TIME TO STEP OFF OUR ROAD TRANSPORT GREENHOUSE GAS

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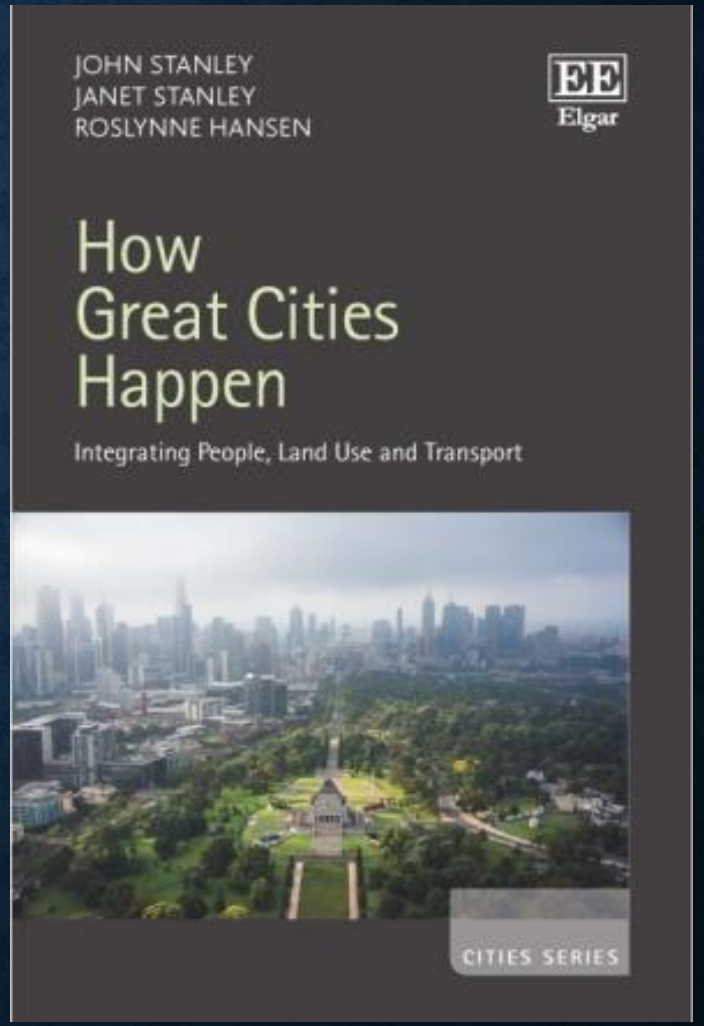
CONTEXT: SUSTAINABLE CITIES AND REGIONS

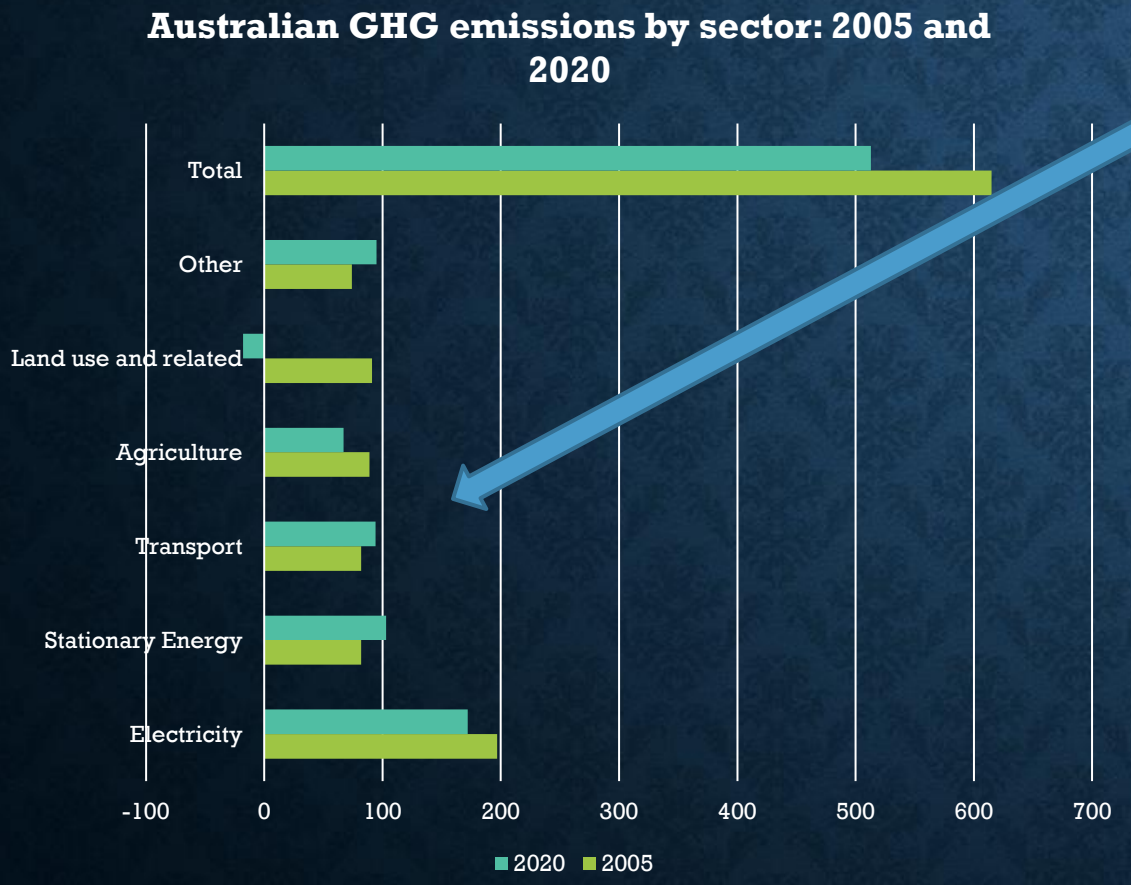
A sustainable city or region is one which …

