



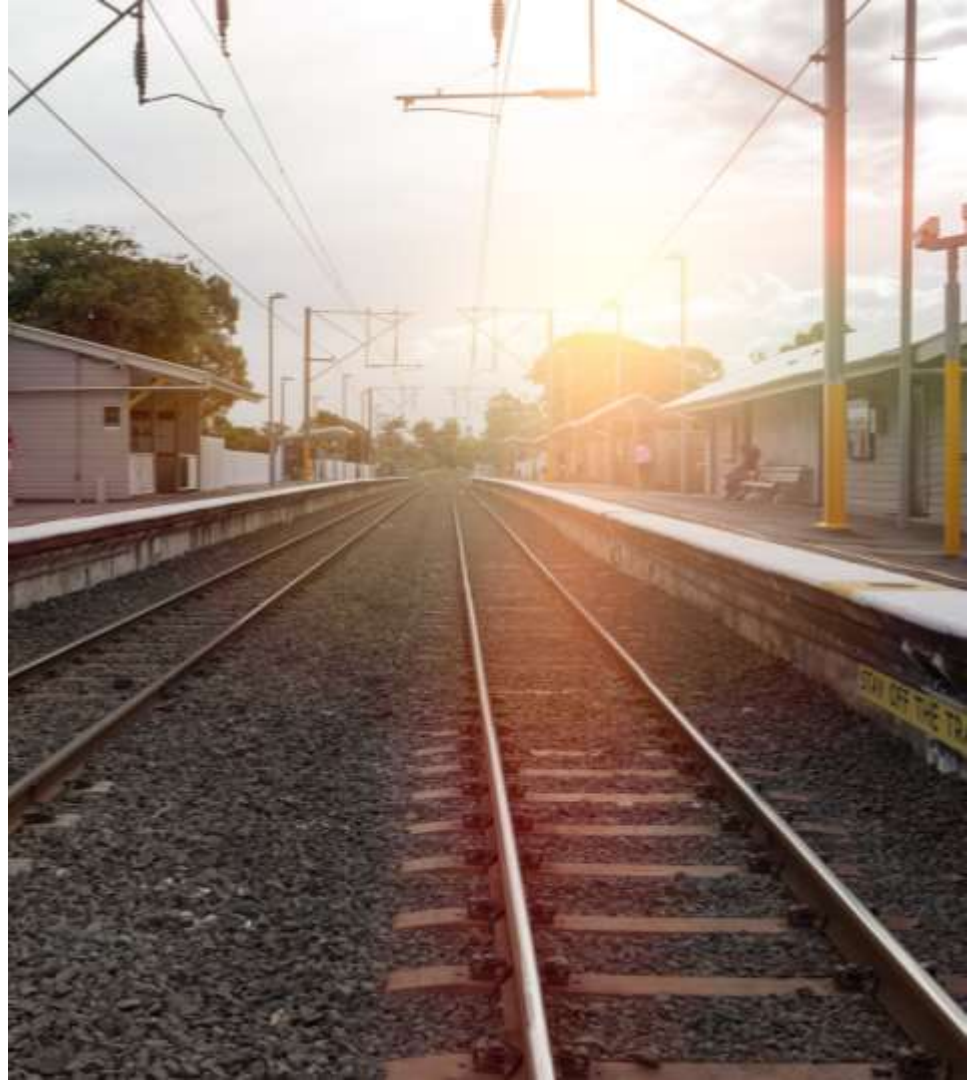
Time Travel

Megatrends shaping the future of
Queensland's transport system

Claire Naughtin and Stefan Hajkowicz, Insight
team

Property Forum – Innovation and Excellence | 27 August 2021

Australia's National Science Agency





Megatrends



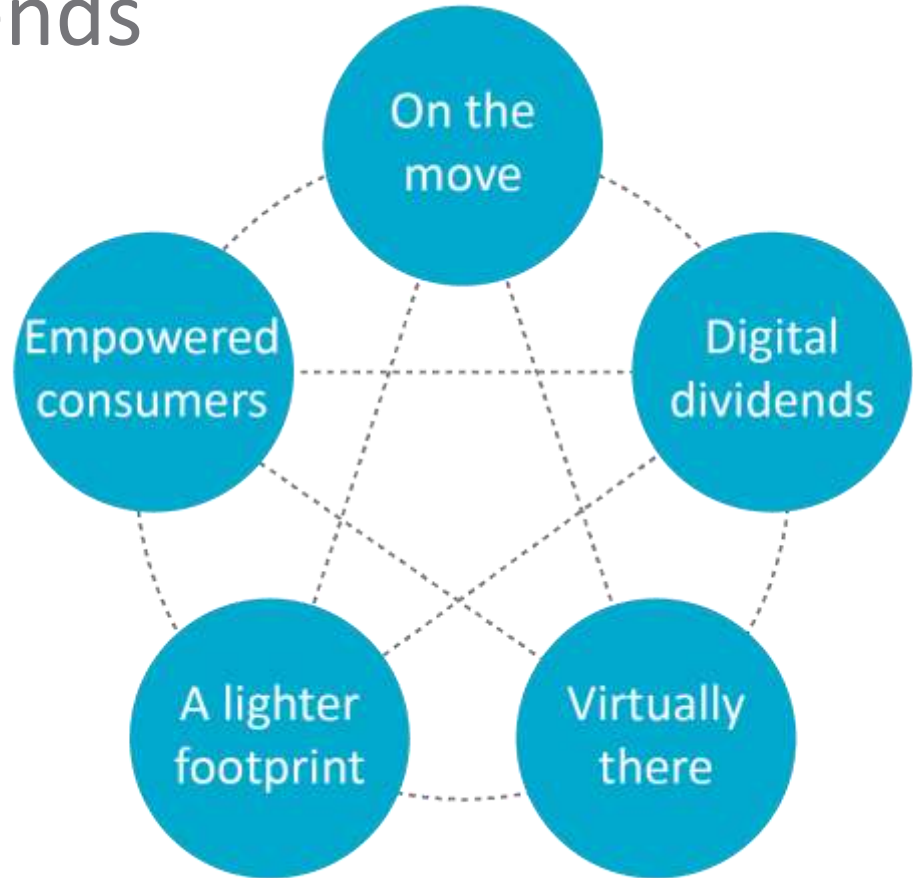
Purple dye showing a rip current at Tamarama Beach, Sydney. Research by University of New South Wales surf scientist, Dr Rob Brander, reported by ABC News, 24 October 2011



