaviour based on past
- Provide more of the same to accommodate growth

Decide and Provide

- Decide the desirable outcome
- Provide the necessary infrastructure to deliver the outcomes you want

Induced and Suppressed Demand

- What does congestion do
- Relieve congestion and you encourage people to travel
 - Induced demand
- Congestion encourages people not to use cars, or not to travel at all
 - Suppressed demand

Supply and demand

- Build and they will come
- Close it and they go away?

Supply and demand



Cheonggyecheon, Seoul, Korea

Supply and demand



Supply and demand



Where did the traffic go?

- *“It just disappeared”* - Prof Jeff Kenworthy

Build it and they will come

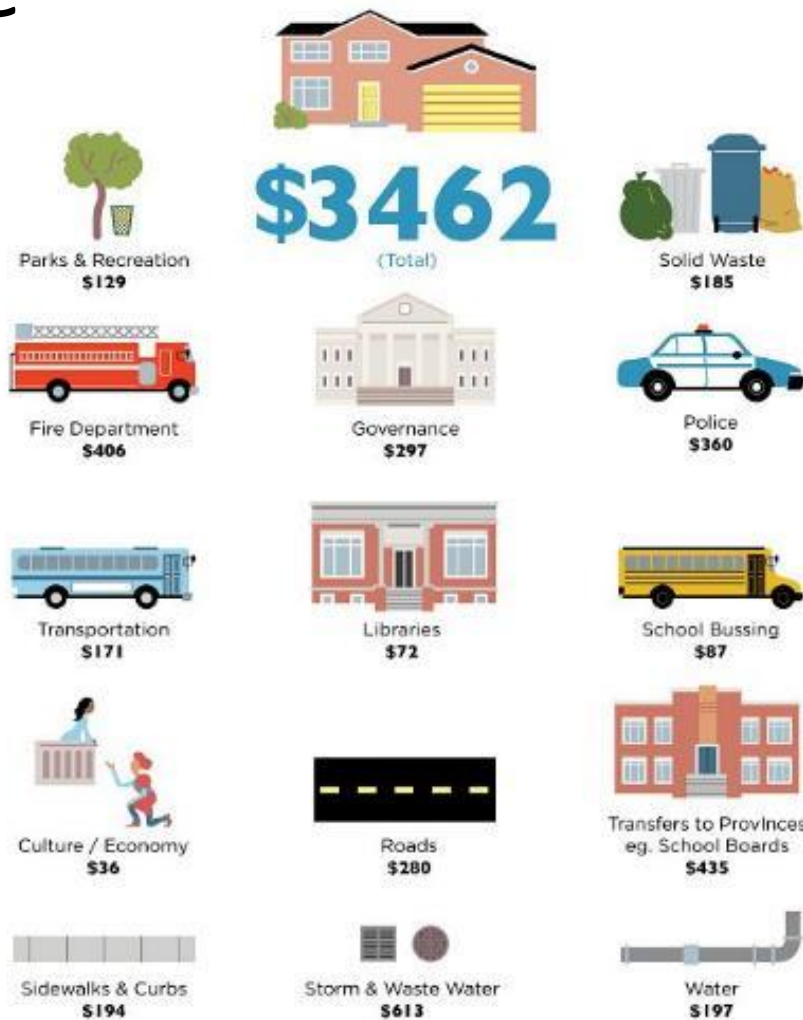
- Applies to all modes

Transport and Land Use

- Increased population/housing density
- Easier/cheaper to provide Public and Active transport infrastructure