(Stanley, Stanley and Hansen 2017)

1. Increases its economic productivity
2. **Reduces its environmental footprint and meets critical environmental constraints (esp. climate change is an existential risk and should be treated as a constraint)**
3. Ensures a decent base level of capabilities for all, to support people to flourish (increase social inclusion; reduce inequality)
4. Is healthy and safe
5. Promotes intergenerational equity
6. Engages its communities widely



TRANSPORT WITHIN AUSTRALIA'S GHG EMISSIONS

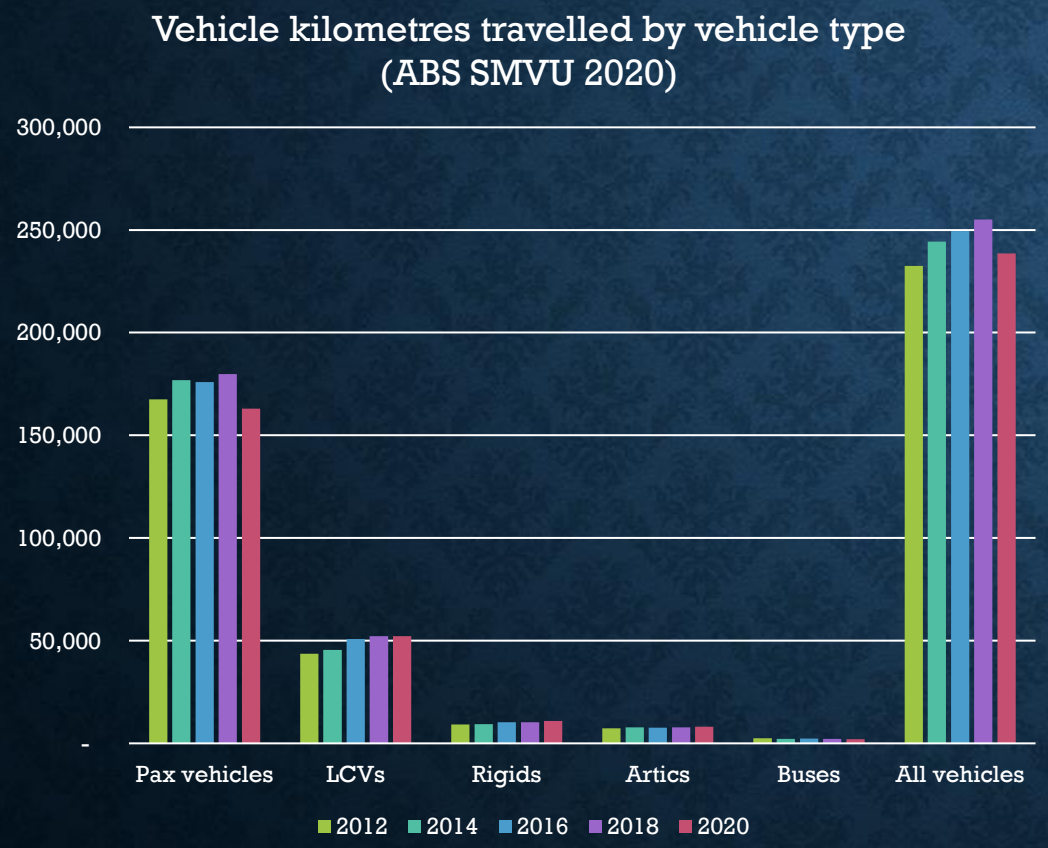


- Transport = 94 Mt emissions in 2020 (82 Mt in 2005)
- **18.3% of total domestic emissions in 2020 (16% in 2012, @ 90 Mt)** Australia's emissions projections 2020 (industry.gov.au)
- **Without COVID, would have been >100 Mt**
  - Was 102 Mt in 2018
  - **Growing around 1 Mt annually**