Transport megatrends



Queensland
Government

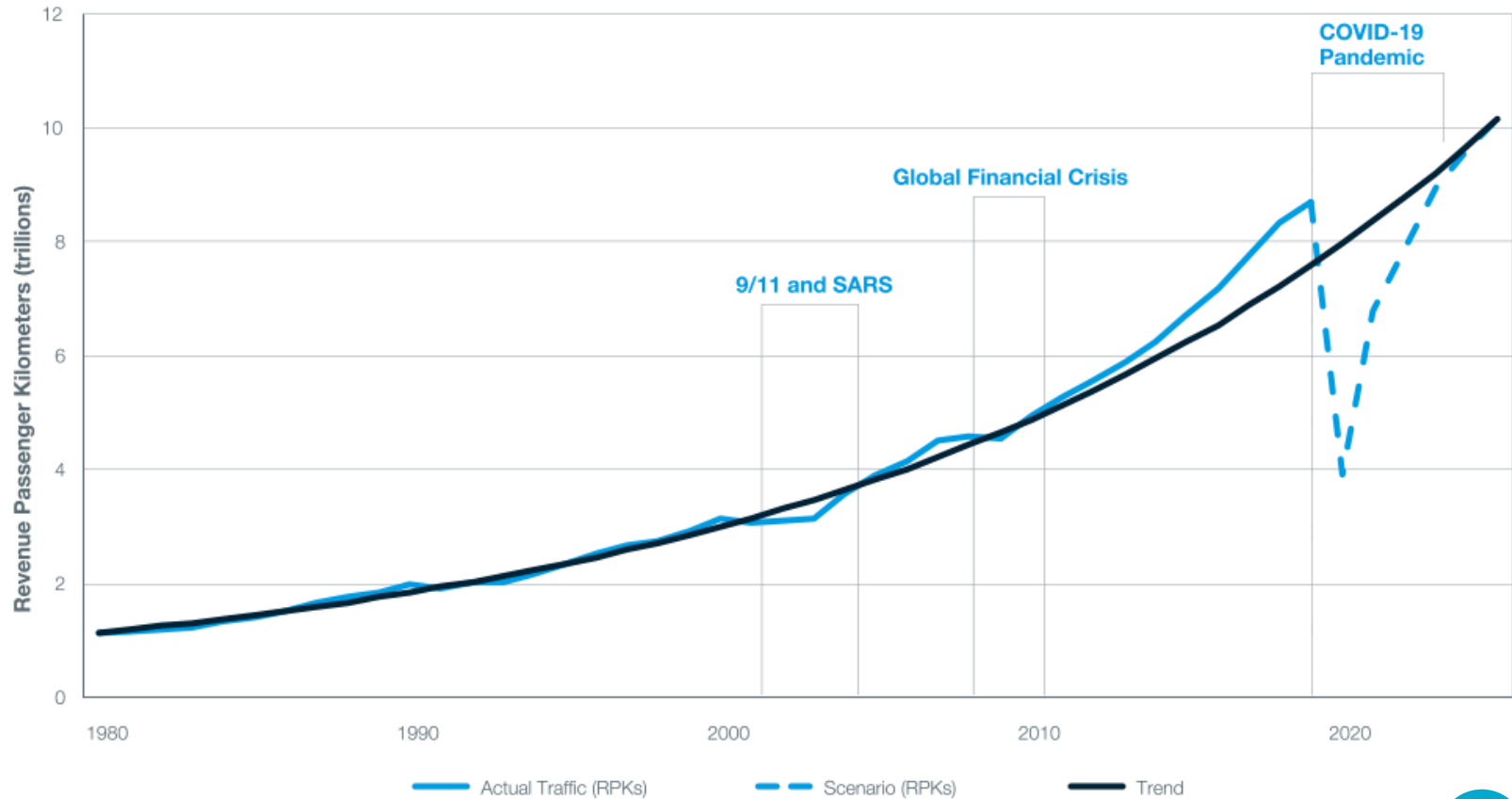




On the move



Aviation proven resilient over and over again

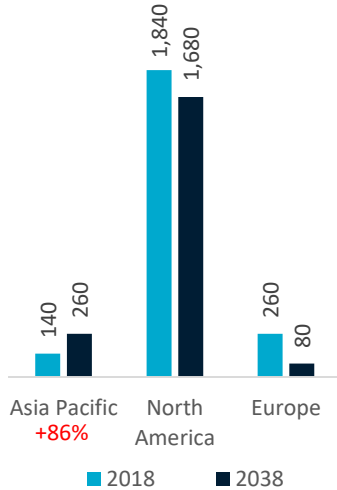


Source: Boeing

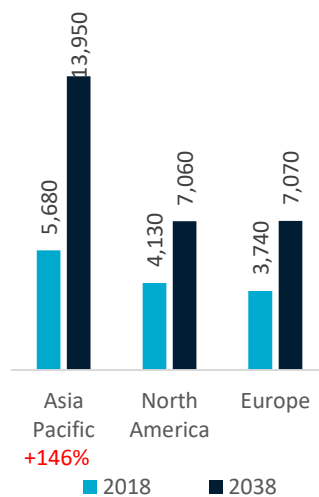
ICAO scheduled traffic through 1999 / 2000-2019E IATA stats / 2020F IATA December 2019

Flights will resume – The Asia Pacific region alone will get 12,000 new jet planes over the coming 20 years; and the world 25,000

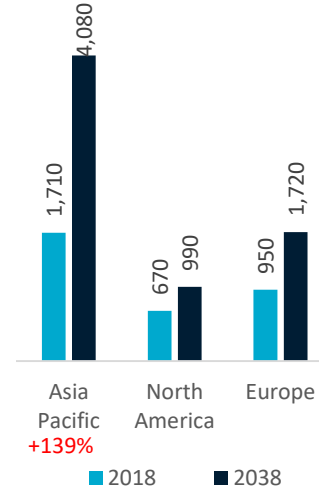
Flights within South Asia, China and South East Asia will see amongst the highest growth in revenue passenger kilometres



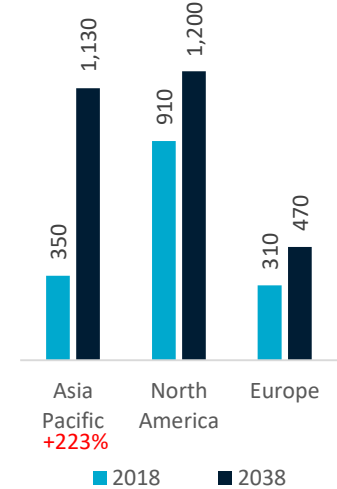
Regional Jets



Single Aisle



Widebody



Freight

Opening in 2020 Brisbane Airport's new 3.3 km runway will see passenger numbers grow from 22.7m/yr to 50 m/yr. This supports the \$150m new theatre at QPAC and the \$3.6bn Queens Wharf Precinct due in 2022.





Average worker commute times in Australia have increased from 3.7 hours/week in 2002 to 4.5 hours per/week in 2017.

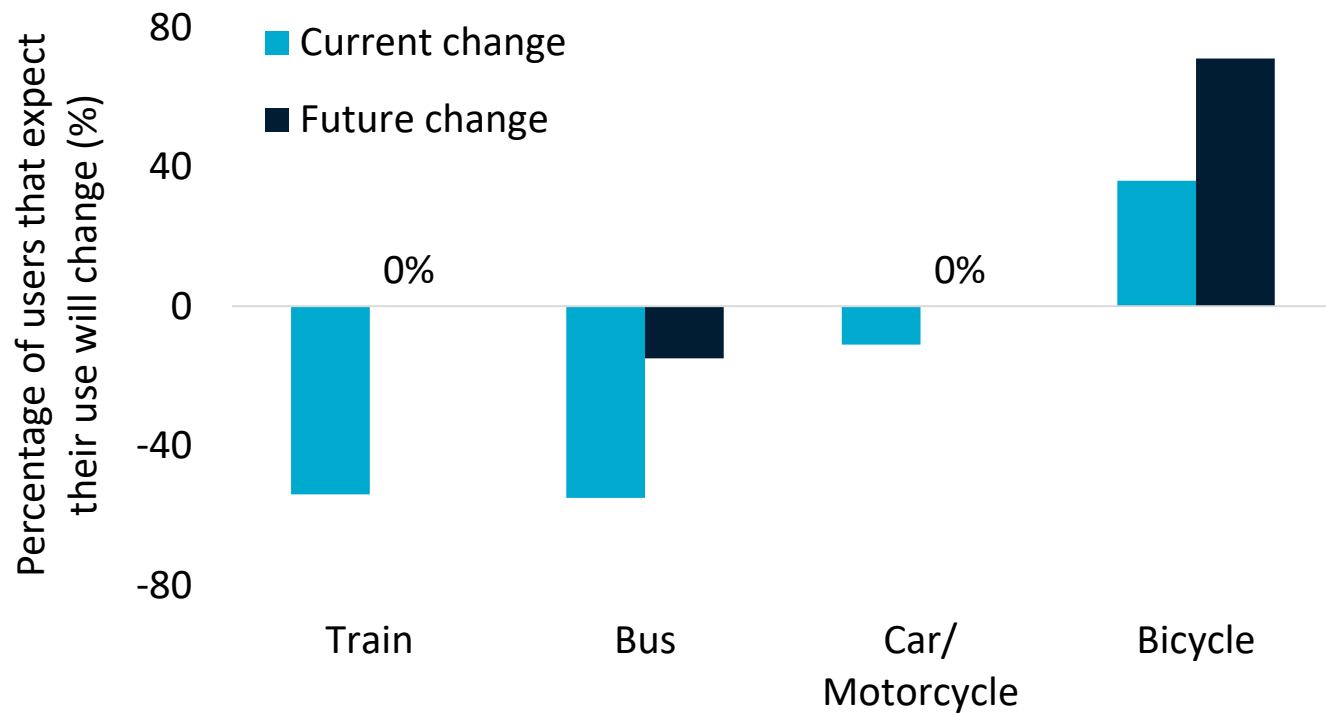
Data source: Household, Income and Labour Dynamics in Australia (HILDA) Survey