Cheaper infrastructure

Suburban City's Annual Cost, per Household



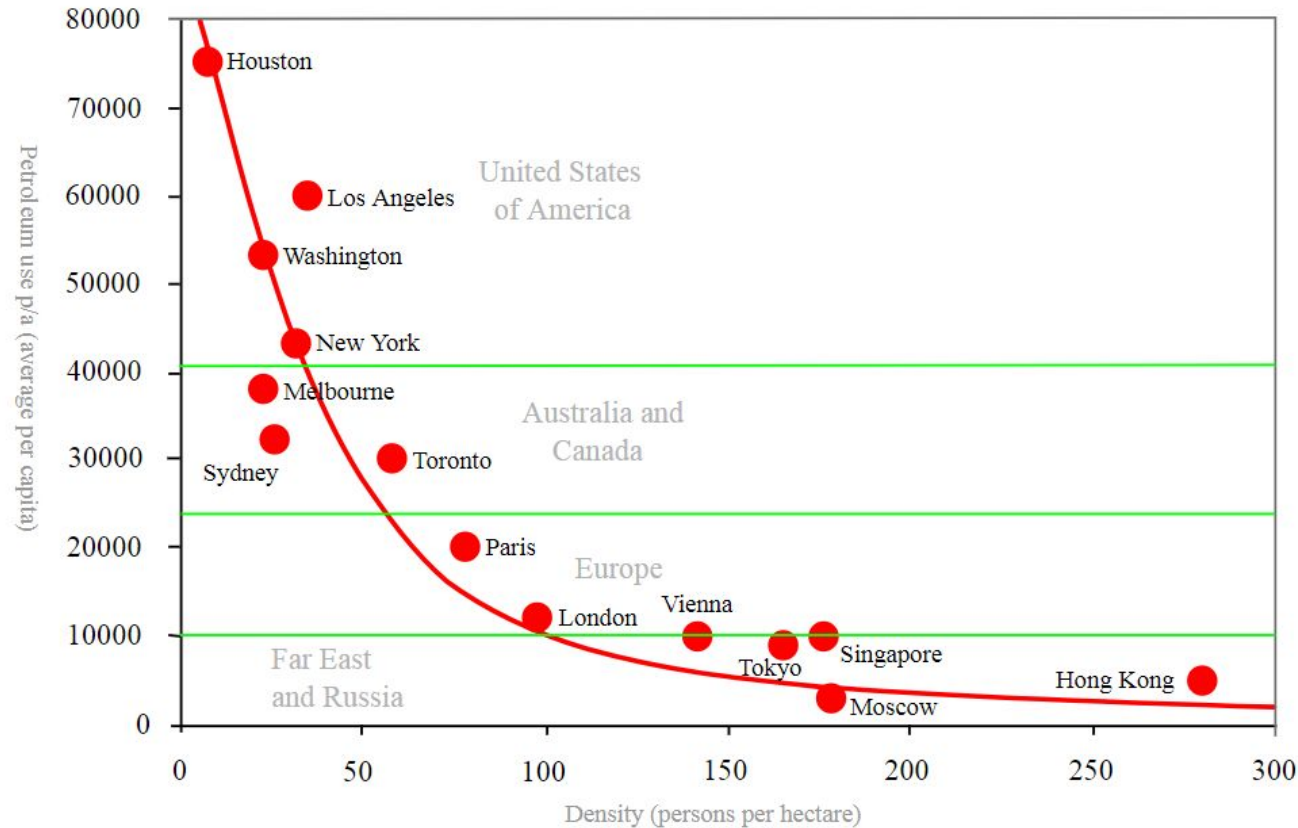
Urban City's Annual Cost, per Household



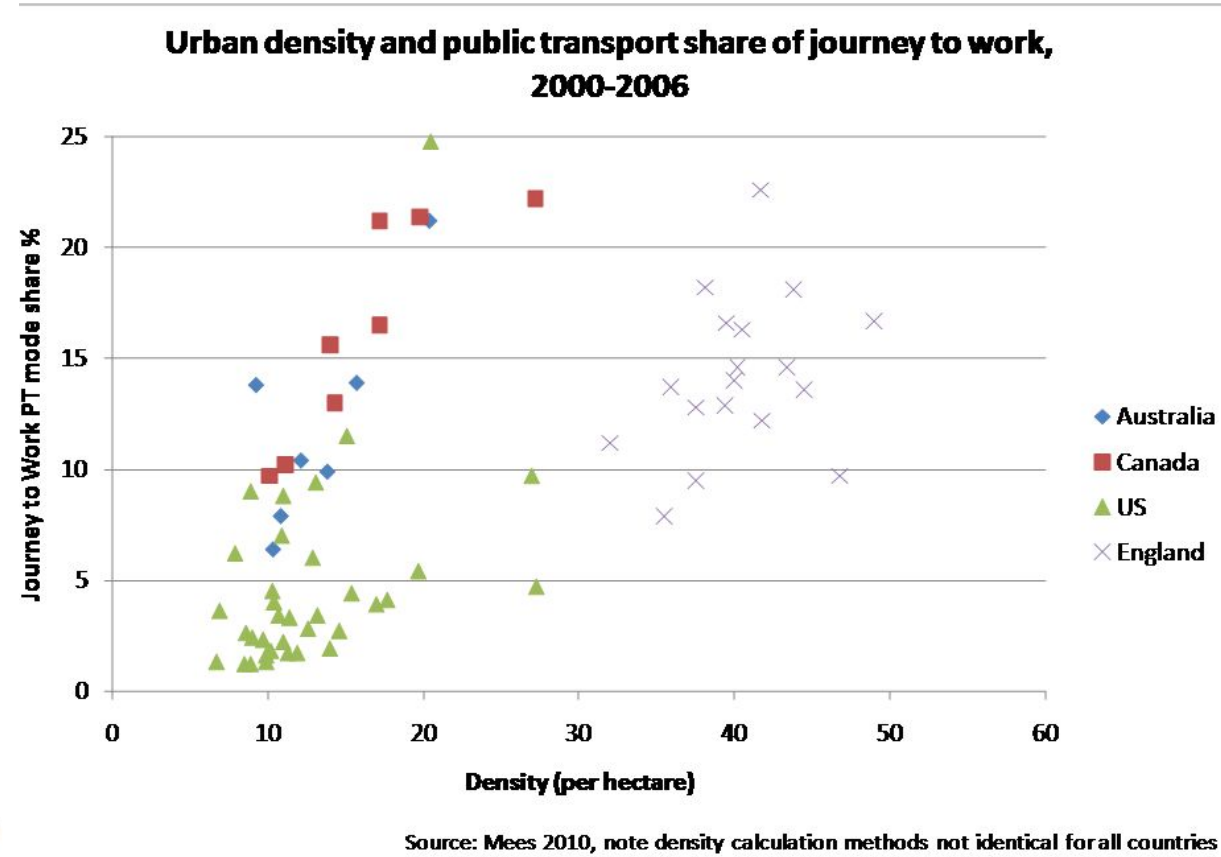
<https://i0.wp.com/usa.streetsblog.org/wp-content/uploads/sites/5/2015/03/sprawlurban.jpg>

Transport and land use

A commonly used study of 32 cities by Newman & Kenworthy in 1989 concluded that there was a strong link between urban development densities and petroleum consumption.



Annual petroleum use per capita adjusted to US MJ (1980)
 After Andrew Wright Associates, small section taken from 'Towards an Urban Renaissance',
 Urban Task Force Partnership, 1999, © DETR, 1999



Source: Mees 2010, note density calculation methods not identical for all countries



Melbourne



Transport and Land Use

- Increased population/housing density
- 15 minute communities
- Your daily needs within 15 minutes walk/bike of home

Avoid, Shift, Improve (ASI)



Avoid-Shift-Improve Framework in Support Low Carbon Mobility

Avoid

Avoid and reduce the need for motorized travel

Shift

Shift to more environmentally friendly modes

Improve

Improve energy efficiency of transport modes



Improve

- Improve energy efficiency of transport modes
 - Incentivise purchase of EVs
 - RUC exemption for EVs
 - Biofuels
 - Electric buses
 - Clean car standard
 - Clean car discount

Avoid

- Avoid and reduce the need for motorized travel
 - Working from home
 - Density rules
 - Urban Growth Partnerships
 - National Policy Statement on Urban development
 - Resource Management Act 1991 review