- **Has increased by about 2/3 since 1990** 2020: Transport is letting Australia down in the race to cut emissions - University of Wollongong – UOW
- **BAU projection of ~110 Mt by 2030**
- **Or 100 Mt in 2030 (gov't projection) with some efficiency improvements = flatlining** Australia's emissions projections 2020 (industry.gov.au)

ROAD TRANSPORT GHG EMISSIONS

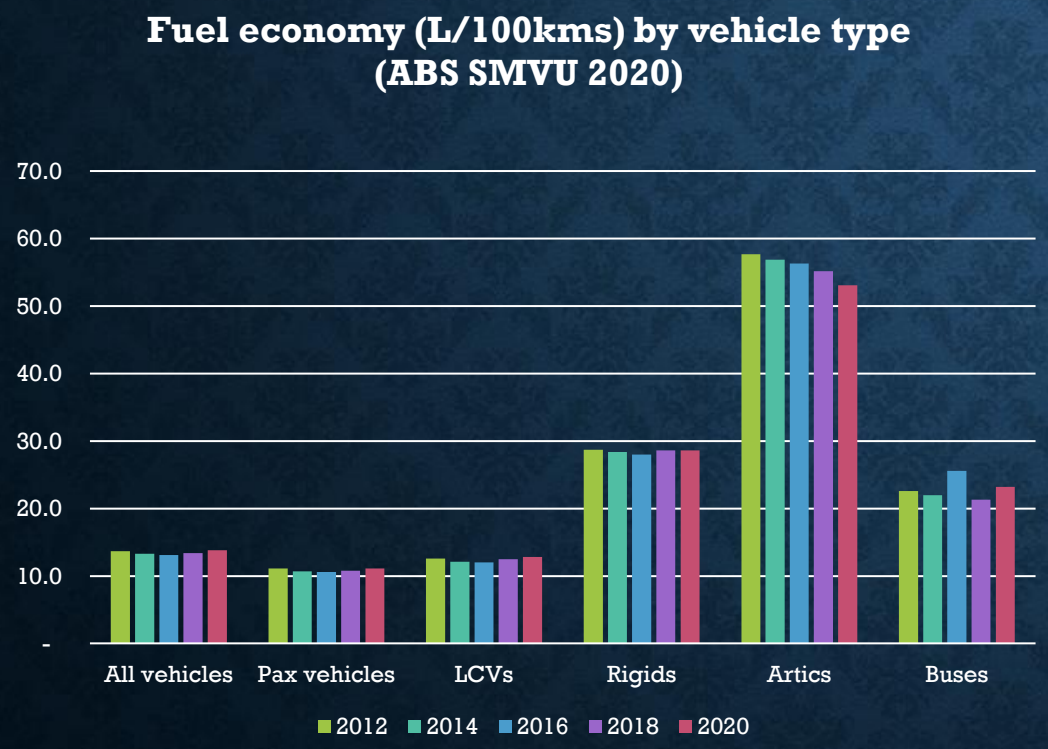
- **Road transport = ~85% of transport GHG emissions**
- Road transport GHG emissions are growing (exc. COVID) because
  - Vehicle Kilometres (VKMs) are growing (slide 5)
  - Emissions intensity (emissions/VKM) is not showing much improvement
    - Fuel economy rates (slide 6)
    - Emissions intensity of fuels
- Strong growth in SUV sales/use and in VKMs by Light Commercial Vehicles (slide 5) stand out