“In 2020-21, a record 1.75 million bikes were sold in Australia and, in the past year, 624,000 people have taken up cycling”.

- SMH 6 August and AusPlay Research



Two wheels over four



Source. Transurban

On the Move to a (Big) City. Our four fastest growing urban centres include

1



Melbourne's population has reached 4.9 million with 2.7%/year growth – biggest Australian city 2028; size of London by 2050.

2



Brisbane has a 2% growth rate with 2.4 million people (Gold and Sunshine Coast also with rapid growth)

3



Sydney has a population of 5.1 million with an annual growth rate of 2%

4



Canberra is growing 1.7% per year with a population of 410,000.

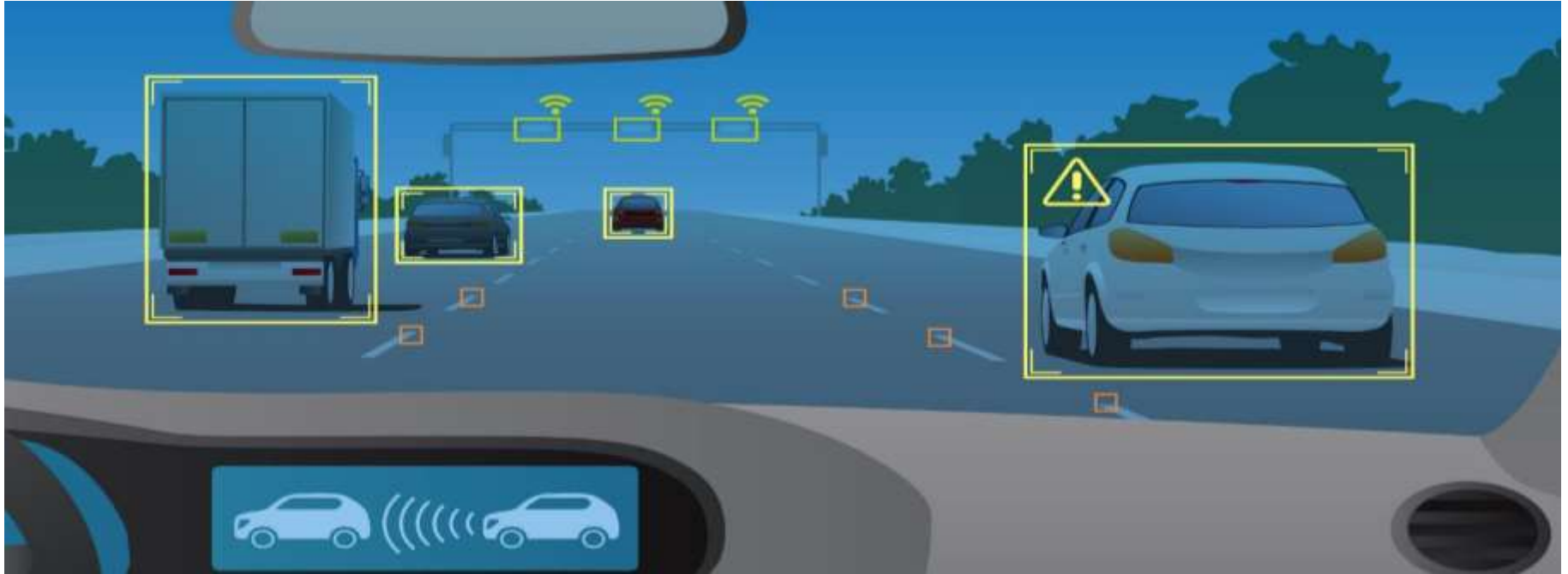


Over 1.5 billion people worldwide and over 815 million in Asia will move from rural to urban areas between 2020 and 2040.

Digital dividends



Making our roads safer



Sources. Keeney (2017) *ARK Invest*; Fagnant and Kockelman (2015) *Transportation Research Part A: Policy and Practice*

Human in the loop (HITL) issues

Future healthcare workers will need to be good at working harmoniously with artificial intelligence and autonomous systems. Reflecting on the voyage of the Viking Cruise Ship in Norway *en route* from Tromsø to Stavanger in 2019.



Image source: ABC News
Data source: Accident Investigation Board Norway Interim Report
(27 March 2020), Media Reports, Wikipedia

Using data science to beat traffic congestion



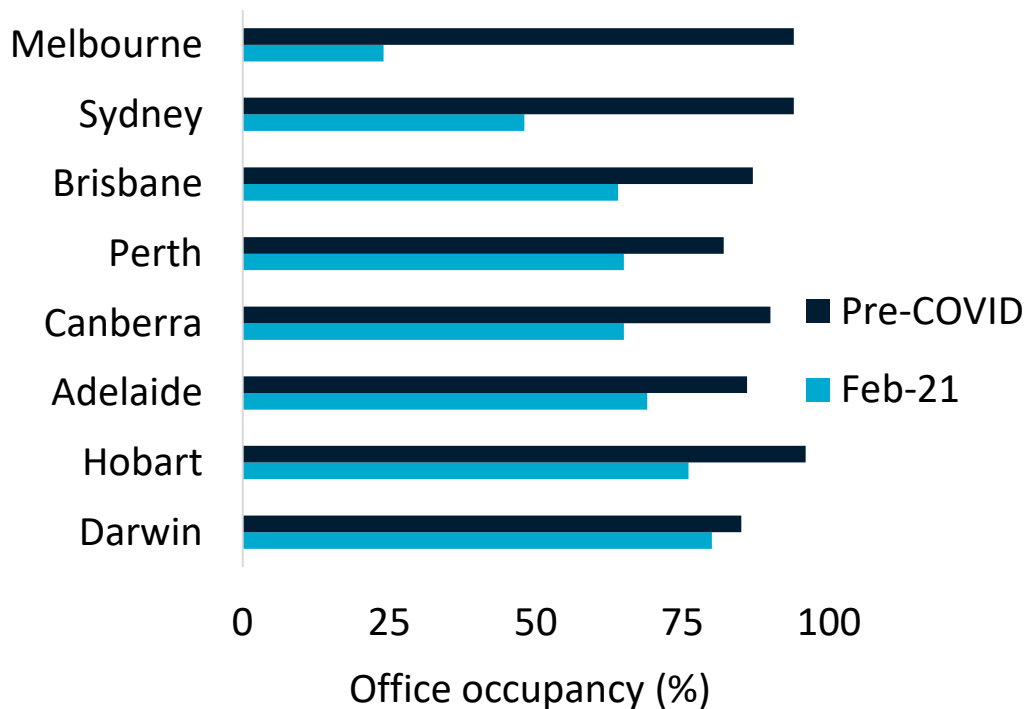
CSIRO Data61's Advanced Data Analytics in Transport team is using large amounts of disparate data and cutting-edge deep learning to achieve **rapid, high-performance speed predictions** for the road network



