

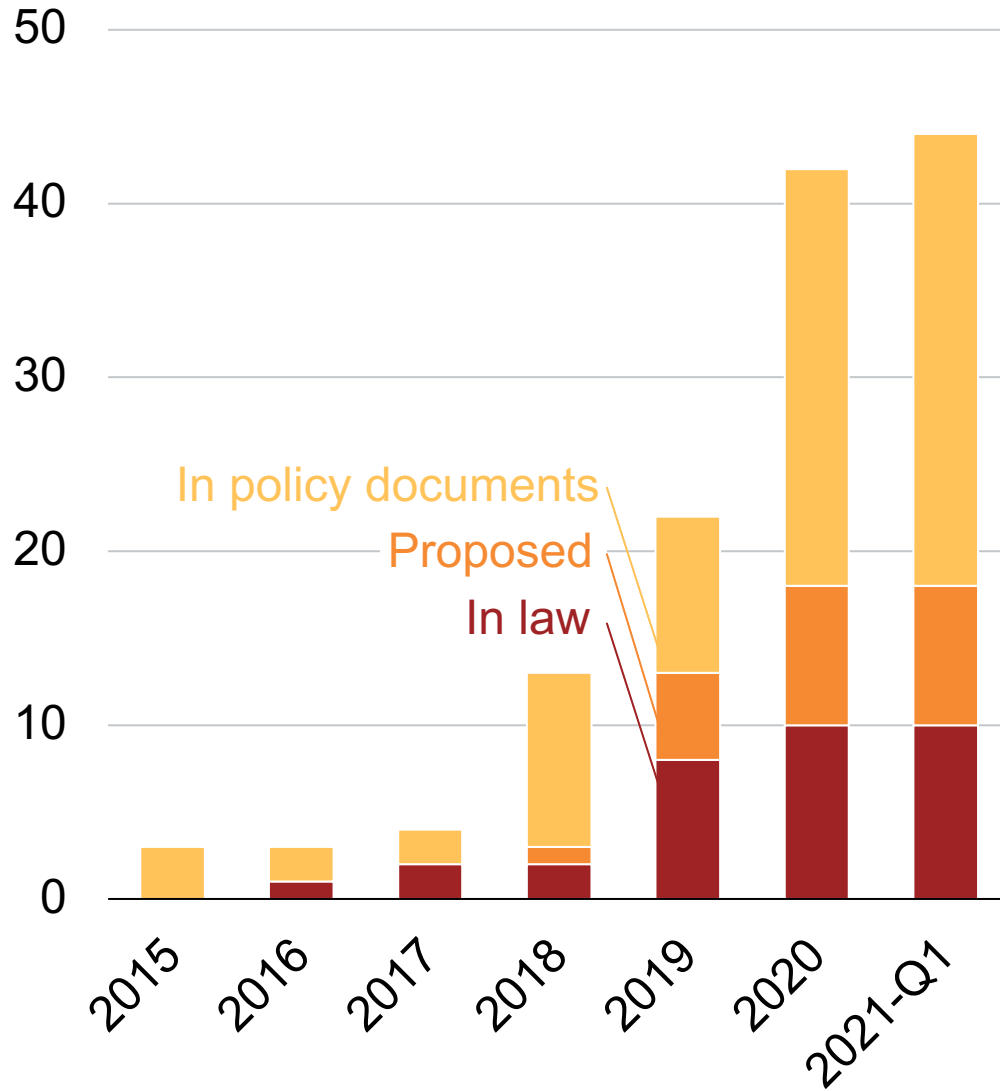


**Net zero by 2050:
Will transport be a lifter or a leaner?**

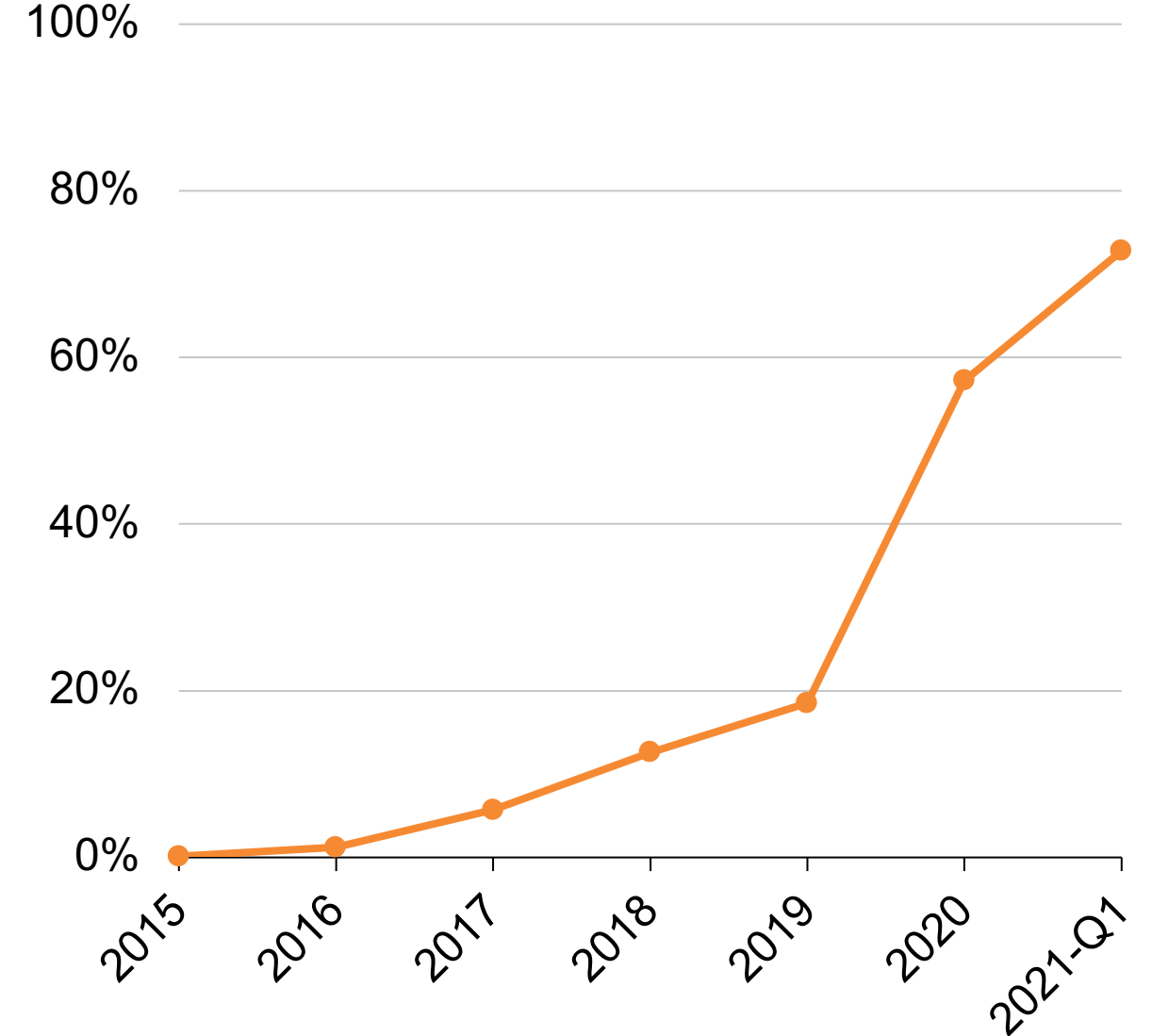
August 2021

The international community is now serious about achieving net-zero emissions

Number of countries with net-zero pledges



Share of global emissions covered by net-zero pledges

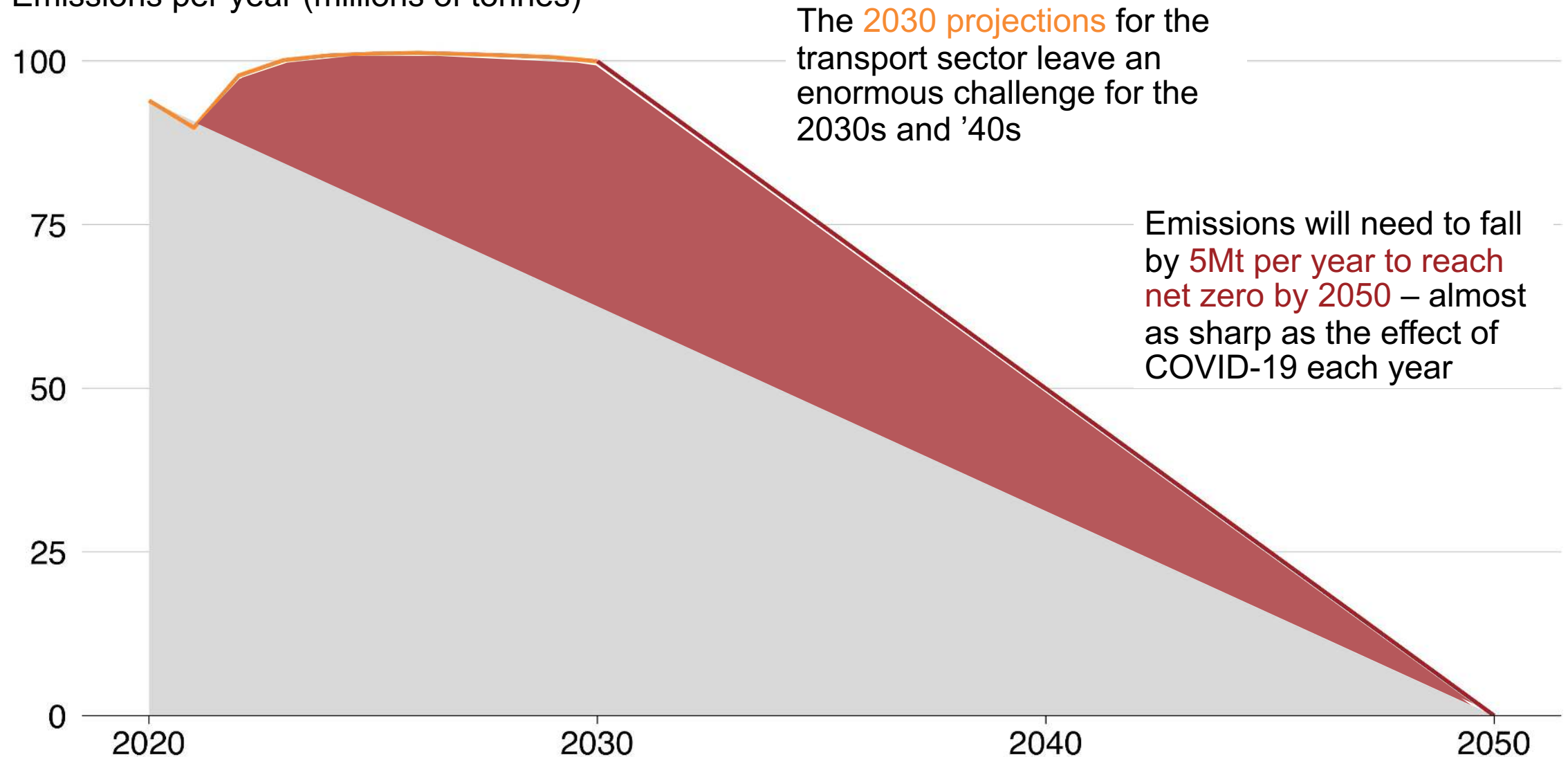


What does 'net zero' mean?

- Global warming will not stop until net zero is achieved
- To get there:
 - Reduce emissions as much as possible
 - Offset any remaining emissions by drawing down emissions from atmosphere