Shift

- Shift to more environmentally friendly modes
 - Encourage other modes
 - Allocate more funding in the GPS
 - Invest in cycling, public transport etc
 - Increase central govt share of costs (often 50/50)
 - Price 'polluting' modes

Public transport

- Provide high quality service
 - Fast
 - Cheap
 - Reliable
 - Goes where people want
- Easier if higher population/household density
- Level of investment/subsidy

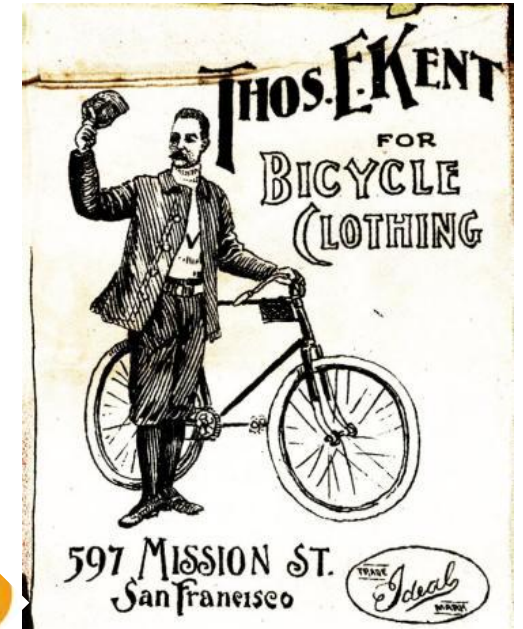
Mass Rapid Transit

- Rail vs Light Rail vs Tram vs Trackless Tram vs Bus
- Trade offs
 - Speed
 - Regularity of stops
 - Flexibility of route
 - Cost
- Valued capture/uplift

Congestion pricing, road tolls etc

- Congestion pricing
 - Price road use to deter travel
 - Time of day
 - Location
 - Re-invest funds
- Road tolls
 - Charge to use (and pay for) roads
 - Sometime privately built

Barriers to cycling



Source: Kingham S, Koorey G and Taylor K, 2011, Assessment of the type of cycle infrastructure required to attract new cyclists. NZTA Research Report 449. <https://www.nzta.govt.nz/resources/research/reports/449/>

4 types of cyclist

**Strong &
fearless**



Interested but concerned
~ 50 - 60%

**Not able or not
interested ~33%**



**Enthusied &
confident**

People-centred planning

- Houten, Netherlands
- *filtered permeability*
 - Dense network of direct routes for cyclists
 - Coarse network of general roads, offering limited city centre access to cars
 - Strong focus on rail and bike
 - Car on the perimeter