Virtually there



An 'office-less' workforce

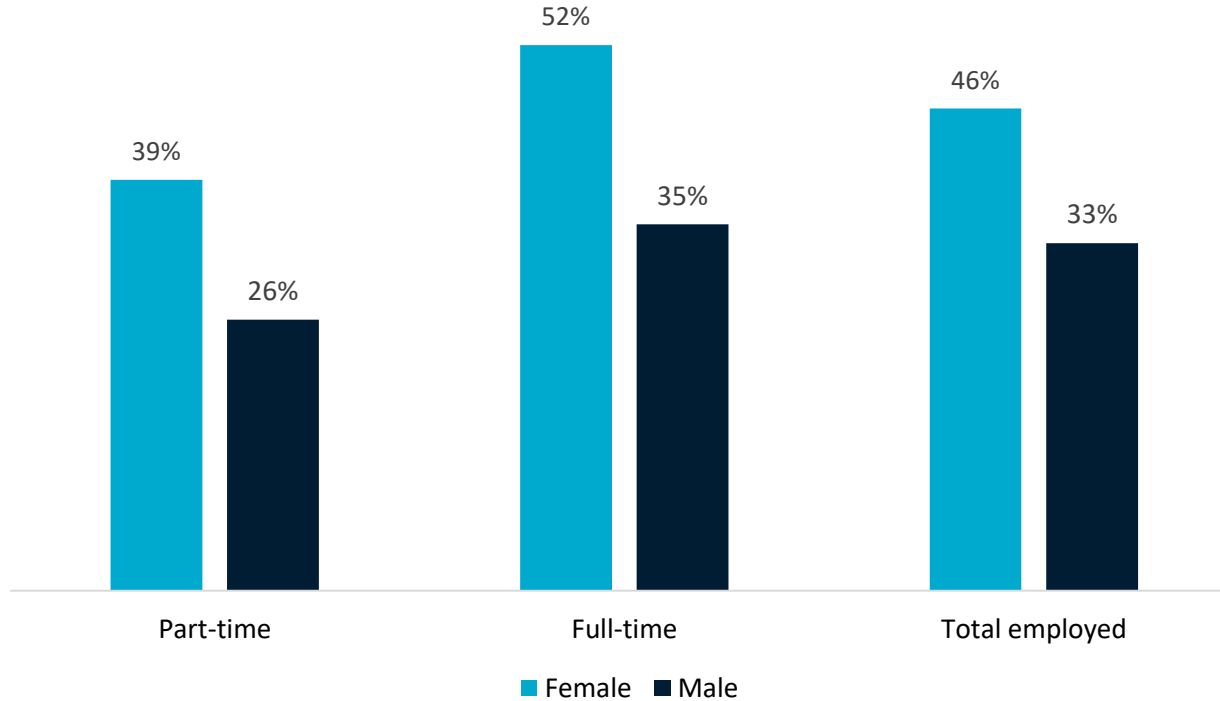


3.3 days

the average number of days that workers want to spend in the office per week, preferably Thursday and not Monday and Friday

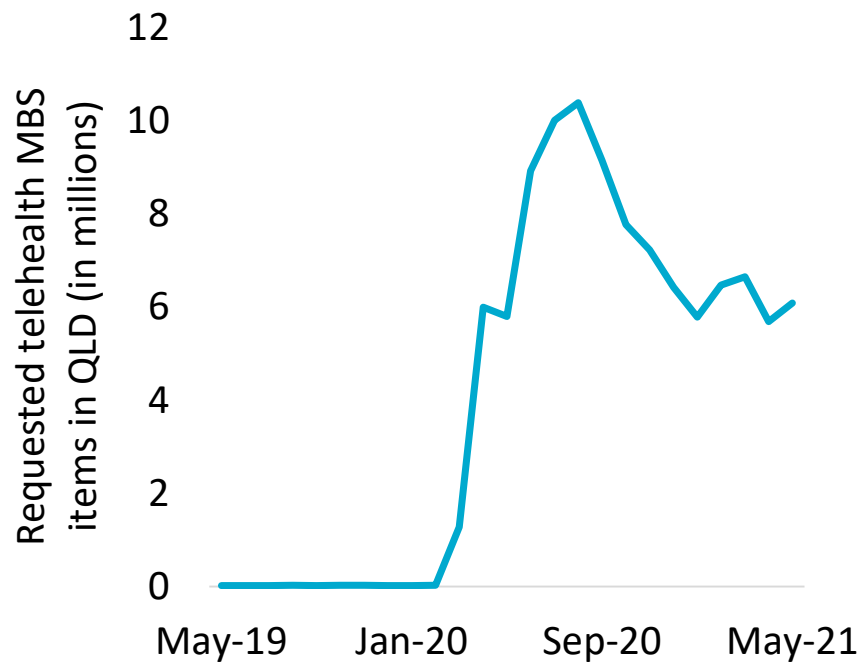
Source. EY and Property Council of Australia, 2021,
Reimagining our Economic Powerhouses

Researchers estimate that 39% of all jobs in Australia can be done via remote teleworking

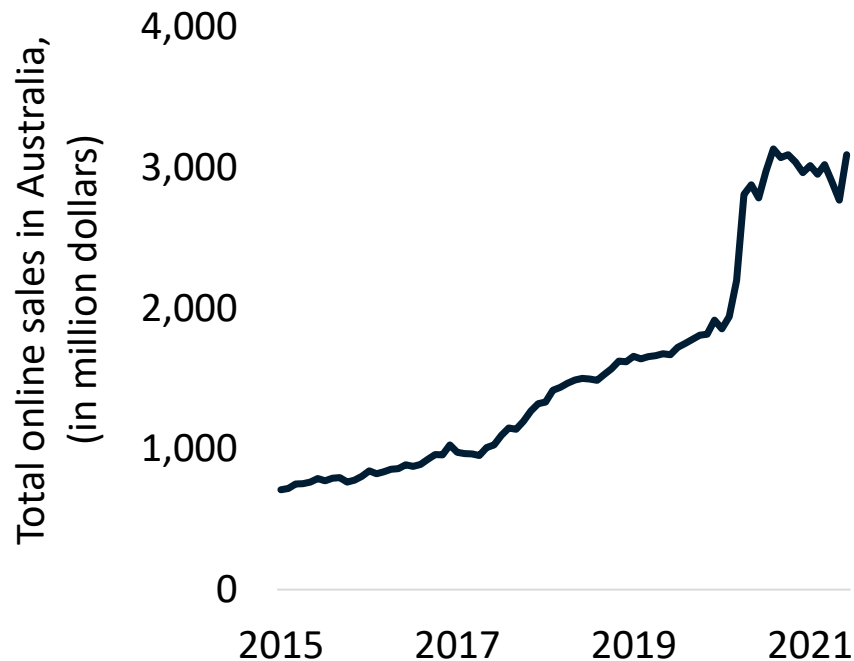


Data source: Ulubasoglu and Onder (2020) The Conversation (29 June).