The transport sector is unlikely to make much progress this decade, and will need transformative action in the 2030s and '40s

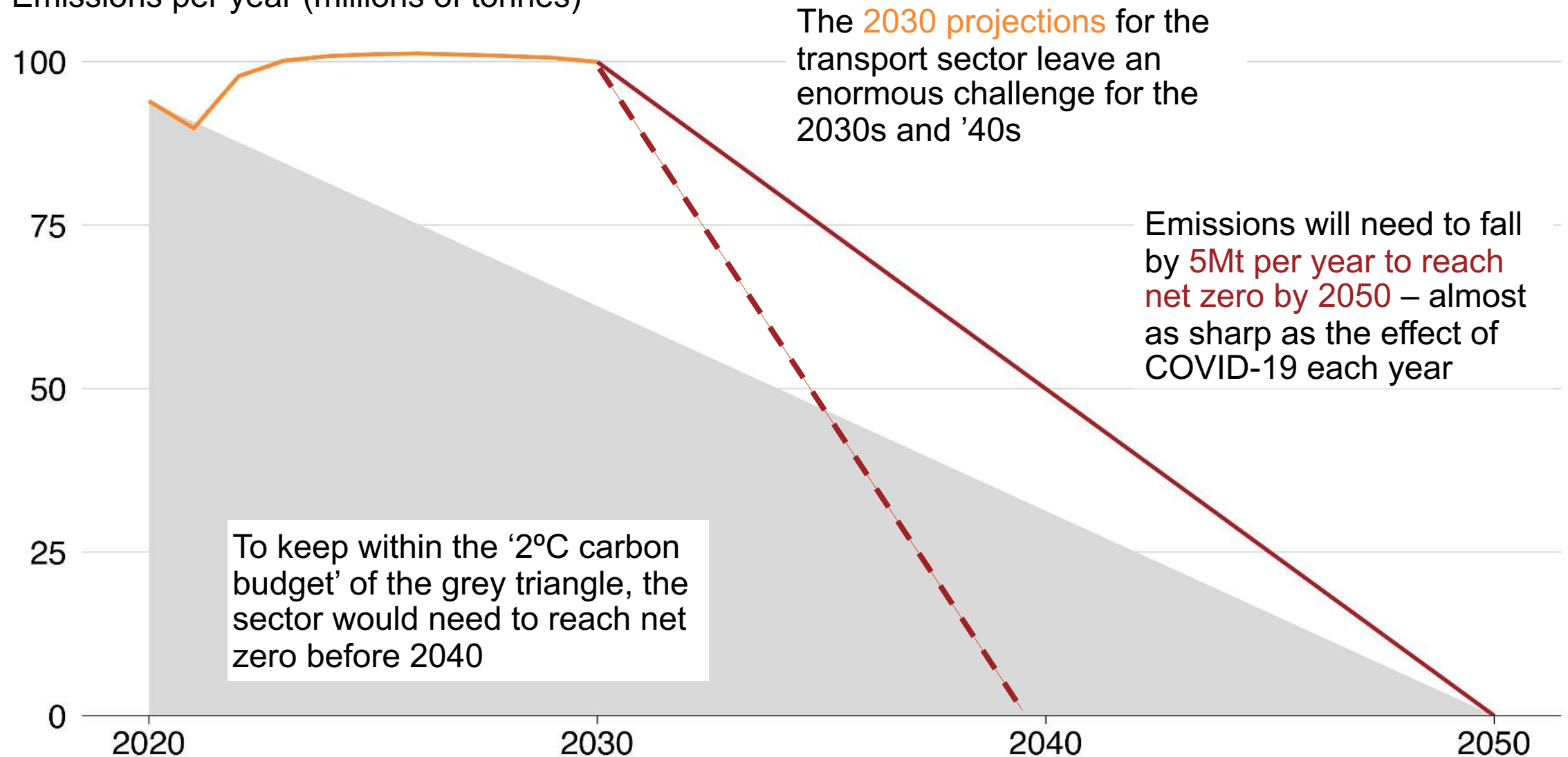
Emissions per year (millions of tonnes)



Notes: Emissions are 'carbon-dioxide equivalents'. The two trajectories depicted do not have an equal effect on the climate, despite both reaching net zero by 2050 – it is the total amount of emissions in the atmosphere, not the annual contribution, that drives climate change. Source: Grattan analysis of DISER (2020a).