GROWING MOTOR VEHICLE USE



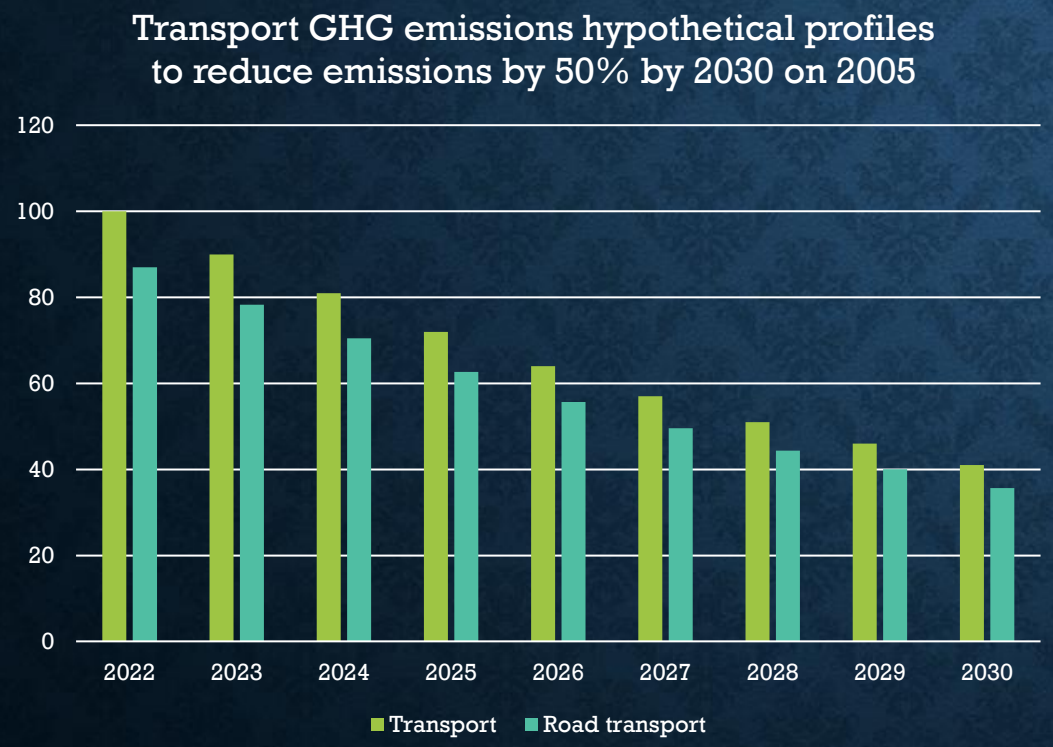
- **2018 total VKMs 9.7% higher than 2012**
  - **Growing ~1.6% p.a. pre COVID**
- Pax vehicles up 7.3% to 2018 (~1.2% pa)
- **LCVs +19.7% 2012-18 (~3.0% pa)**
- Rigids +10.9% (~1.7% pa)
- Artics similar growth rate to pax vehicles
- Buses travelled less in 2018 than in 2012
- **Fast population growth accounts for most of the emissions growth from increased VKT = +8.7% (2012-18)**
  - **VKMs/pc barely increased overall**
  - **Outer urban sprawl from rapid population growth has accentuated VKT growth (poor PT options)**
- **Vancouver and Freiburg have been targeting no increase in absolute motor vehicle VKMs, using their land use transport strategies (growing up not out)**

FUEL ECONOMY GOING NOWHERE (APART FROM ARTICS)



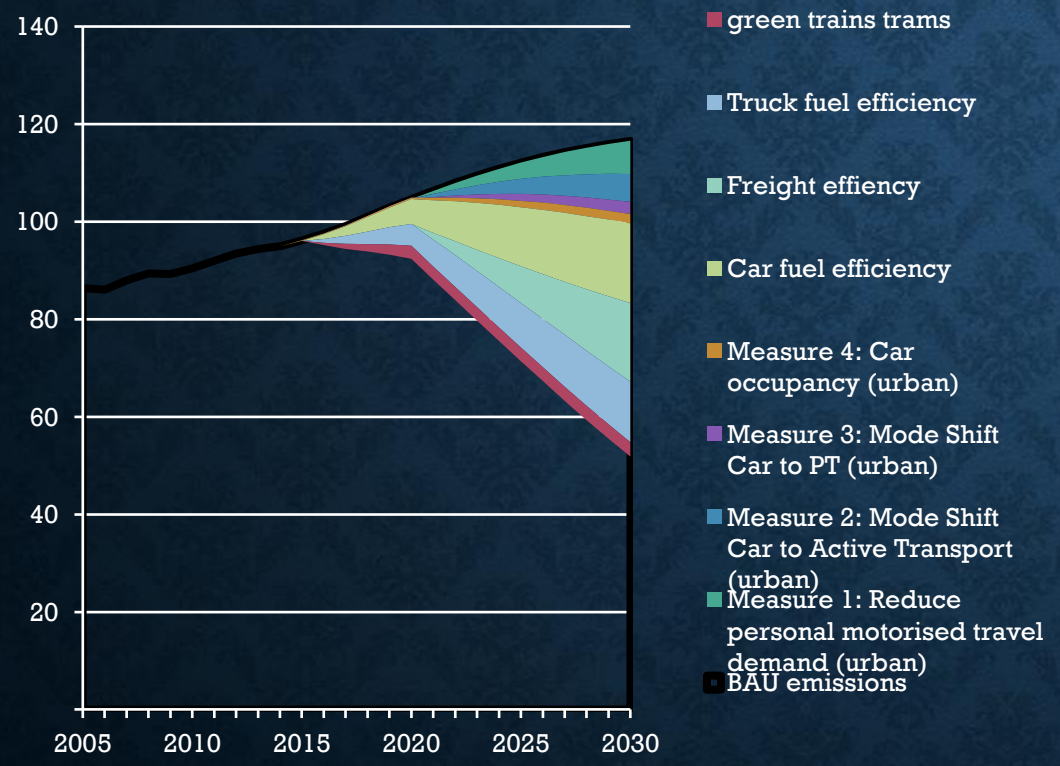
- Growing VKMs would not be a problem for emissions if fuel economy was improving rapidly
- It isn't!
- Articulated trucks are the only vehicle class to have shown a steady improvement in fuel economy in recent years
- Passenger vehicle fuel economy getting worse as SUV penetration increases
- LCV fuel economy also getting worse (and use growing strongly)