Online services have sky-rocketed from COVID



Source. Services Australia



Note. Data reflects seasonally adjusted series
Source. Australia Bureau of Statistics



Does Working from Home Work? Evidence from a Chinese Experiment *

Nicholas Bloom, James Liang, John Roberts, Zhichun Jenny Ying

The Quarterly Journal of Economics, Volume 130, Issue 1, February 2015, Pages 165–218,

<https://doi.org/10.1093/qje/qju032>

Published: 20 November 2014



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Abstract

A rising share of employees now regularly engage in working from home (WFH), but there are concerns this can lead to “shirking from home.” We report the results of a WFH experiment at Ctrip, a 16,000–employee, NASDAQ–listed Chinese travel agency. Call center employees who volunteered to WFH were randomly assigned either to work from home or in the office for nine months. Home working led to a 13% performance increase, of which 9% was from working more minutes per shift (fewer breaks and sick days) and 4% from more calls per minute (attributed to a quieter and more convenient working environment). Home workers also reported improved work satisfaction, and their attrition rate halved, but their promotion rate conditional on performance fell. Due to the success of the experiment, Ctrip rolled out the option to WFH to the whole firm and allowed the experimental employees to reselect between the home and office. Interestingly, over half of them switched, which led to the gains from WFH almost doubling to 22%. This highlights the benefits of learning and selection effects when adopting modern management practices like WFH.

Making Remote Work Increasingly Feasible



CSIRO Wearable Technology



CSIRO Haptic Workbench

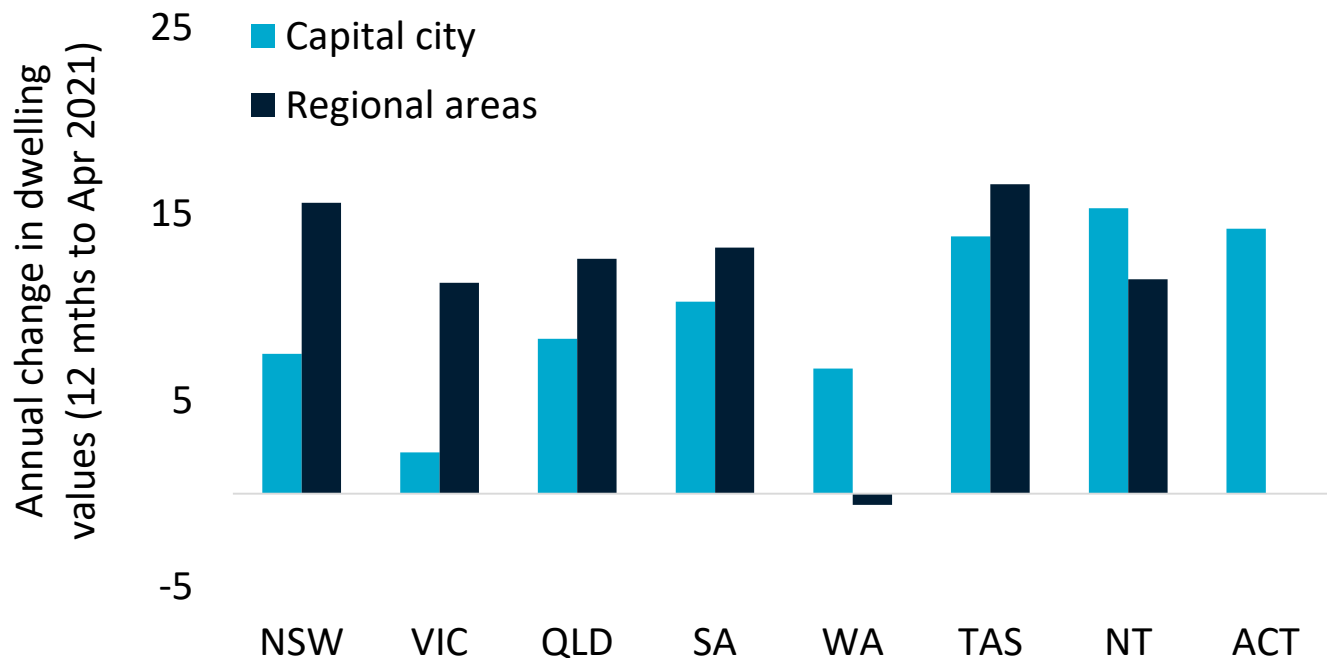
In the past 12-months there has been a 23% rise in dwelling prices in regional areas compared to the national average of 17%.



Data source: Core logic

Image: Huon Valley, Tasmania (Shutterstock)