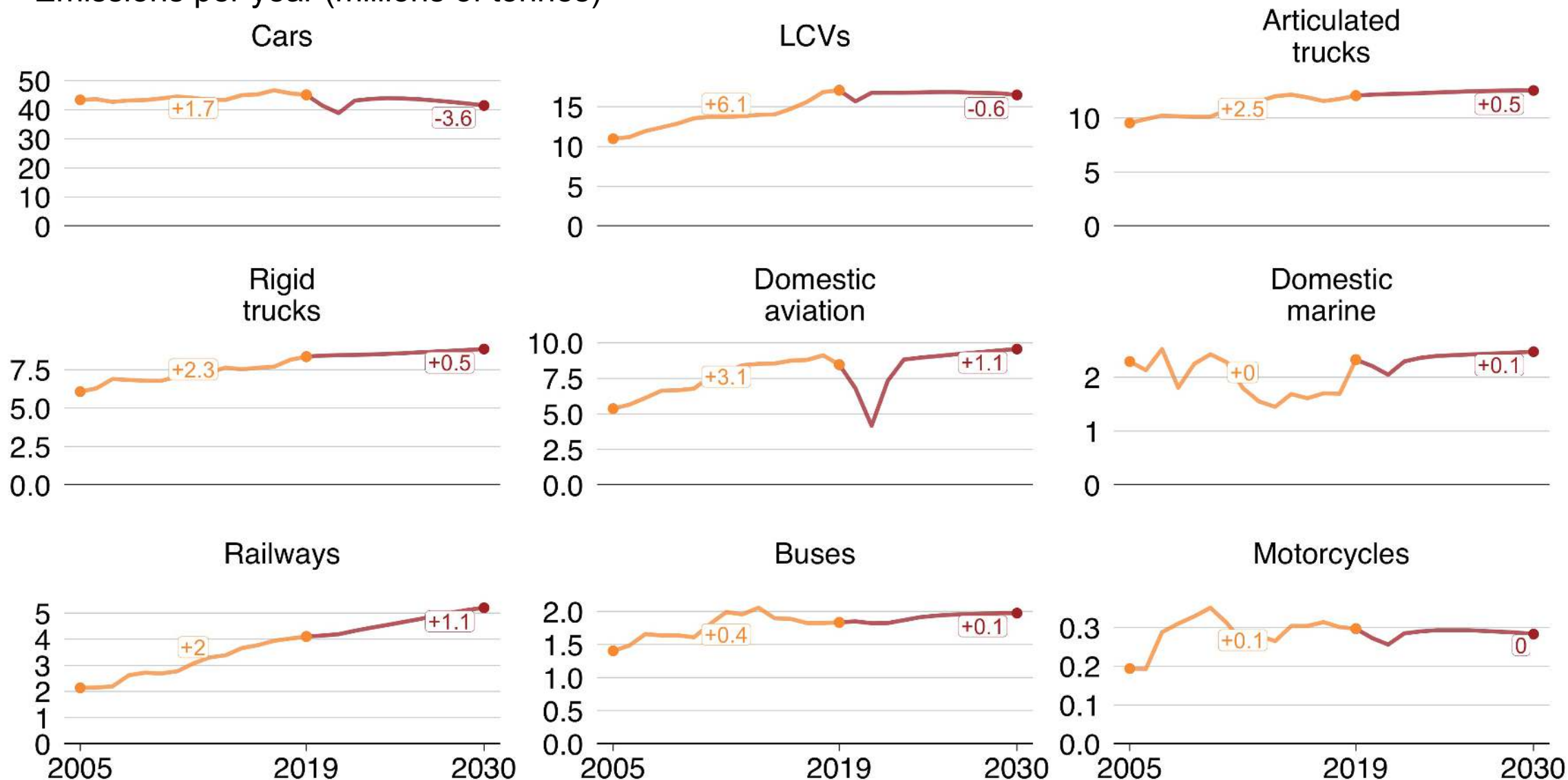
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Emissions per year (millions of tonnes)



Car emissions are expected to fall slightly, but freight and aviation emissions are expected to increase

Emissions per year (millions of tonnes)

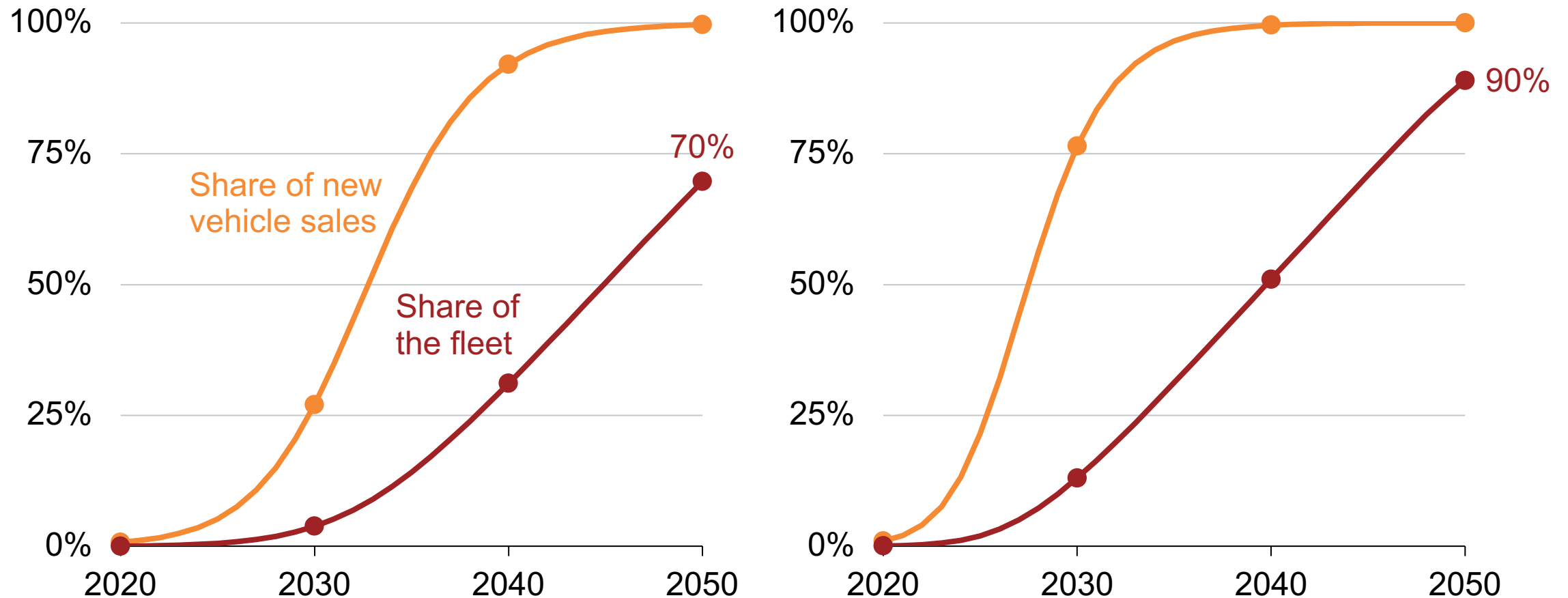


Notes: LCVs = light commercial vehicles. Emissions are 'carbon-dioxide equivalents'. Source: Grattan analysis of DISER (2020a).

What to do about light vehicles (cars, vans, and utes)?

Main challenge: average life of 20 years means we urgently need to get on track to avoid 'lock in'

Zero-emissions vehicles (electric or fuel cell)



Notes: Adoption curve is stylised, based on a logistic function. It assumes sales of zero-emissions vehicles reach 50 per cent by 2030 and 100 per cent by 2050. Vehicles are assumed to be retired due to age only, at a rate of 4 per cent per year (consistent with average vehicle turnover between 2015 and 2020: ABS (2020b)).