HYPOTHETICAL ON CUTTING ROAD TRANSPORT EMISSIONS ~50% BY 2030



- Target for road transport = ~50% reduction by 2030, on 2005
- BAU in 2030 ~ 110 Mt (or 100 Mt projected with improvements)
- 50% reduction on 2005 means ~60 Mt lower than BAU for total transport emissions
  - Or ~50 Mt lower than government projections (from slide 3)
- **~50 Mt lower for road transport emissions against BAU (or ~42 Mt below government projection)**

STANLEY ET AL. (2018) EXPLORED CUTTING ROAD TRANSPORT GHG EMISSIONS BY ~50 MT BY 2030!



- Chart shows one way that 50 Mt could hypothetically have been saved
  - With behaviour change and technology measures that were seen to be feasible at the time
- **But there are now fewer years to save that 50 Mt!**

SOURCES OF EMISSIONS REDUCTIONS IN STANLEY ET AL. (2018)

Behaviour change (from 2015 to 2030) (~20Mt)

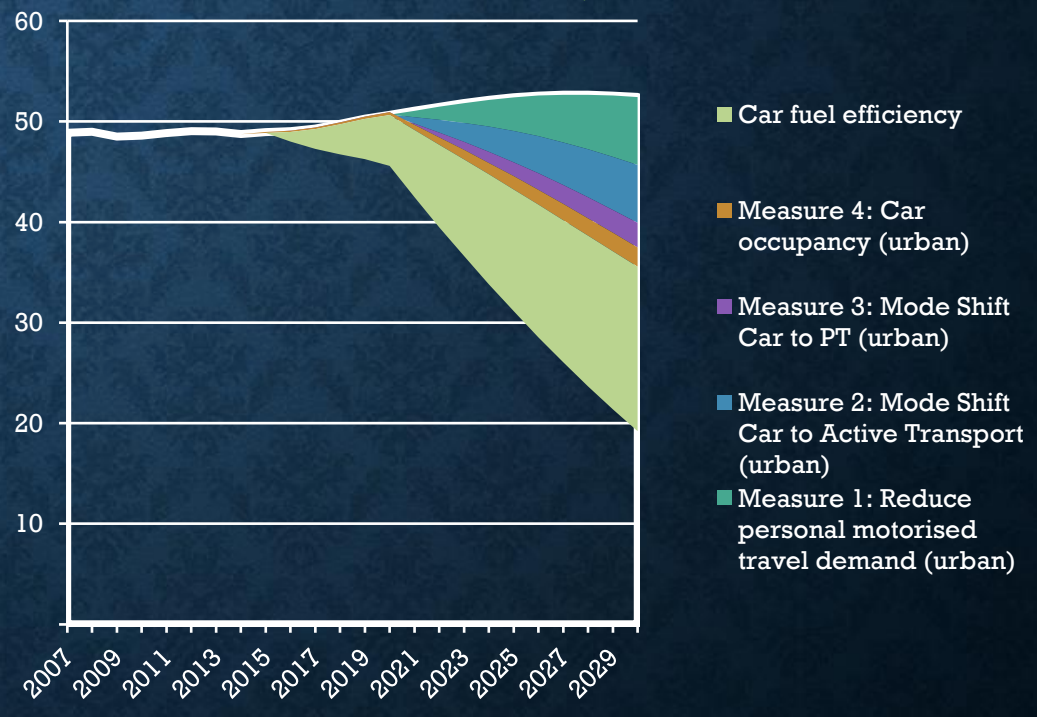
1. **Personal travel demand reduction** (15% less car VKT; reduce VKMs not trips, because of the inclusion value of trips; land use strategy key) = ~5.8 Mt
2. **Increased active transport mode share** (15% shift from car; land use again key, plus cycling infrastructure) = ~4.9 Mt
3. **Increase urban PT mode share to 20%** (a reasonable target if we get serious about the middle/outer suburbs; big increase in bus services integral) = ~2.1 Mt
4. **Increase car occupancy** (from 1.56 to 1.67; it is going the other way) = ~1.4 Mt
5. **Improve freight efficiency** (15% emission reduction; smart logistics) = ~6.9 Mt