Growth in regional property locations



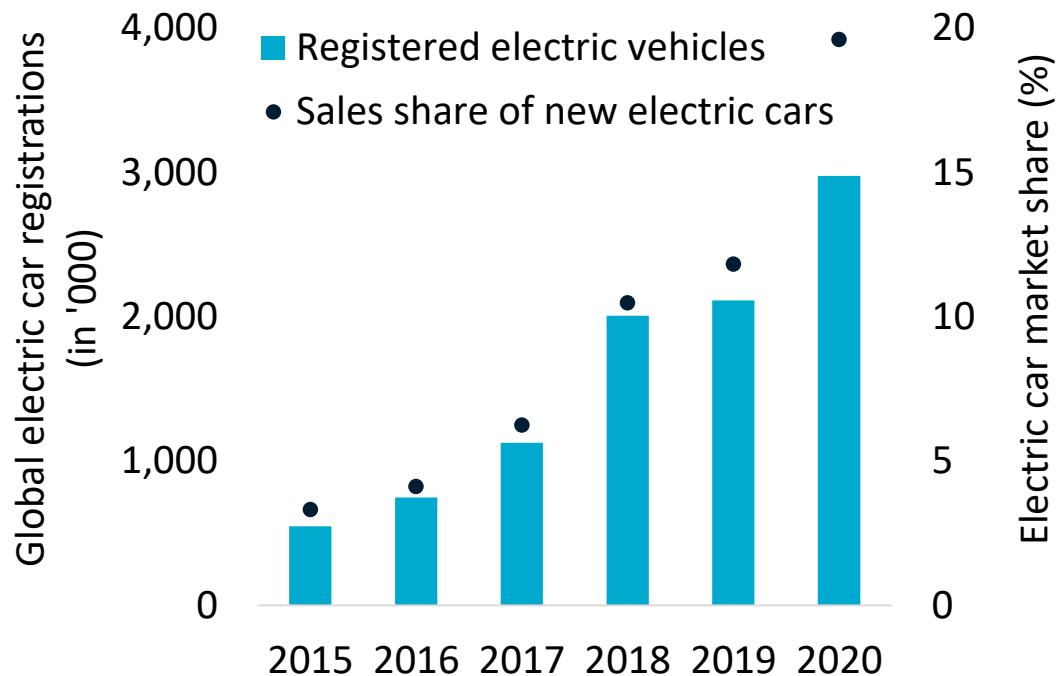
Source. CoreLogic



A lighter footprint

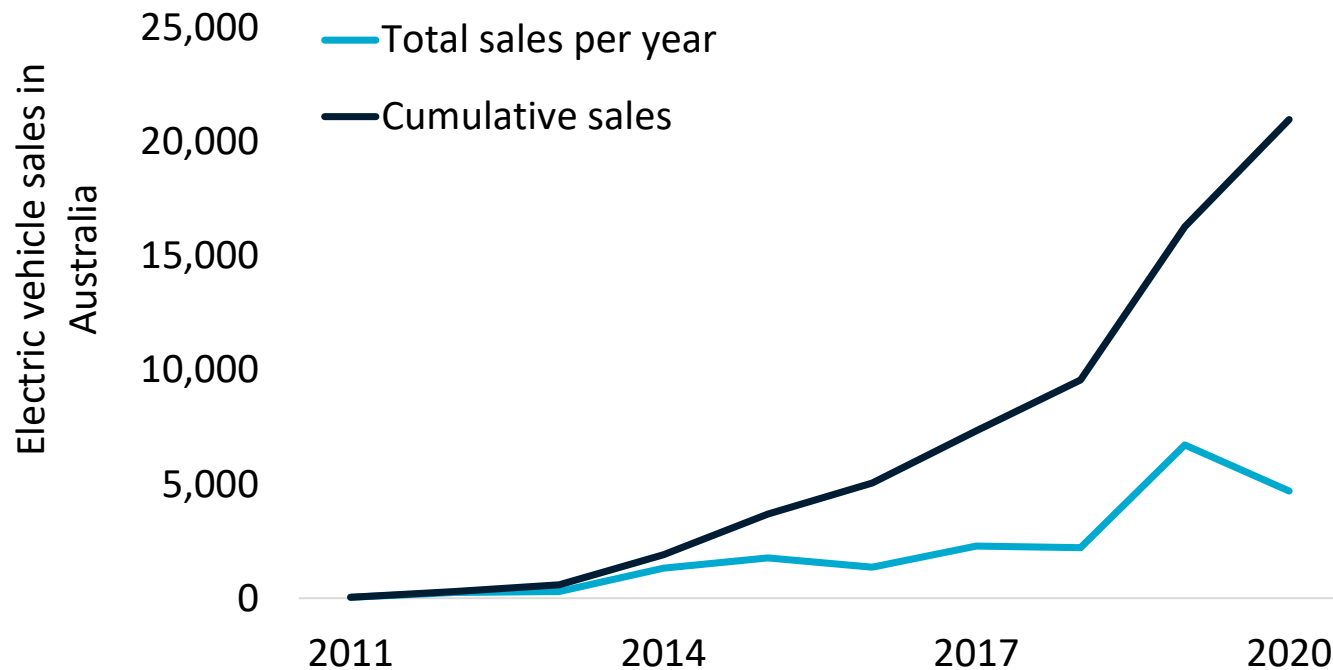


A push to phase out petrol-powered vehicles



Source. International Energy Agency

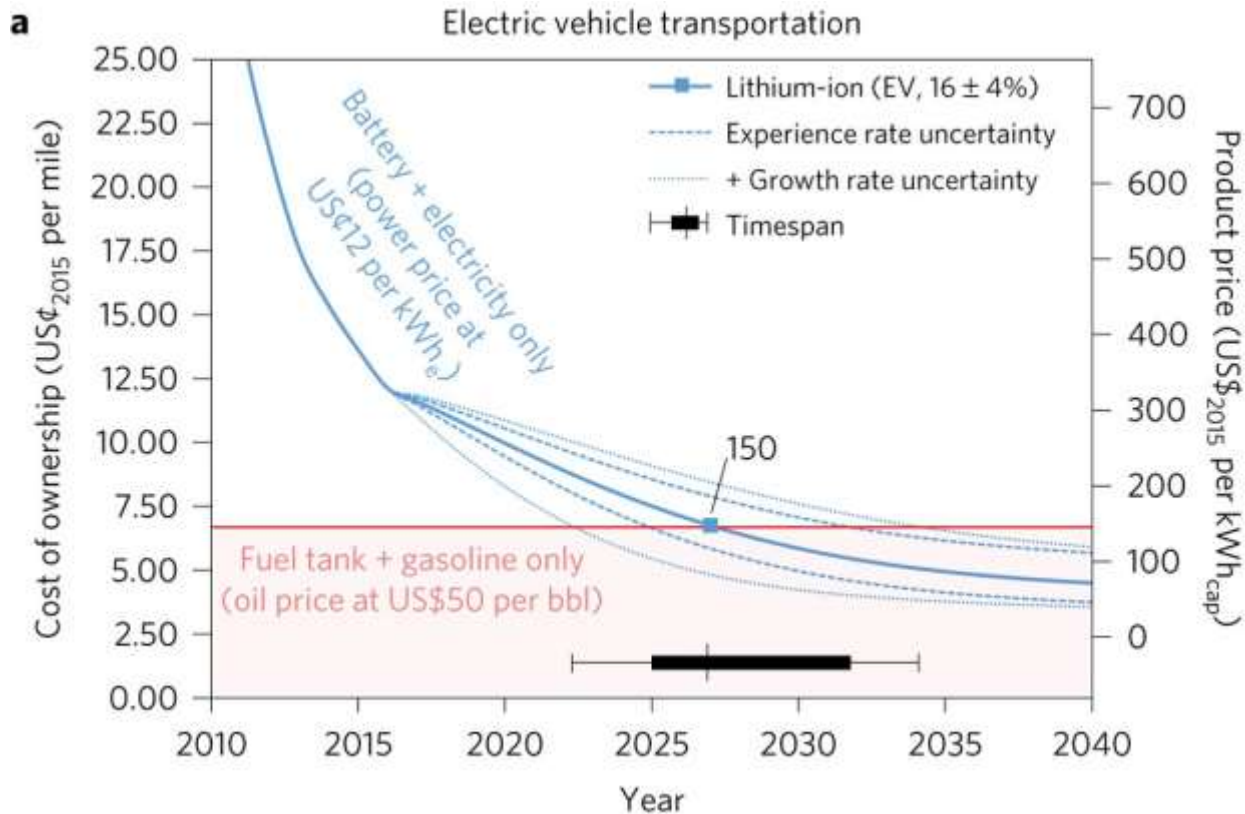
Australia lags behind on EV uptake



Source. The Driven

More From Less – Declining costs of electric cars

Published by Schmidt et al. on 10 July 2021 in *Nature Energy*



Sion Power Announces Licerion-EV Targeting Electric Vehicles with a Large Format 17 Ah, 400 Wh/kg Cell