Zero-emissions vehicles: problems and solutions

Barriers to zero-emissions vehicles:

- Availability of models to suit Australians' needs
- Upfront cost
- Access to charging

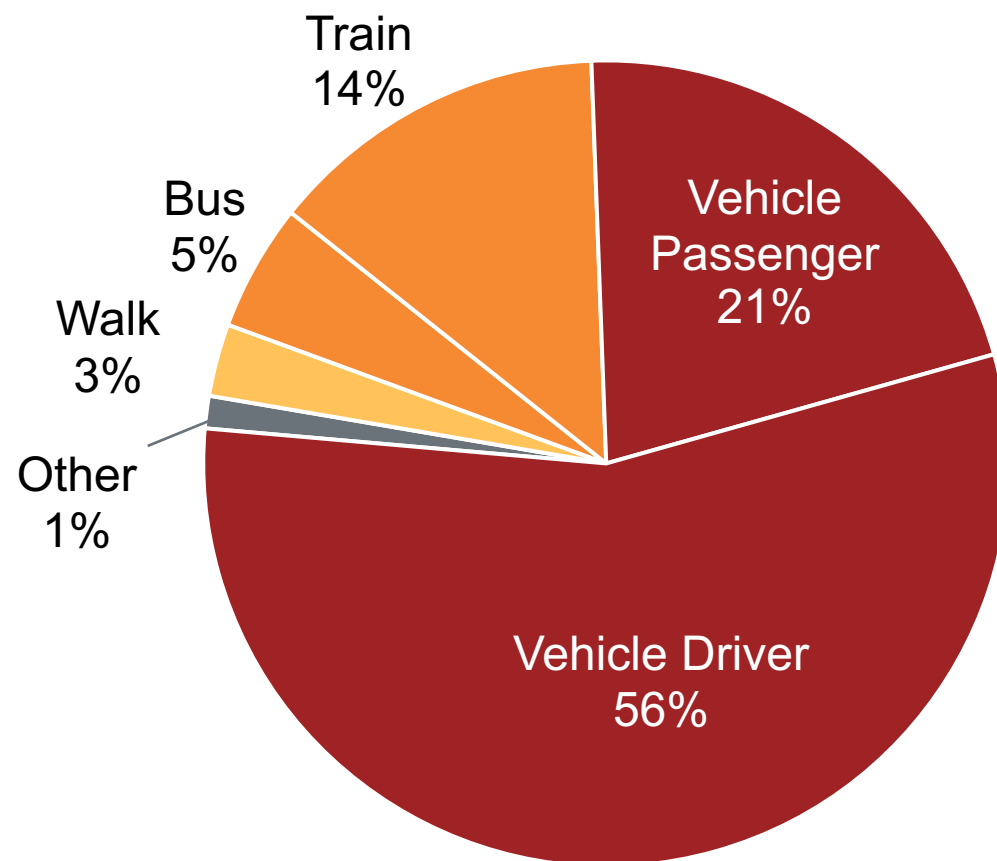
Key recommendations:

- Use a vehicle fleet emissions standard (technology neutral) to virtually phase out sales of new petrol/diesel models by 2035 (Europe, Japan, Canada, California, also a preference in NSW and SA)
- Scrap inefficient taxes (motor vehicle duty, import duty, LCT)
- Boost access to charging for those who have few options:
 - Change National Construction Code in 2022
 - Amend tenancy standards by 2030
 - Local charging in suburbs without off-street parking
 - Tariff reform to encourage smart charging

Kilometres by mode in Greater Sydney

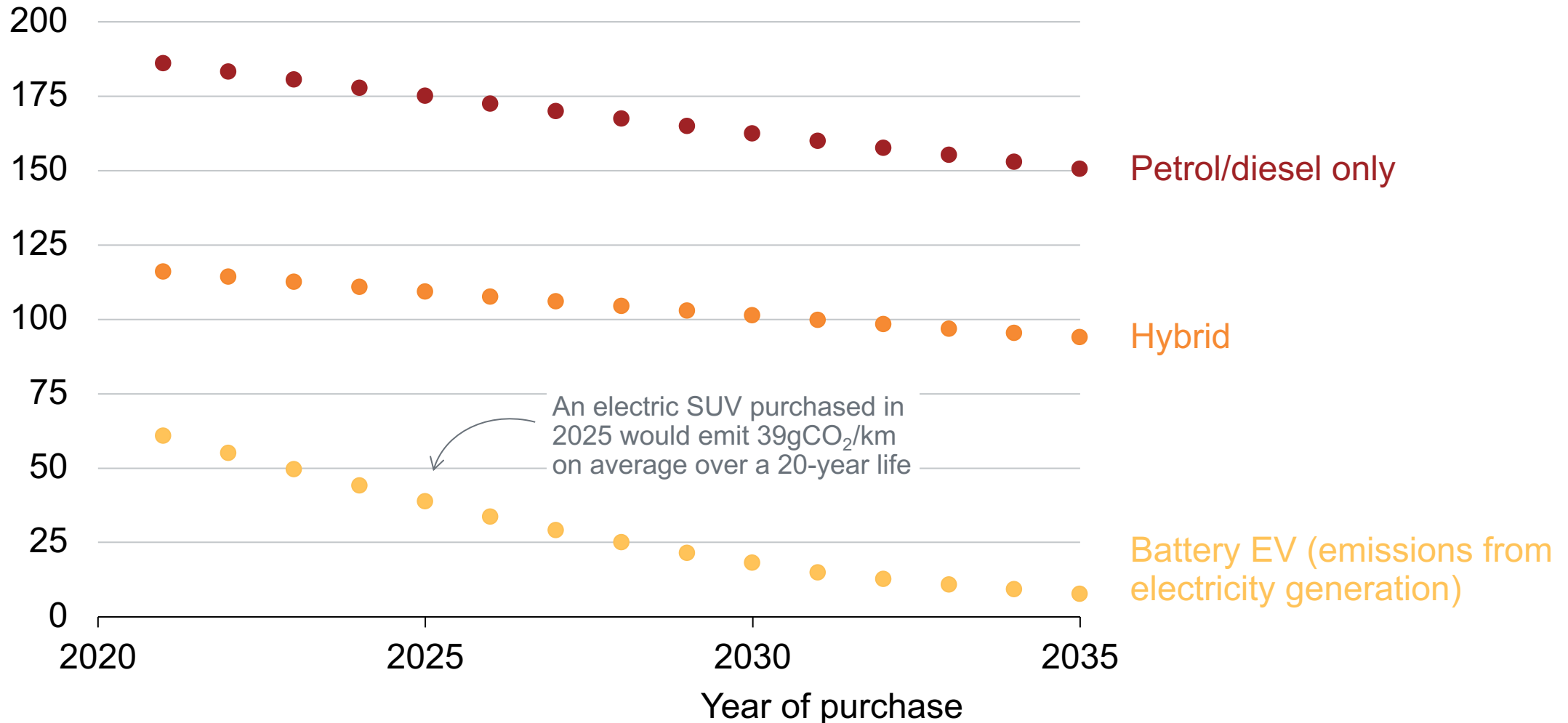
Sydney has the highest public transport mode share of any Australian capital (Census 2016)

Even here, walking and public transport account for only 23% of kilometres travelled (HTS 2018-19)



Lifetime operating emissions for a battery electric vehicle are lower than for comparable internal combustion engine vehicles

