Electric bus rapid transit

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Experience includes:

- Alternative Fuels Conversion Program
- Travel Demand Management (Australian Greenhouse Office)
- Founder, Living Streets Canberra
- Conservation Council board member
- Chair, North Canberra Community Council
- Executive Officer of Pedal Power

Electric bus rapid transit

Transport & greenhouse emissions in the ACT
 Why electric buses?

- 3) ACT Government case for bus rapid transit
- 4) The case for transit lanes

Transport and transport emissions in the ACT

- ACT carbon footprint
- Transport emissions
- Travel within the ACT
- ACT transport emissions
- Emissions by mode of travel

Per capita greenhouse emissions, 2018

Top seven countries, World and Australian Capital Territory (ACT)



tonnes CO2-e per capita

Greenhouse emissions per person for a 10.8 km journey

Average ACT public transport journey is 10.8 km



Travel within the ACT

Daily kilometres travelled per person, by travel mode, ACT 2017





Sources for ACT carbon footprint 2018

- UNSW Sydney, the University of Sydney and CSIRO Land and Water, ACT OCSE Investigation into Scope 3 Greenhouse Gas Emissions
- ACT Greenhouse Gas Inventories (local transport emissions)
- Transport Canberra and City Services Annual Reports (fuel use figures used to estimate greenhouse emissions)
- National greenhouse accounts factors, July 2017

Impact of light rail and Covid on Transport Canberra fleet emissions

120 100 80 -X- Bus only 60 tCO2-e/day Bus+light rail, pre covid ------ Bus+light rail, covid 40 20 0 2013-14 2015-16 2016-1 2014-15

Transport Canberra fleet emissions

Expected impact of Stage 1 on car travel

Expected impact on car travel of public transport improvements

Source: ACT Government 2012 submission to Infrastructure Australia



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Source: ACT Government 2012 submission to Infrastructure Australia



Impact of light rail on local ACT transport emissions



Why electric buses?

Average car exhaust and/or "fuel life cycle" emissions



Source: Green Vehicle Guide

ACT Government electric bus policy

"The Zero-Emission Transition Plan for Transport Canberra outlines the pathway to achieve the ACT Government's ambition of a zero-emission public transport system by 2040."

- At \$700,000 to \$900,000 per electric bus, replacing Transport Canberra's 460 fossil-fuelled buses with electric buses will cost about \$370 million.
 - Much of that cost would be incurred in any case, if Transport Canberra's buses were replaced with fossil-fuelled buses as they became obsolete.
 - Converting all Transport Canberra buses to zero emissions will reduce the ACT's annual carbon footprint (~12 Mt CO₂-e) by 0.3%.

IEA Global EV outlook 2022



3) ACT Government case for bus rapid transit

- Each 10% reduction of in-vehicle travel time is estimated to increase patronage by 3.7%
 - Booz Hamilton, 2003, ACT Transport Elasticities Study
- Census journey to work results indicate that a 3.7% increase in public transport patronage would reduce the number of commuting cars by 1%.

ACT Government case for bus rapid transit: Base case

	Bus rapid transit stage 1 (2012)	Light rail stage 1 (2012)	Light rail stage 2 (2019)
Total cost	\$249m	\$524m	\$1,173m plus cost of wire- free operation
Total benefits	\$492m	\$535m	\$751m
Net benefit	\$243m	\$11m	<-\$422m
Benefit-to- cost ratio	1.98	1.02	<0.64

Wider economic benefits – Auditor General 2021

- "Neither the Stage 2a Business Case or Economic Appraisal Report provides any narrative that describes, explains or supports the estimates of wider economic benefits."
- "Douglas Economics advised 'despite two decades of [wider economic benefits] being part of the [cost-benefit analysis] lexicon in the UK, NZ and Australia, debate continues over whether or not [wider economic benefits] have merit."

ACT Government case for bus rapid transit: Higher density land use / Wider economic benefits scenarios

	Bus rapid transit stage 1 (2012)	Light rail stage 1 (2012)	Light rail stage 2 (2019)
	Higher density land use	Higher density land use	Wider economic benefits
Total cost	\$249m	\$524m	\$1,173m plus cost of wire- free operation
Total benefits	\$1,188m	\$1,225m	\$1,217m
Net benefit	\$939m	\$701m	<\$44m
Benefit-to- cost ratio	4.78	2.34	<1.14

6 Inquiry into Auditor-General's Report No. 8 of 2021: Canberra Light Rail Stage 2A: Economic Analysis.

4.5. The Business Case breakdown of costs and benefits are shown in table 1:

Table 1: Light Rail Stage 2A costs and benefits²²

ltem	Stage 2A (\$million)	Stage 2A and 2b combined (\$million)				
Light Rail Stage 2A costs (present value 2019, discounted 7%)						
Capital cost	162	960				
Operation and maintenance costs	82	190				
Development costs	23	23				
Total project cost	268	1,173				
Light Rail Stage 2A benefits (present value 2019, discounted 7%)						
Transport benefits	55	349				
City shaping benefits	47	402				
Wider economic benefits (WEBs)	48	466				
Total project benefit	150	1,217				
Benefit Cost Ratio (BCR)						
Benefit Cost Ratio (excluding WEBs)	0.4	0.6				
Benefit Cost Ratio (including WEBs)	0.6	1.0				

ACT Government case for bus rapid transit

Sources:

- ACT Government, Environment and Sustainable Development, City to Gungahlin Transit Corridor Infrastructure Australia Project Submission August 2012
- ACT Government, Major Projects Canberra, City to Woden Light Rail: Stage 2A City to Commonwealth Park Business Case

4) The case for transit lanes

- Public transport increased from 6.8% of journeys to work in 2001 to 7.5% in 2021, BUT car-as-driver also increased, from 73.1% to 75%
- Much of the public transport increase came from former car passengers (down from 9.4% to 6.7%) rather than from former car drivers.
- Transit lanes:
 - cost much less than bus rapid transit
 - reduce commute times for bus passengers and for car passengers
 - encourage car drivers to become bus passengers,
 and encourage car drivers to become car passengers

Case study: southern approach to intersection of Commonwealth Avenue and Coronation Drive



Case study: convert Melrose Drive bus lane to T3 lane



Melrose Drive Bus lane

AECOM, 2012, *Transit Lane Warrants Study* 7.30 am to 9 am results for Adelaide Ave, towards city – people who would qualify to use a bus lane

- 2,200 people in 52 buses
- 120 people on 119 motorcycles
- 89 people in 60 taxis
- Total 2,409 people in 231 vehicles
- Lane capacity ~1,200 cars or ~500 buses per hour

Melrose Drive T3 lane

AECOM, 2012, *Transit Lane Warrants Study* 7.30 am to 9 am results for Adelaide Ave, towards city – people who would qualify to use a T3 lane

- 2,200 people in 52 buses
- 120 people on 119 motorcycles
- 89 people in 60 taxis
- 256 people in 75 cars with 3 or more occupants
- Total 2,665 people in 306 vehicles
- Lane capacity ~1,200 cars or ~500 buses per hour

Converting Melrose Drive bus lane to T3 lane

- Cost = cost of replacing a few road signs
- T3 is well within the lane capacity
- 256 more people get to work more quickly

Possible transit lane nework: indicative cost \$50 million



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