Tech improvements to cut emissions intensities (~30Mt)

6. **Reduce vehicle emissions intensity** (see next Slide 10)
   - Cars to 56% below 2005 = ~12.0 Mt
   - Light vehicles to 56% below 2005 = ~7.7 Mt
   - Heavy vehicles to 40% below 2005 = ~9.5 Mt

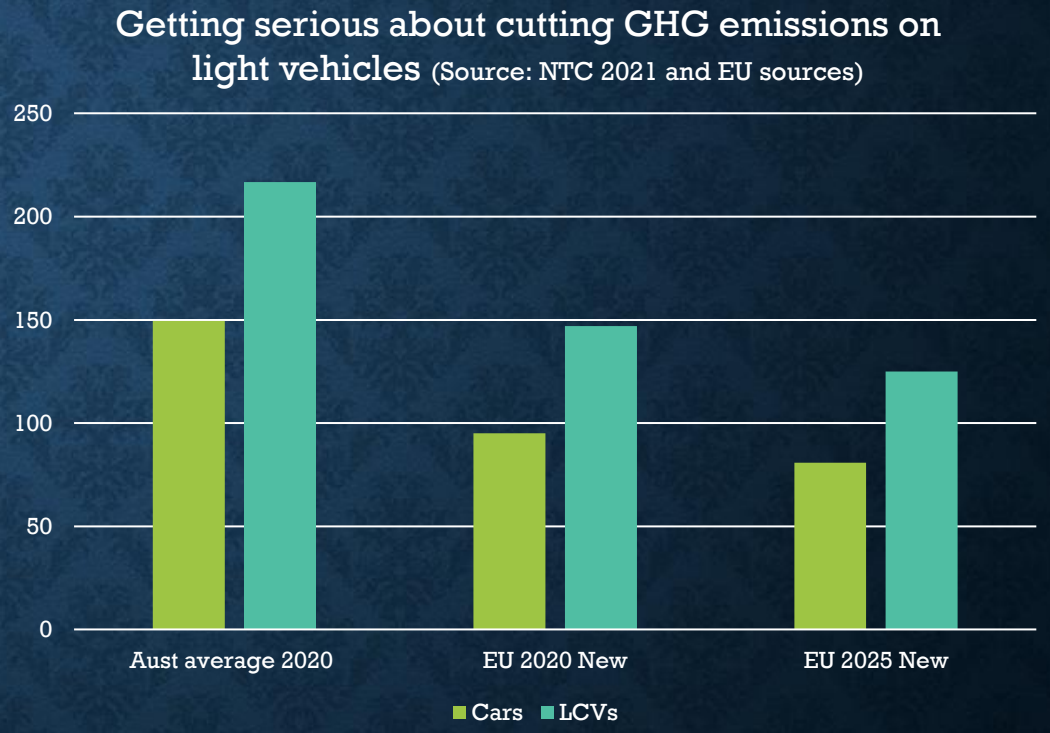
- **Total = ~50 Mt**

Cutting car emissions (~30Mt of 50Mt)



CAN WE DO IT? TECHNOLOGY

- The average emissions intensity of new Australian cars /LCVs in 2020 was 25% below 2005 (NTC 2021)
- We would need another ~30% reduction pretty quickly
  - EU 2020 emission standards implemented ASAP would go some way to getting us there (depends on vehicle turnover rates)
- For passenger cars, the 2019 European average emissions intensity (30 countries) was 122g/km, with Australia at 150g/km (NTC 2021)
- LCVs = ~18% of Australian 2020 sales <200g/km; Europe = 83% (NTC 2021)
- EU emission standards are tightening (see chart and next slide)
- **Vancouver's new (draft) Transport Strategy (Transport 2050) is targeting 2030 light vehicle emissions at 65% less than 2010**



Remind me – how many cars and LCVs do we manufacture in Australia?