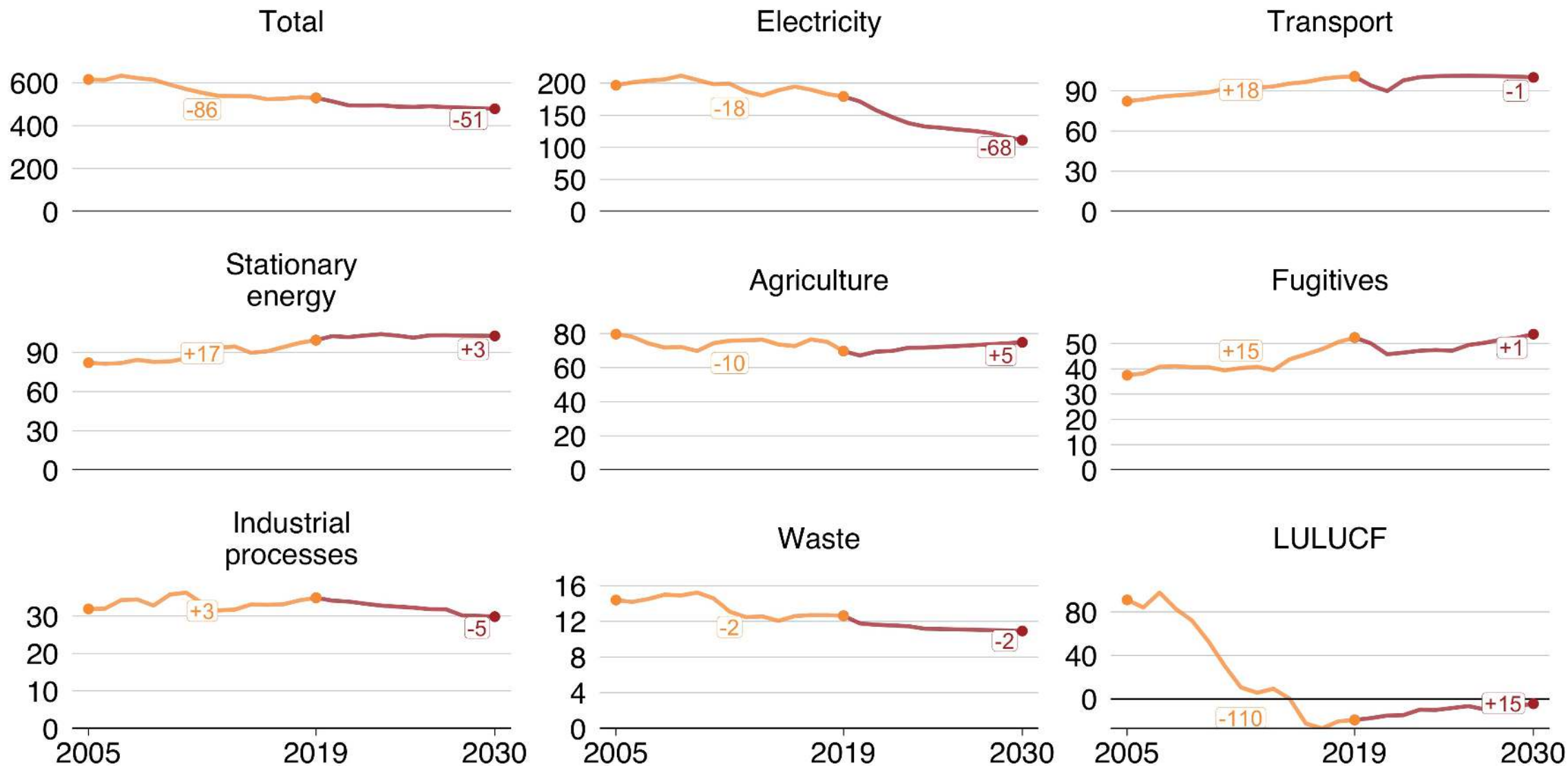
Average fuel and electricity emissions over 20-year vehicle life (gCO₂-e/km) for three large SUVs



Notes: The models in this diagram are comparable large SUVs, each with towing capacity of 1,500kg or more: the Toyota RAV4 (petrol), Toyota RAV4 (hybrid), and Tesla Model X (electric). NEM emissions intensity is assumed to decline over 2021-2042 according to AEMO's Step Change Scenario, and then linearly to zero emissions by 2050: AEMO (2020a). Electricity emissions intensity includes scope 3 emissions from fossil fuel production, as noted in GHD (2018), the source of emissions data used in AEMO (2020b). Sources: Grattan analysis of the above references, Toyota (2021), and Tesla (2021).

Apart from electricity, there's very little emissions reduction expected in Australia over the next decade

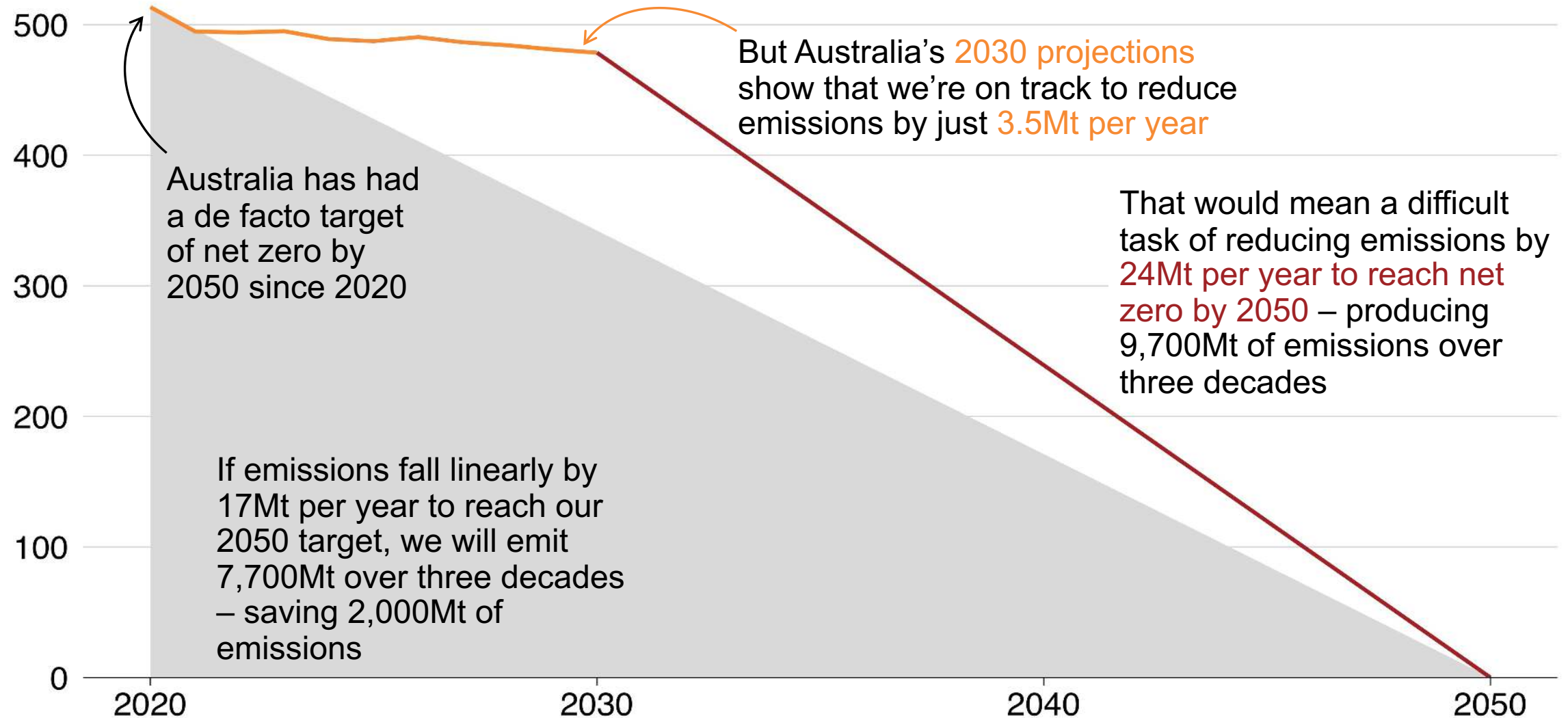
Emissions per year (millions of tonnes)



Source: Grattan analysis of DISER (2020a).

If there's insufficient progress by 2030, a highly disruptive economic restructuring will be needed in the 2030s and '40s

Emissions per year (millions of tonnes)



Mandatory vehicle fleet emissions standards would be the best policy for systematically reducing light vehicle emissions

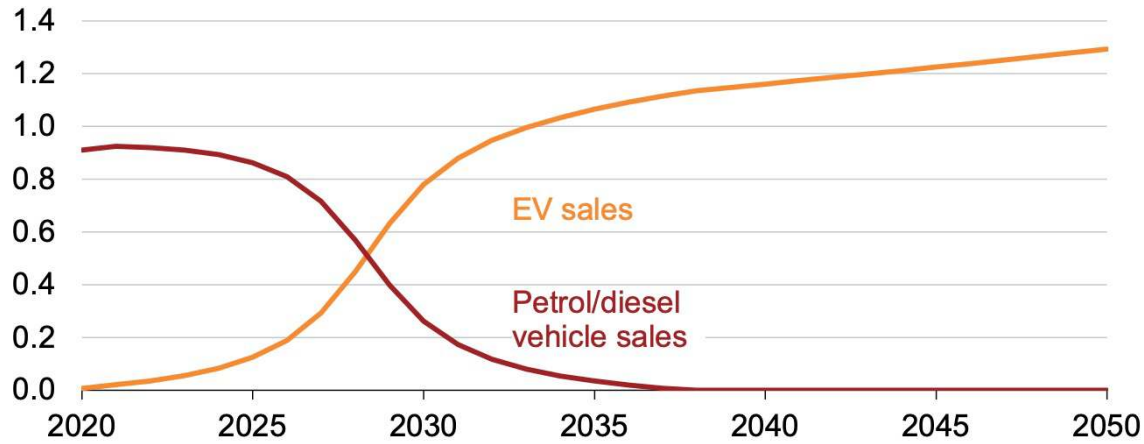
Comparing policies to ensure that new light vehicles are lower-emissions