4 March 2021, Tuscon Arizona



Image source: Sion Power

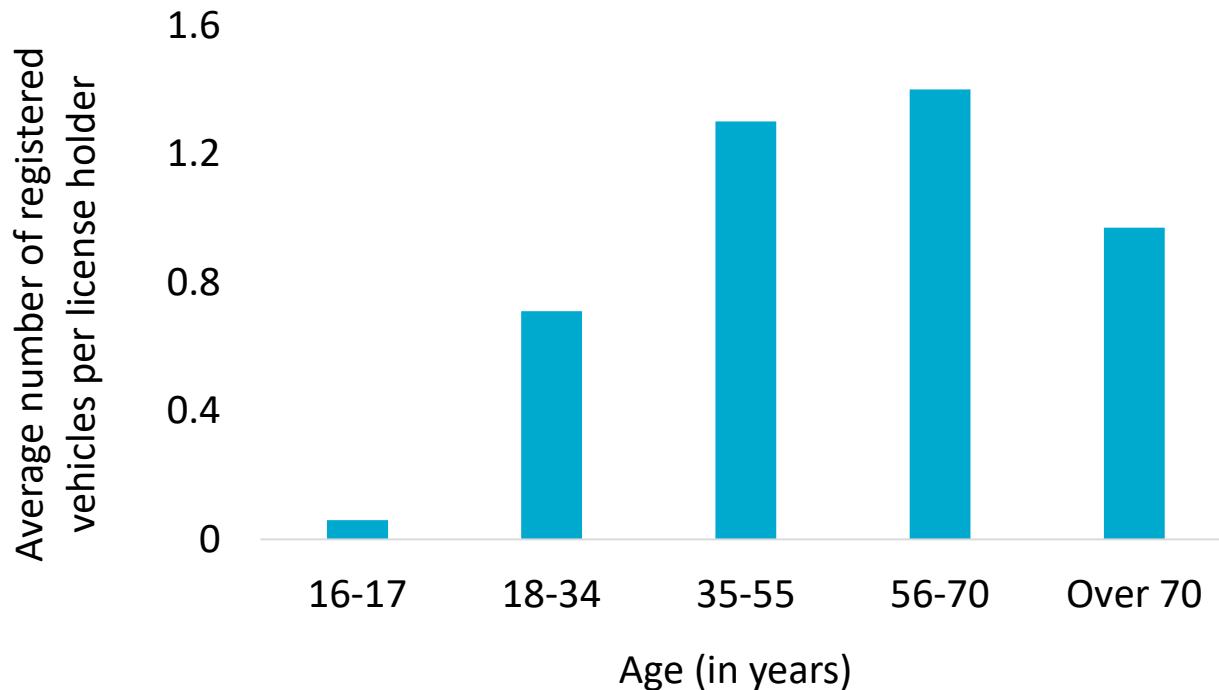
By comparison the energy density of batteries Tesla's Model 3 is approximately 260 Wh/kg. In a 2018 NASA Aerospace Battery Workshop Sion Power identify a roadmap to 640 Wh/kg for Licerion Batteries.



Empowered consumers

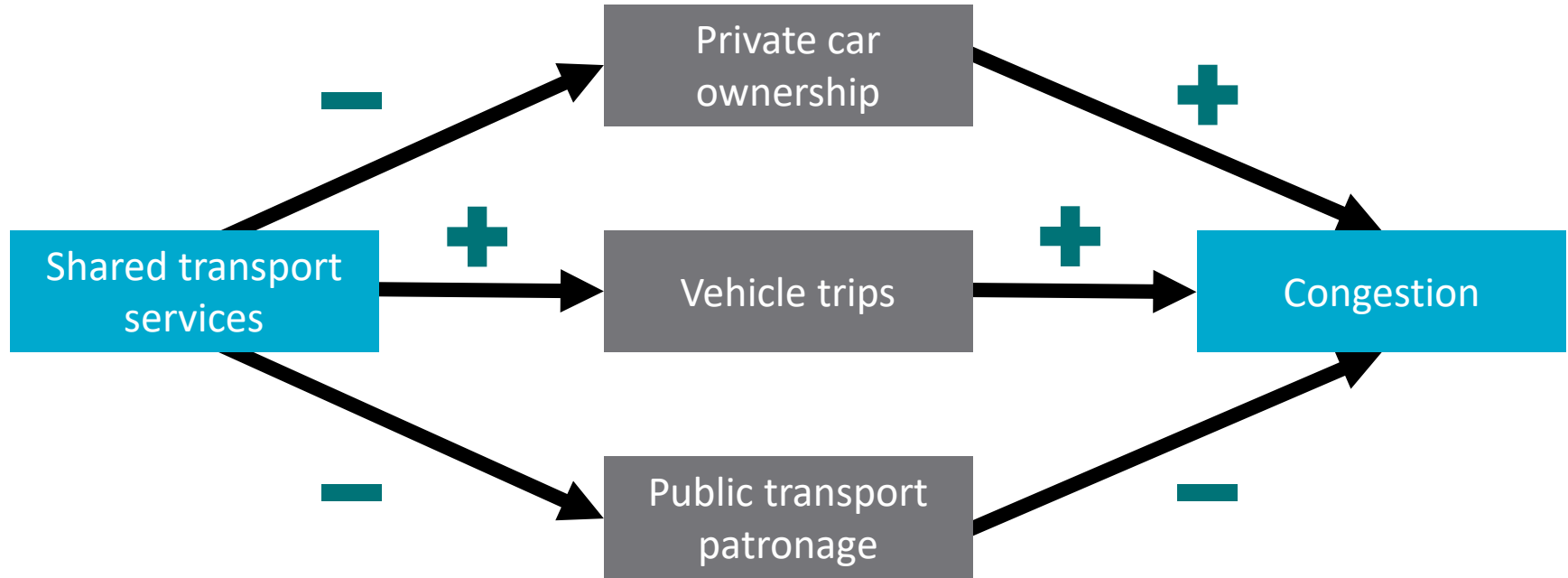


Younger generations may be less likely to own a car



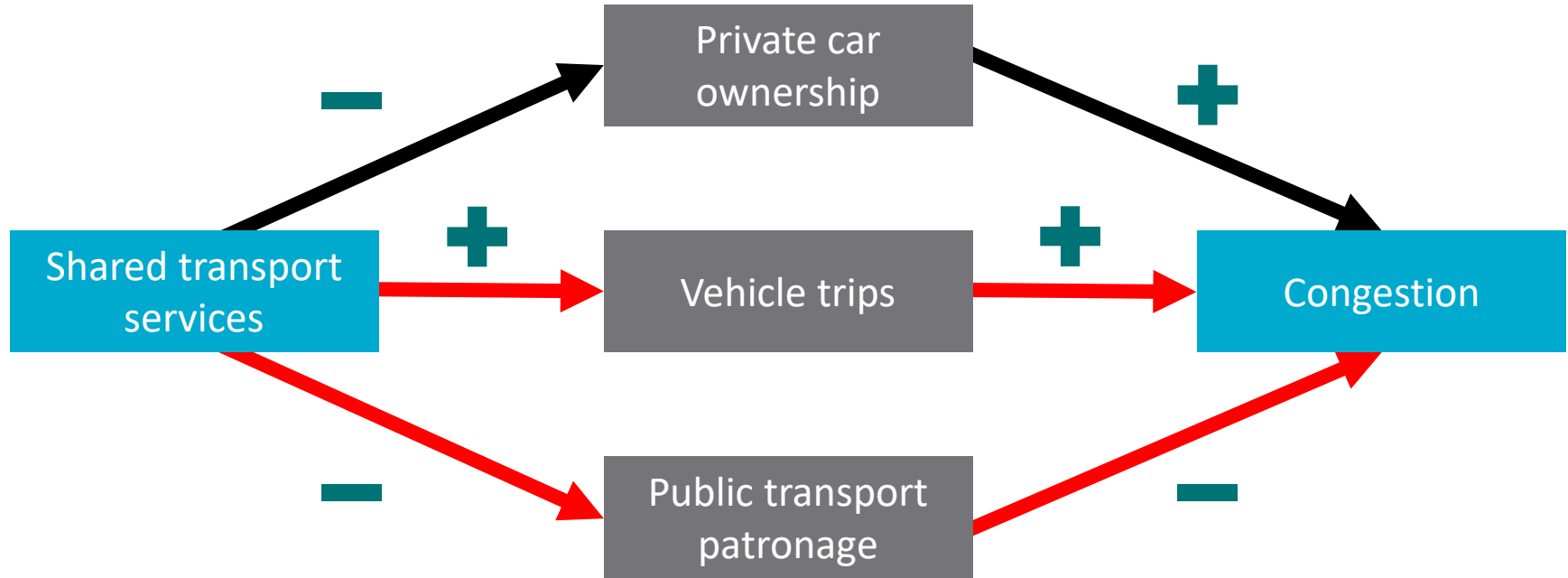
Source: Department of Transport and Main Roads

The sharing economy: More harm than good?