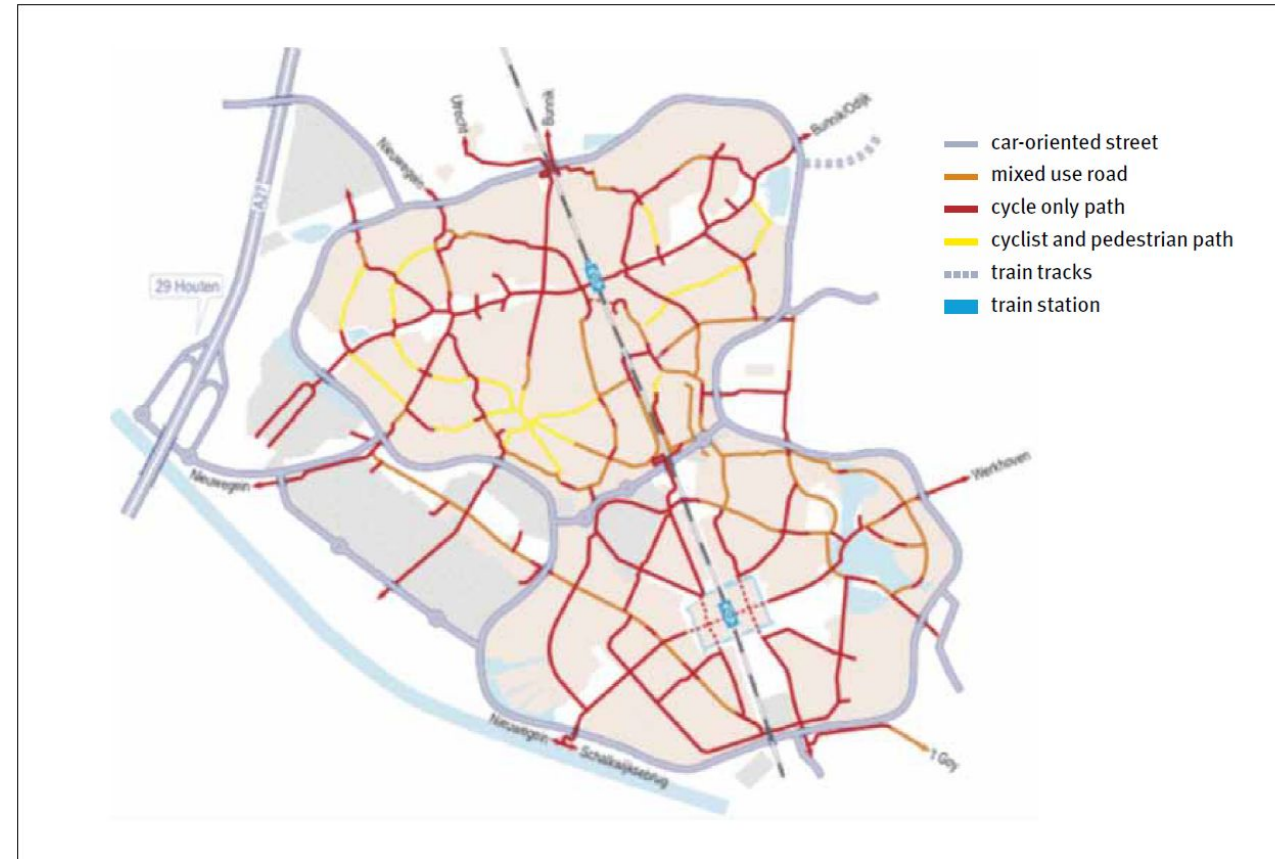
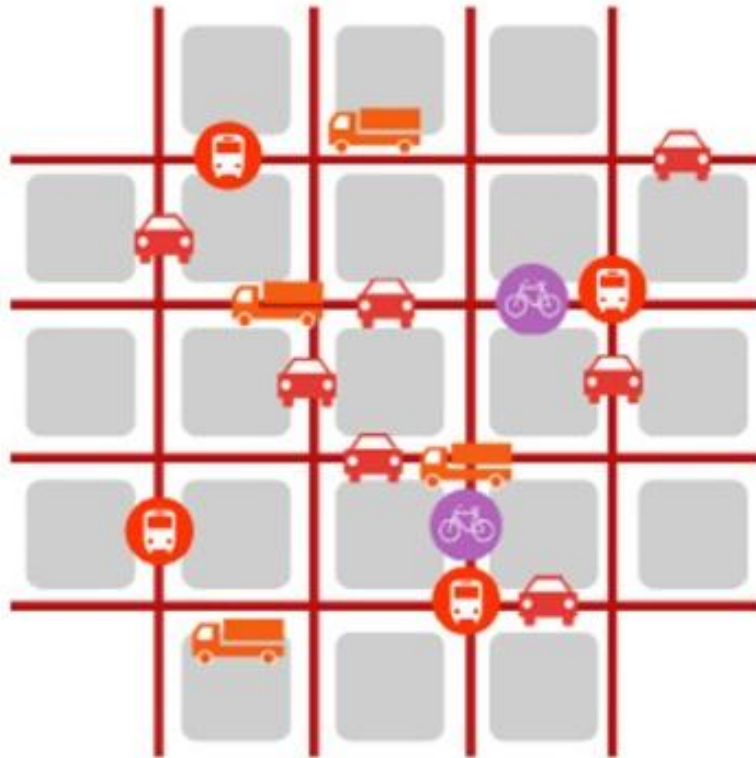