	Effective	Efficient	Simple	Flexible	Popular
Mandatory vehicle fleet emissions standards	Lightest Yellow	Lightest Yellow	Lightest Yellow	Lightest Yellow	Lightest Yellow
Zero-emissions vehicle sales targets	Lightest Yellow	Lightest Yellow	Lightest Yellow	Lightest Yellow	Lightest Yellow
Ban imports or registrations of new petrol/diesel vehicles	Lightest Yellow	Lightest Yellow	Lightest Yellow	Lightest Yellow	Lightest Yellow
Government fleet purchases are strictly low-emissions	Lightest Yellow	Lightest Yellow	Lightest Yellow	Lightest Yellow	Lightest Yellow
Legend	Lowest	Lowest	Lowest	Lowest	Highest

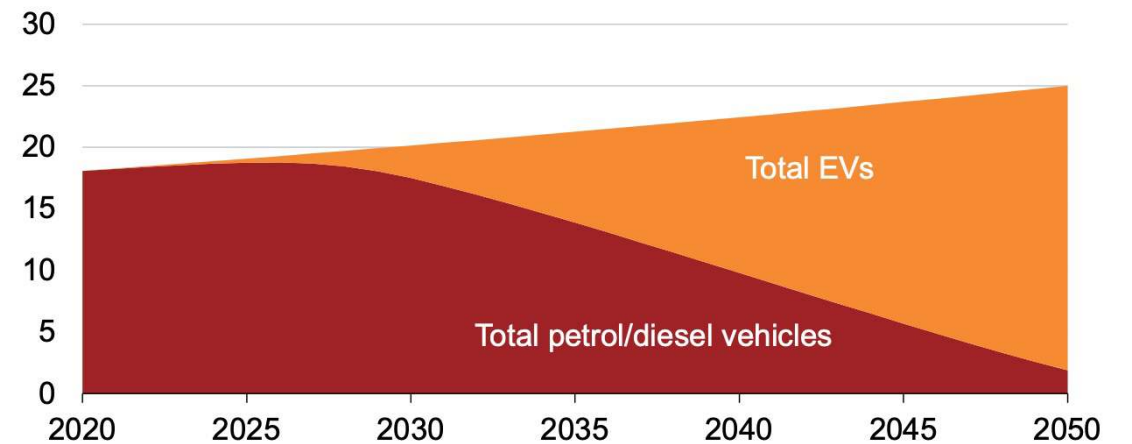
Note: 'Effective' compares how much each policy gets the light vehicle fleet on track for net zero. 'Efficient' compares the relative cost of abatement for each policy. 'Simple' compares how administratively easy is it to implement. 'Flexible' compares how easy is it to adjust the policy or transition it into another policy. 'Popular' compares how politically easy it is to sell

Achieving 75 per cent electric vehicle sales by 2030 and near-100 per cent by 2035 would get the light vehicle fleet mostly on track for net zero, with just a few million petrol and diesel cars still on the road in 2050

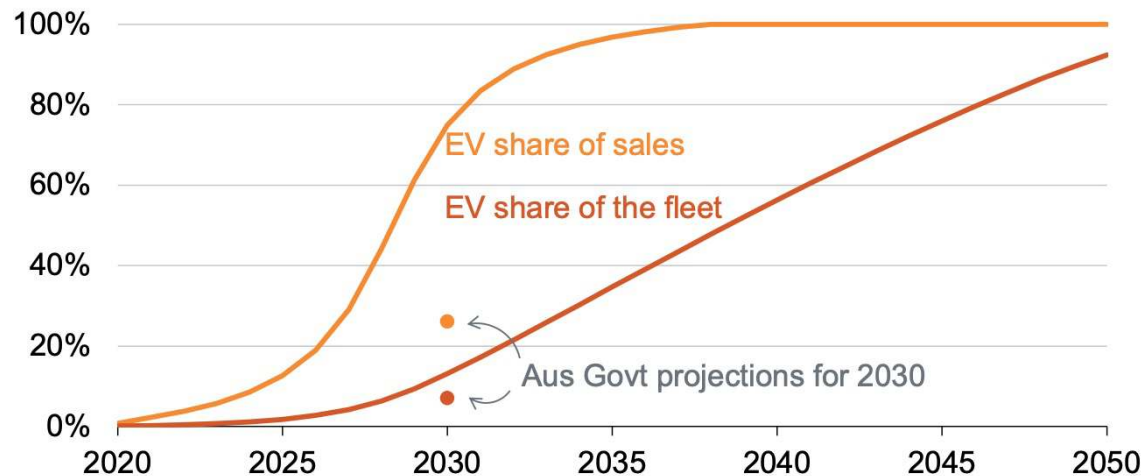
Light vehicle sales (millions)



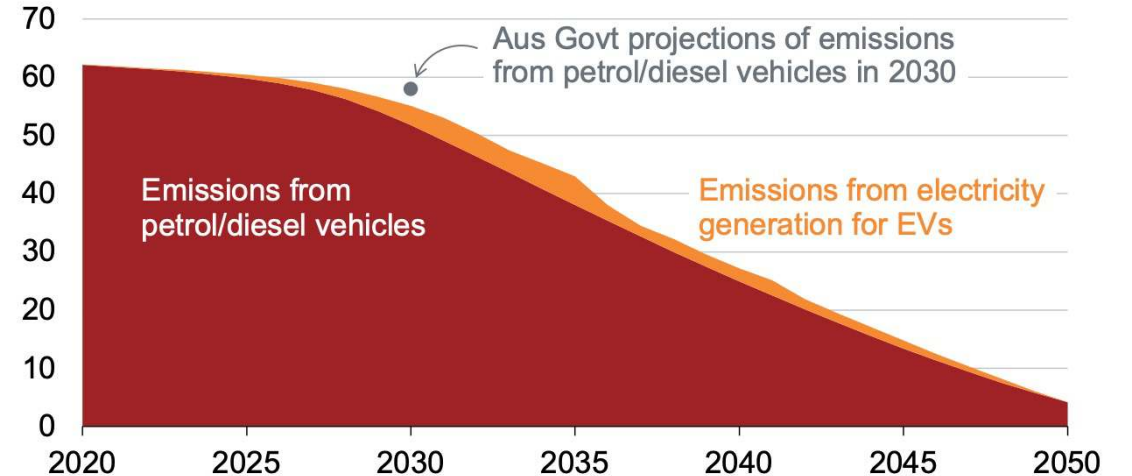
Total light vehicle fleet (millions)