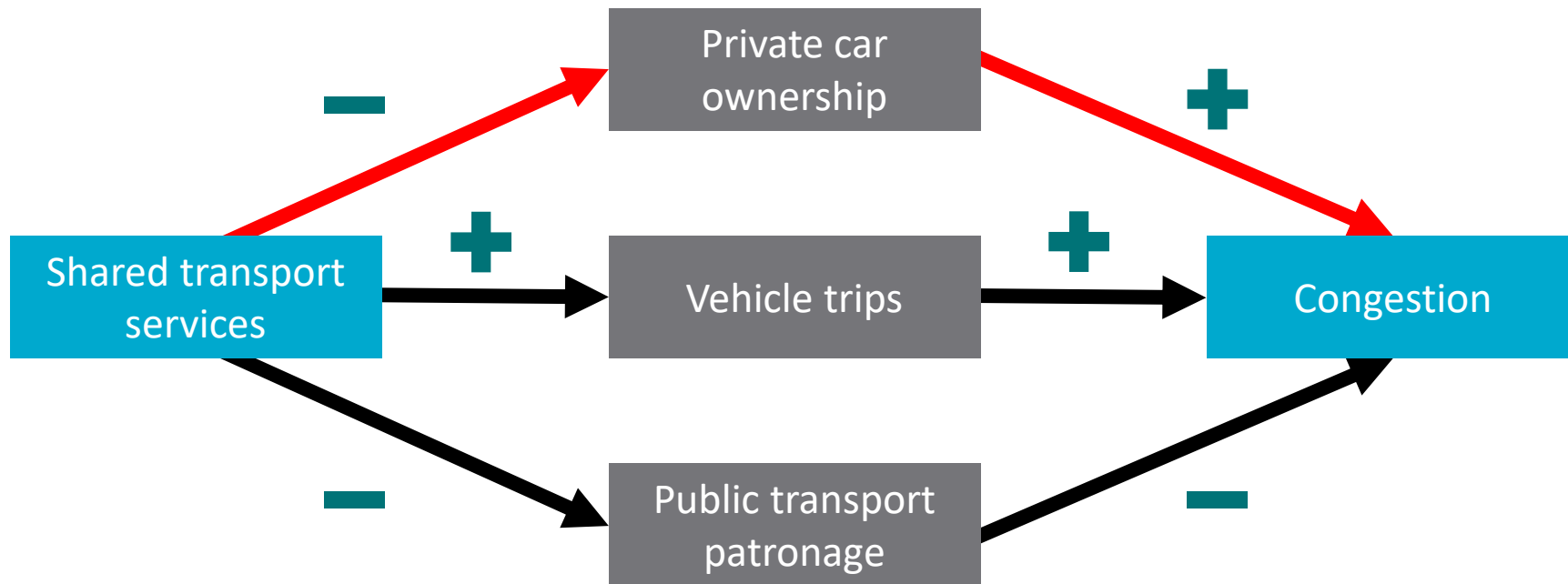
Source. Diao, Kong and Zhao (2021) *Nature Sustainability*

The sharing economy: More harm than good?



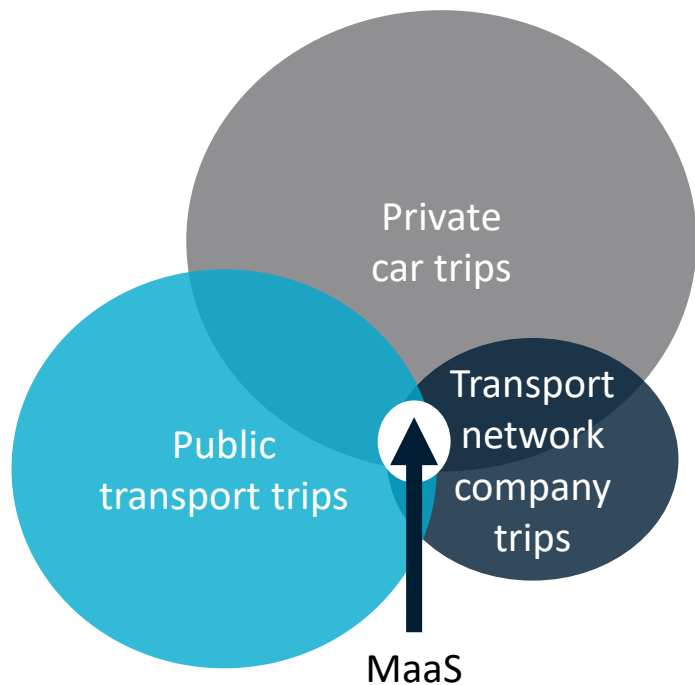
Source. Diao, Kong and Zhao (2021) *Nature Sustainability*

The sharing economy – Impacts on Congestion

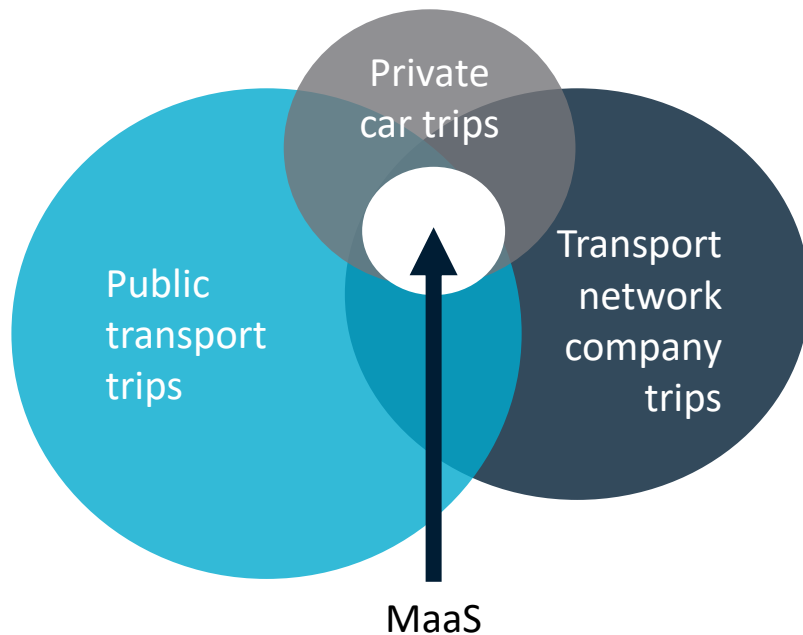


Mobility-as-a-service

Present



Future



Source. Austrade and Cubic

Trialling demand-responsive mobility in Australia



Image source. Keoride



Image source. Translink

'Wind tunnelling' future strategies



Lastly, Post COVID Scenarios
When is this going to end?

“High vaccination rates of the adult US population have given rise to the hope that a return to pre-pandemic life may be in the offing.”

- Kofman et al.

Hooray!



But not so fast....

“However, differential vaccine access, persistent vaccine hesitancy, emerging viral variants, and deadly global disease waves may well stand in the way.”

- Kofman et al.



July 8, 2021

Potential COVID-19 Endgame Scenarios

Eradication, Elimination, Cohabitation, or Conflagration?

Aaron Kofman, MD¹; Rami Kantor, MD²; Eli Y. Adashi, MD, MS³

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Thanks for Listening

Claire Naughtin and Stefan Hajkowitz, CSIRO