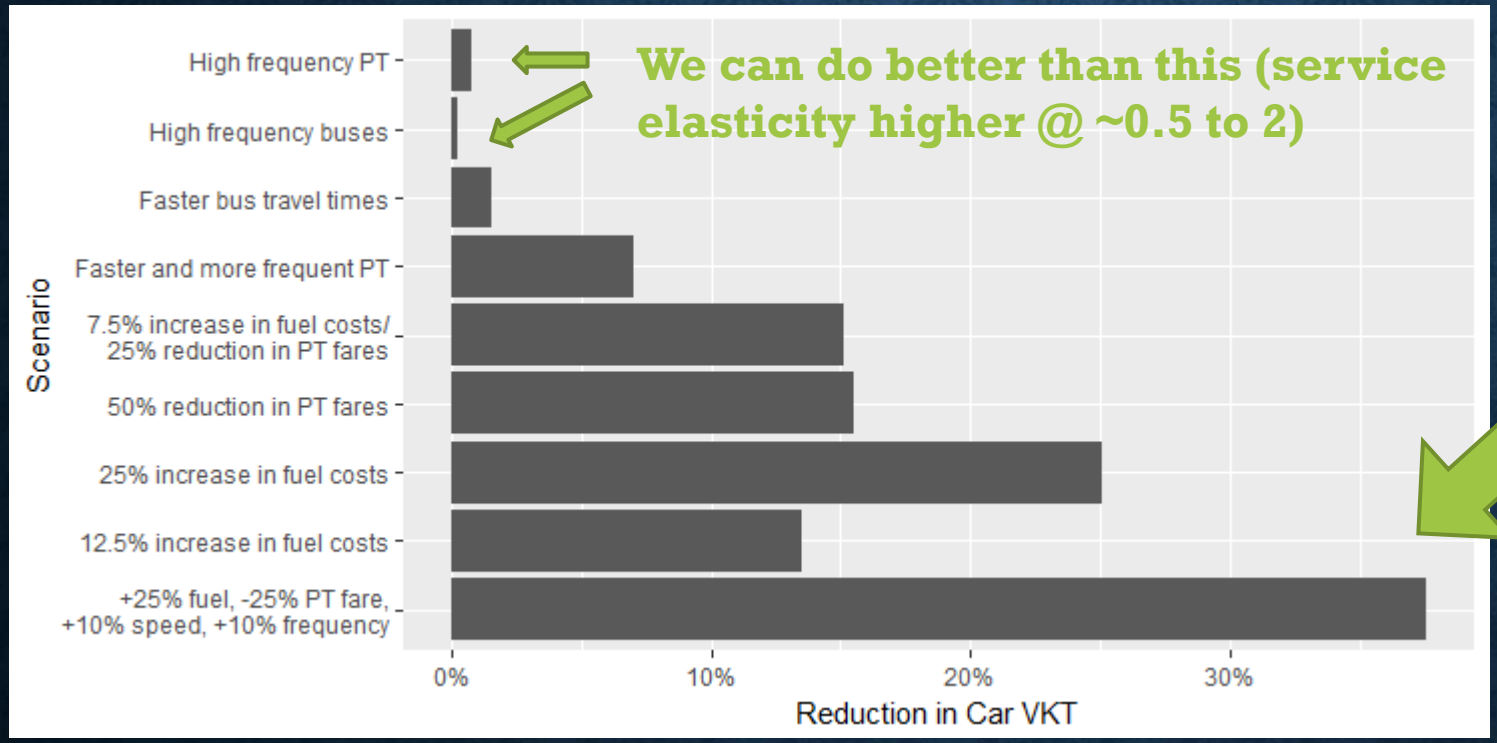
TECHNOLOGY (CONT. 2)

- **Early adoption of European CO_2 emissions standards, or equivalent, should be an immediate government priority for accelerating the required technological change (voluntary standards aren't doing it)**
  - EU 2021-24 average for new vehicles= Cars 95gm CO_2/km; Vans 147gm/km; further reductions of 55% cars/50% Vans are now proposed for 2030, with all new Cars/Vans to be emission free from 2035
  - Fleetwide reductions of ~32% by 2030, on 2005, predicted
  - Suggests we will struggle to meet the reduction target set above but will it will be even worse the longer we delay!
- **Behaviour change measures will thus need to do more than shown in slide 9 to 2030 to deliver ~50 Mt emissions reductions**
- **For heavy vehicles, after-market technologies (hydrogen based) are becoming available where trials show that truck (and other) diesel CO_2 emissions by can be reduced by 25%, or more (US test results), as a transitional approach to lowering emissions**
  - Might OEMs threaten to void warranties if these are added?