Figure 1: Street Layout of Houten

Barcelona Superblocks





Current Model



Superblocks Model



-  PUBLIC TRANSPORT NETWORK
-  BICYCLES MAIN NETWORK (BIKE LANE)
-  BICYCLES SIGNPOSTS (REVERSE DIRECTION)
-  FREE PASSAGE OF BICYCLES

-  PRIVATE VEHICLE PASSING
-  RESIDENTS VEHICLES
-  URBAN SERVICES AND EMERGENCY
-  DUM CARRIERS

-  DUM PROXIMITY AREA
-  ACCESS CONTROL
-  BASIC TRAFFIC NETWORK
-  SINGLE PLATFORM (PEDESTRIANS PRIORITY)

Barcelona Superblocks



Barcelona Superblocks



Auckland

<https://content.aucklanddesignmanual.co.nz/resources/case-studies/street-fort-street-precinct/Documents/ADM%20Case%20Study%20Fort%20Street%20Precinct%20Auckland.pdf>



<https://www.stuff.co.nz/life-style/home-property/72930841/shared-space-lifts-fort-street>

People-focused streets & communities

- Lower traffic / Lower speeds
- Modal filters / filtered permeability
 - e.g. sometimes limit through traffic

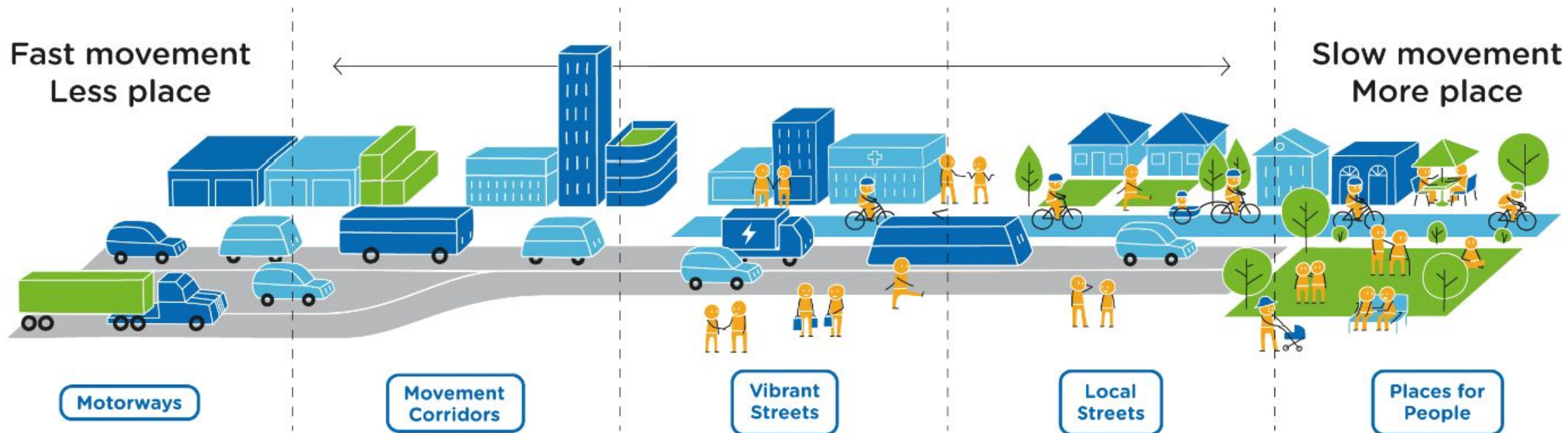
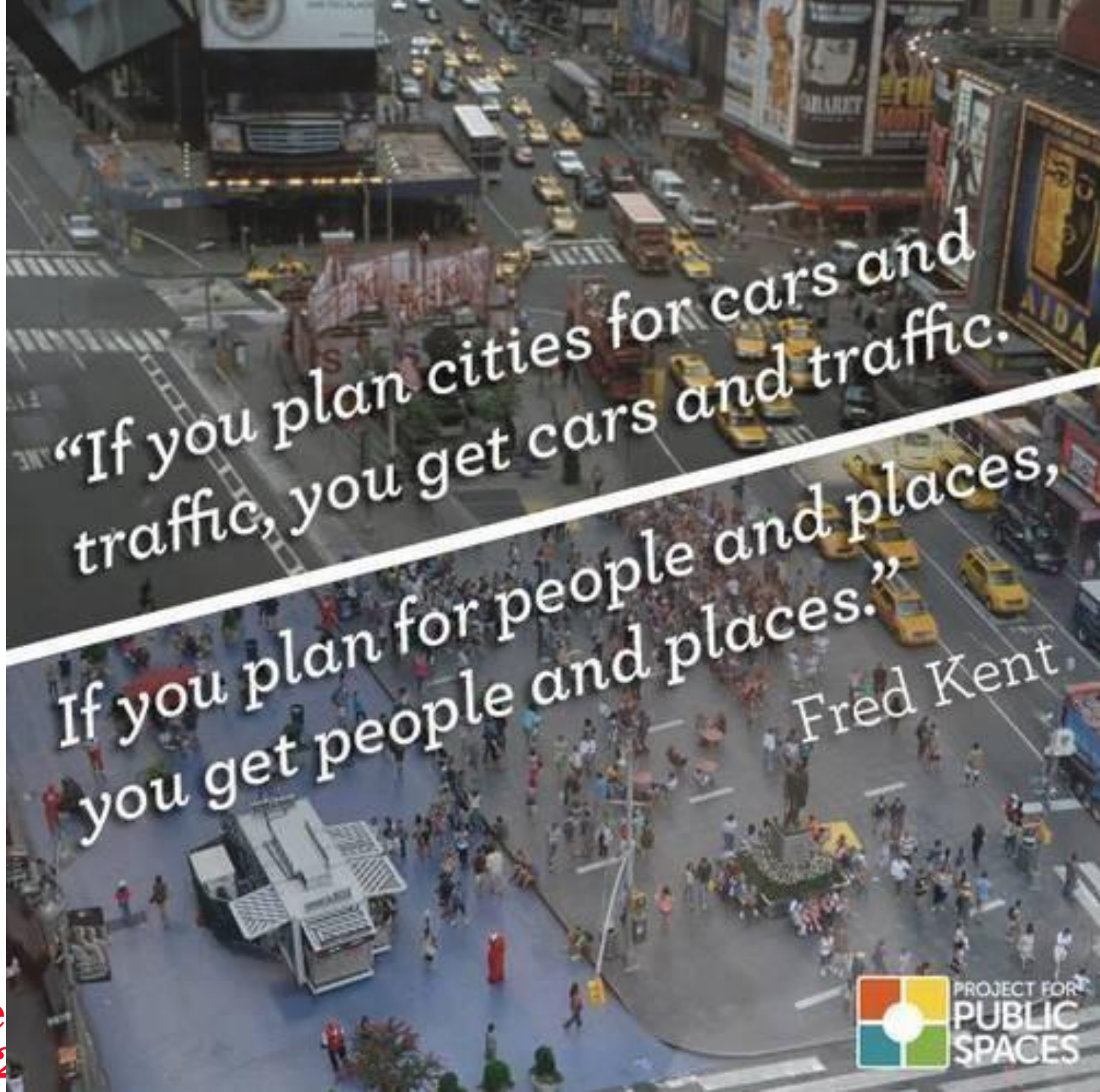


Figure 7. Movement and Place Framework

People need choices

- When people have choices e.g.
 - Walking
 - Cycling
 - Public transport
- They don't all choose to drive
- Increasing density helps the provision of more transport choices



“If you plan cities for cars and traffic, you get cars and traffic.”

If you plan for people and places, you get people and places.”

Fred Kent