EV share

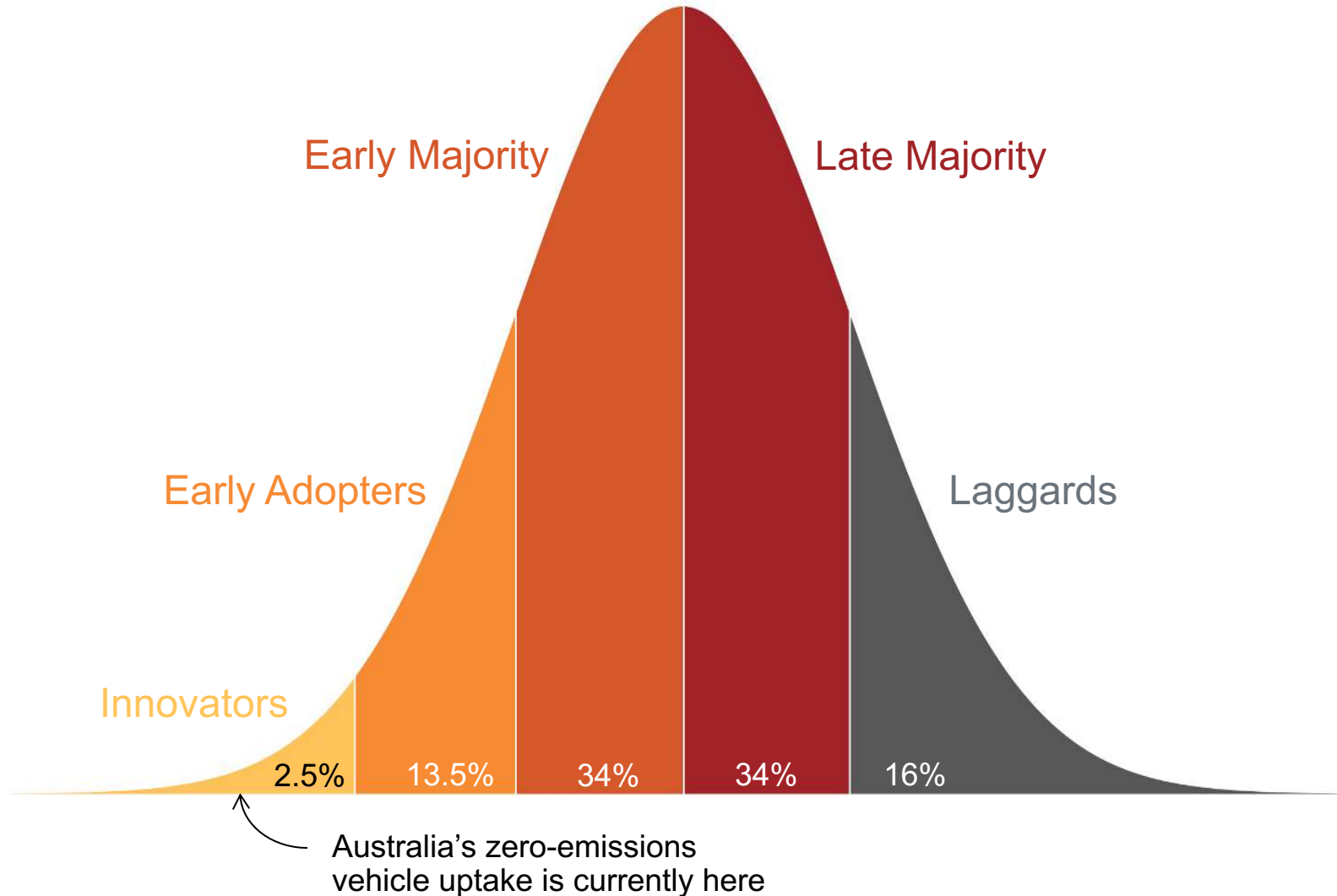


Annual emissions from the light vehicle fleet (millions of tonnes)



Notes: Adoption curve is stylistic only. Electricity emissions intensity is assumed to decline nationwide at the same rate as the National Electricity Market over 2021-2042, according to AEMO's Step Change Scenario, and then linearly to zero emissions by 2050: AEMO (2020a). 4.1 per cent of the vehicle fleet is scrapped each year, in line with the attrition rate over 2015-2020: ABS (2020b). Based on data from VicRoads (2020), one-fifth of the turnover is assumed to be due to random crashes, with the rest due to vehicle age. Source: Grattan.

The technology adoption curve; rebates are likely to be most effective once Australia is past the Innovator phase (probably 5 years away)



The rest of the transport sector

Heavy vehicles (trucks)

- Probably a mix of electric and hydrogen fuel cell
- Run targeted trials of hydrogen trucks on key routes
- Amend truck width limit from 2.5m to 2.6m to match US

Aviation

- Probably jet fuel made from biomass, or just offset the emissions
- Implement a renewable hydrocarbon standard to develop domestic capabilities

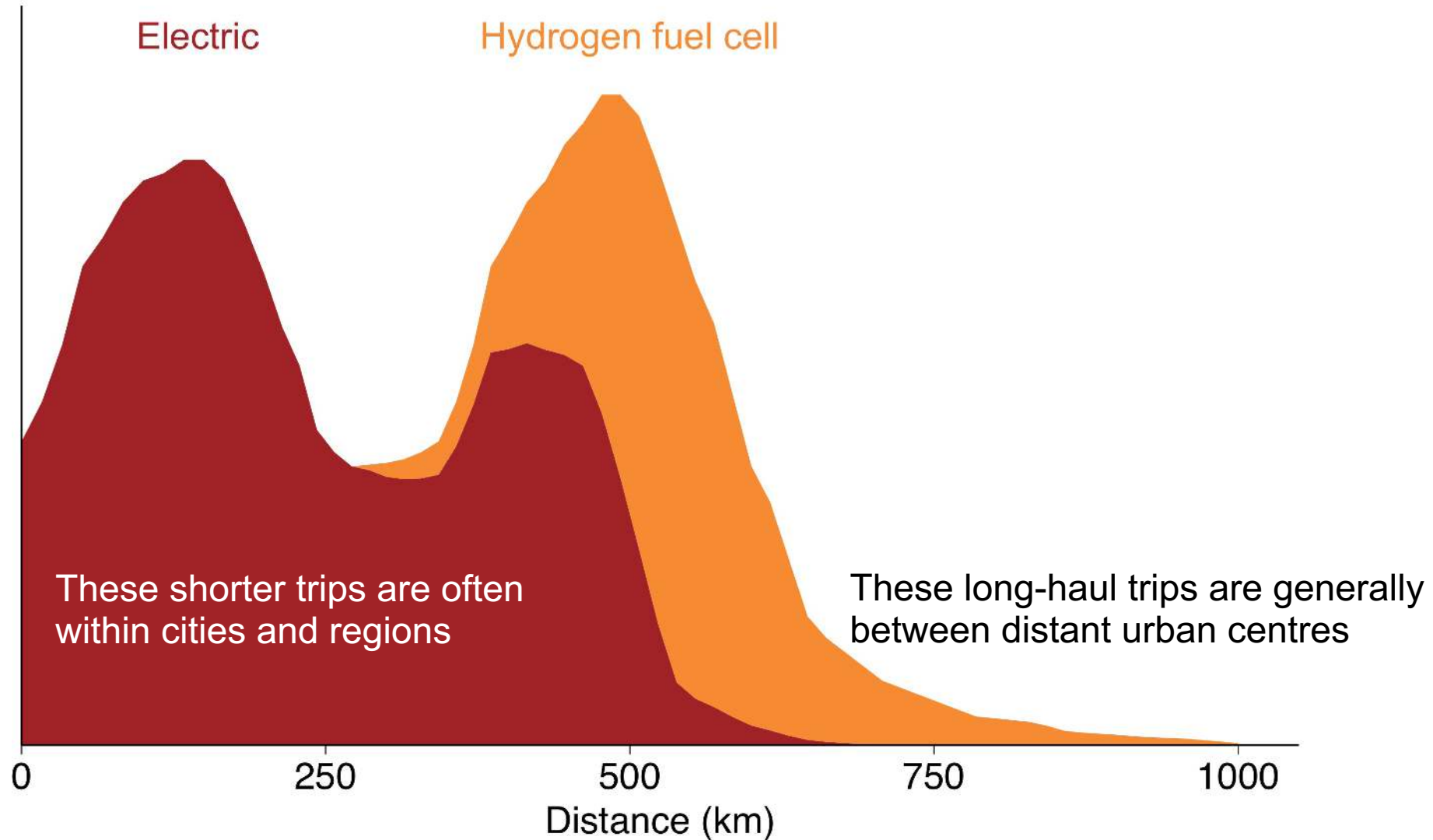
Shipping and watercraft

- Electricity for small vessels, possibly hydrogen or ammonia longer term for large ones

Rail, buses, motorcycles: small, mix of electrification and possibly hydrogen for freight rail/coaches