BEHAVIOUR CHANGE: ROAD PRICING REFORM AS A STIMULANT (STANLEY AND HENSHER 2017)

- **Central proposition: road users should pay for ALL the societal costs attributable to their travel choices**
- **What right do they have to impose these costs on others!**
- The cost base should include ALL the external costs of road use (costs that are not paid by users), with fuel taxes plus registration charges removed
- Imagine we did this for cars via a fuel tax, until we implement mass-distance-location based charges
- 2015 external cost estimates from Stanley and Hensher (2017)
  - Congestion (35.9c/L)
  - Air pollution and noise (4.8c/L)
  - GHG emissions (11.1c/L; valued at $US35/t in 2010 prices, updated)
  - Accident costs not covered through insurances (13.6c/L)
  - Health costs from car-dependence (e.g., less walking) - not estimated
  - Road damage costs – attribute to heavy vehicles
- With optimal pricing, required 27.5c/L increase in fuel excise at 2015 (was 39.6c/L; retail ~$1.30/L for ULP)
- Welfare benefits of ~$220 million estimated; increased fuel excise payments ~$4 billion => use this to provide alternatives, especially in car dependent areas

LONG RUN REDUCTION IN CAR VKT AT 2030: SYDNEY CASE STUDY (STANLEY ET AL. 2018)



A package of measures gives the biggest impact

Behaviour change can impact emissions faster than technological change

The 27.5c/L increase in fuel excise from slide 12 was almost a 25% increase in fuel costs, one of the options tested above.

SETTING THE SPATIAL CONTEXT:
START WITH THE KIND OF CITY YOU WANT: A COMPACT CITY WITH MUCH REDUCED NEED TO TRAVEL BY CAR

1. **Strong core:** key to agglomeration (productivity) economies (Melbourne well-placed here)
2. **Middle urban knowledge clusters:** help to boost productivity, spread higher income job opportunities and reduce external costs of growth
   - Provided only a few well-chosen "polys" are chosen (esp. based around universities and research-based medical centres)
   - Plan Melbourne provides a strong lead here but is weak on delivery
     - Suburban Rail Loop = nice thought but overkill; Medium Capacity Transit at an earlier date would be better
     - Invest in cluster development on multiple fronts (not just in transport)
3. **Strategic transit corridors:** for increased inner/middle urban density (Vancouver does this very well and is looking to do more but it was not part of Plan Melbourne)
4. **20-minute neighbourhoods:** a complementary "bottoms-up" approach across the whole city
   - A great Plan Melbourne initiative (copied by Singapore!) but weak on delivery (COVID a help)
5. **Ports and airports**: a key part of the trade-exposed chain

Conclusion: Plan Melbourne has most of what is needed on the land use front to support improved sustainability (reduced VKT) but is weak on implementation of some core elements and needs a transit corridor focus added

CONCLUSIONS

- Road transport is a large and growing source of Australian GHG emissions
- GHG emissions reduction should be a binding constraint on land use/transport strategy
- A 50% reduction target for road transport GHG emissions (by 2030, on 2005 levels) is potentially achievable by a combination of extensive behaviour change measures and technological improvements
- This needs partnerships between governments and other stakeholders
- Adoption of EU emission standards, or equivalent, ASAP is key to accelerating low emissions technologies (and needs renewable energy)
- Behaviour change measures can impact more quickly
    - Requirements include integrated land use transport strategy (to reduce VKT), road pricing reform that charges for externalities, a large increase in PT (bus) services in outer/regional areas (EVs) and better infrastructure for active travel/electric micro-mobility

CONCLUSIONS (2)

- Technological changes will have to do more of the heavy lifting, in total, over the longer term
  - In addition to early adoption of EU emission standards, incentives for purchase/use of EVs should be widely available, as we did with solar (e.g., cost rebates, fee discounts, access to bus lanes/parking places, awareness raising, government purchasing priority, installation of EV charging infrastructure)
  - Vic Government electric bus initiatives are promising (some coming; all new buses from 2025)
- Plan Melbourne has the foundations for an emissions-supportive land use strategy but implementation has been weak on the key elements of NEICs and 20 Minute Neighbourhoods
  - And strategic transit corridors should be added to Plan Melbourne as favoured development locations
  - Melbourne needs an integrated transport strategy
- The population growth rate should be part of the discussion about emissions and other futures
- **A virtuous element of a concerted attack on road transport GHG emissions is that the CO-BENEFITS will far exceed the direct environmental benefits (e.g., congestion cost savings; agglomeration economies; increased social inclusion; safer travel; better health)**

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