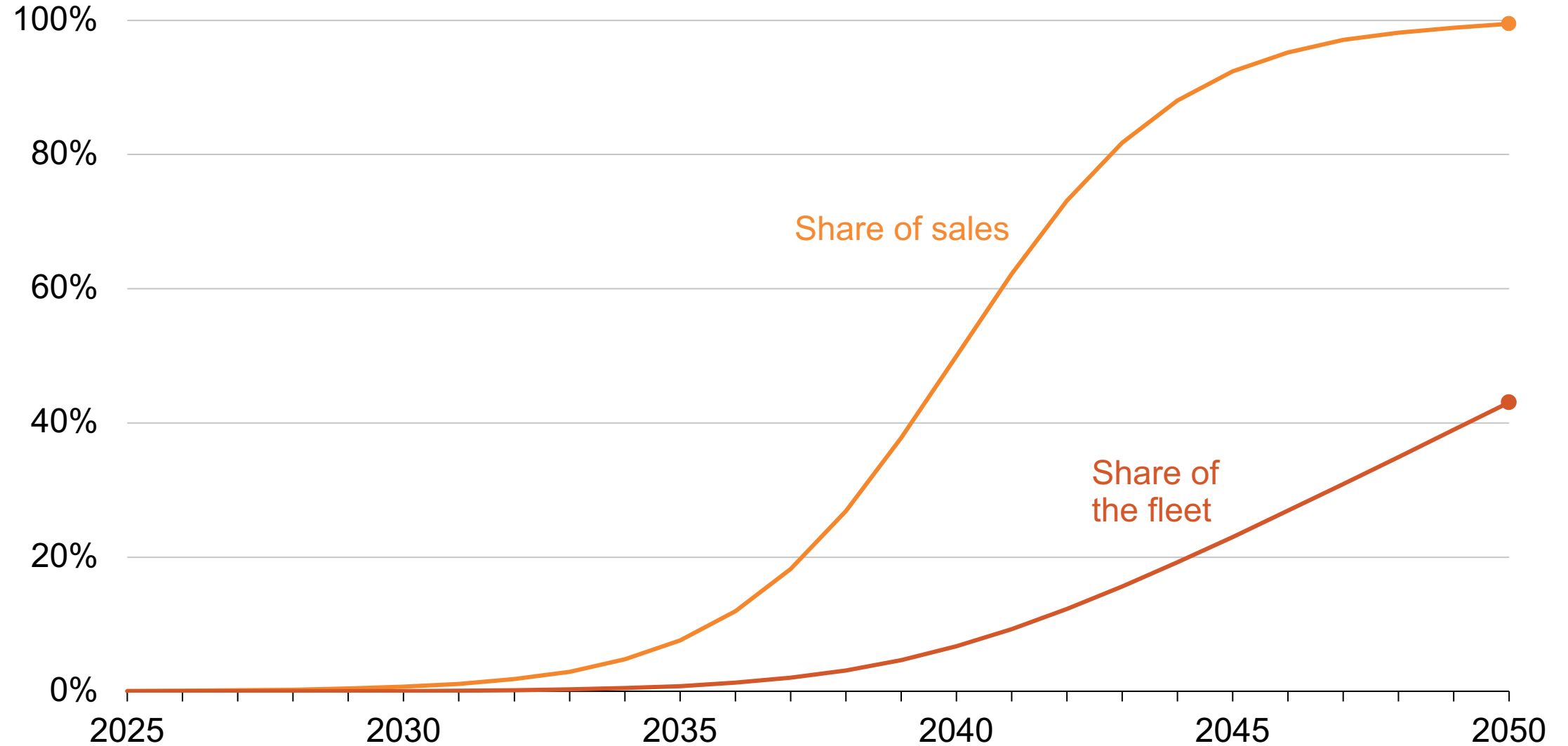
The IEA predicts that electric vehicles will dominate short-range trucking by 2050, with hydrogen fuel cell trucks for longer distances

Future distribution of trucking trip distance by fuel type



Slow uptake of zero-emissions trucks could mean most of the fleet still uses diesel in 2050

Zero-emissions trucks (electric or fuel cell)



Notes: Adoption curve is stylised, based on a logistic function. It assumes sales of zero-emissions trucks reach 1 per cent by 2030, 50 per cent by 2040, and 100 per cent by 2050. Trucks are assumed to be retired due to age only, at a rate of 4.1 per cent per year (consistent with average vehicle turnover between 2015 and 2020: ABS (2020b)). Source: Grattan analysis.

Our policy recommendations (recap)

Reduce barriers to zero-emissions vehicles:

- Availability of models to suit Australians' needs
- Upfront cost
- Access to charging

Key recommendations:

Light vehicles

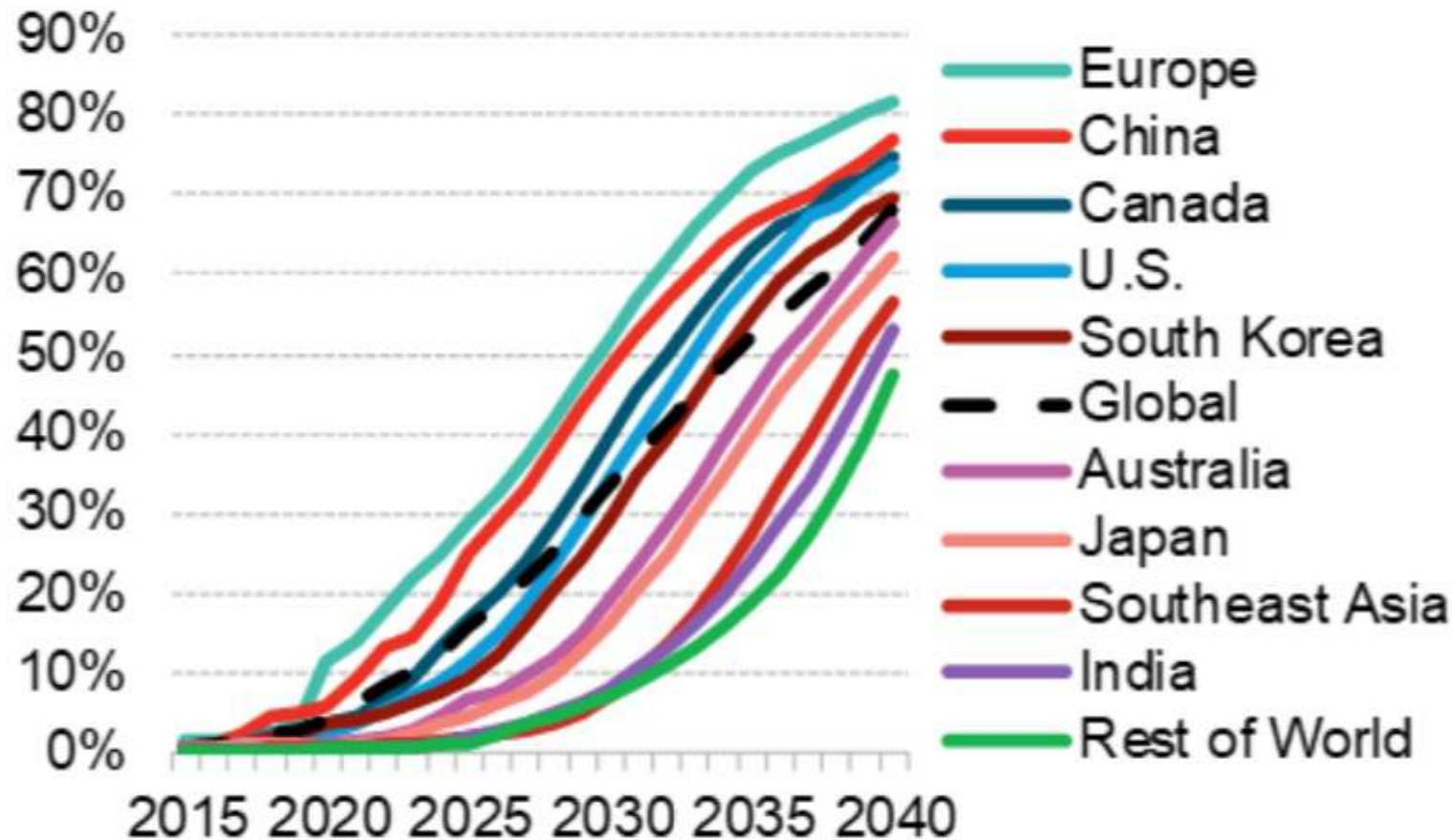
- Use a vehicle fleet emissions standard to phase out sales of new petrol/diesel models by 2035
- Scrap inefficient taxes (motor vehicle duty, import duty, LCT)
- Boost access to charging for those who have few options

Heavy vehicles

- Amend truck width limit
- Support trials for zero-emissions trucks along key routes
- Establish renewable hydrocarbon standard as a hedge for hard-to-decarbonize transport tasks

BNEF predicts that market forces + technology improvements alone won't get us close to 100% ZEV sales by 2035

EV share of new passenger vehicle sales outlook by market - Economic Transition Scenario



Source: BNEF. Note: EVs include battery-electric and plug-in hybrid electric vehicles. Battery-electric vehicles represent 88% of total electric vehicle sales in 2030. Europe includes the EU, the U.K. and EFTA countries.