



22 November 2019

Mr David Thodey
NSW Federal Financial Relations Review
GPO Box 5469
Sydney, NSW 2001
Via email: FFRReview@treasury.nsw.gov.au

Dear Mr Thodey

RE: NSW FEDERAL FINANCIAL RELATIONS REVIEW DISCUSSION PAPER

Infrastructure Partnerships Australia is pleased to provide this submission in response to the NSW Government's *Review of federal financial relations discussion paper*. Infrastructure Partnerships Australia is an independent think tank and an executive member network, providing research focused on excellence in social and economic infrastructure.

In response to the Discussion Paper, we submit that NSW should initiate road funding reform through introduction of a road user charge on electric vehicles. The Discussion Paper highlights declining fuel excise revenue as a pressing issue. Implementing a road user charge for electric vehicles could help to address this issue, while providing broader benefits for road users and the economy.

Our recent report *Road user charging for electric vehicles* is submitted as an attachment to this submission. This paper proposes a model for implementing a simple, distance-based charge to electric vehicles that will make road funding fairer and more sustainable.

The paper outlines the ways in which reform can be progressed, including state and territory governments taking the lead. This approach would see the vehicle fleet shifting to a road user charge over time as more electric vehicles hit the roads, with internal combustion vehicles continuing to pay fuel excise. This would make a road user charge 'opt-in' for motorists, and would ensure that all road users make a fair contribution for the roads they use.

Initiating road reform through the uptake of electric vehicles is a no-regrets reform that could create a new ongoing revenue stream for NSW and other state and territory governments. This revenue would be resilient to changes in the economy, inflation and developments in technology. By ensuring funds are earmarked for use on transport and kept in the state they are raised, this reform would also provide NSW will greater capacity to manage its own transport networks. It would also establish a mechanism to deliver wider policy and reform outcomes for Sydney and NSW.

Electric vehicle uptake could bring enormous potential benefits for Australia, enhancing transport, boosting productivity and supporting better environmental outcomes. But time is running out for these benefits to



extend to road reform. Reform is only possible while electric vehicles make up a minor proportion of the fleet.

We would be happy to provide further evidence in support of our submission. Should you require further information, please contact Director of Policy and Research, Jon Frazer on 0422 688 430 or jon.frazer@infrastructure.org.au.

Yours Sincerely



ADRIAN DWYER

Chief Executive Officer

Attachment: Infrastructure Partnerships Australia report Road User Charging for Electric Vehicles

ROAD USER CHARGING FOR ELECTRIC VEHICLES



Infrastructure Partnerships Australia

Infrastructure Partnerships Australia is an industry think tank and an executive member network, providing research focused on excellence in social and economic infrastructure. We exist to shape public debate and drive reform for the national interest.

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CEO'S INTRODUCTION



Over recent years, reform has become the hardest word. Productivity-boosting reforms of the 1980s, 1990s and early 2000s have driven 28 years of uninterrupted economic growth. Governments are investing in infrastructure at record levels – particularly in NSW and Victoria – but productivity growth has largely stalled. Technologies and markets are moving faster than regulators, placing Australians at risk of missing out on the opportunities these advances bring.

Transport in particular faces a strong imperative for change. We are in the midst of a transport revolution, driven by electrification, the spectre of automation, and on-demand travel options. Without reform, Australia will be soon driving with the handbrake on.

It does not have to be this way. One transport reform can place Australia at the front of the pack, support further innovation and technological development, unlock productivity benefits through more efficient road networks, and ensure we can pay for transport services for generations to come.

Introducing a road user charge for electric vehicles is a home run reform. It represents a win-win for infrastructure users and taxpayers. But there is a catch – reform must be delivered soon.

Fortunately, the timing is perfect. We've made it through a cluster of elections over the past 12 months – including those of the Federal Government and our two largest states. This means governments have a unique window to engage communities on the need for reform, and to get it done.

Fuel excise is in terminal decline, while the total number of vehicle kilometers traveled is only growing. This trend started many years ago as vehicles became more fuel-efficient and is set to fall off a cliff as a wave of electrification hits. What has emerged gradually as an increasingly unsustainable tax – and one that is unfair for many users – will very quickly become untenable as those who cannot afford an electric vehicle must foot a growing road bill for those who can.

We are also at the perfect moment in the technology cycle. While electric vehicles still only represent a small fraction of new car sales, the future of our light vehicle fleet is electric. Once there is an electric car in every street, the opportunity will be lost.

While fuel excise is a federal charge, and there are benefits to nationally led-reform, states and territories have an opportunity to jump ahead. There is a large first mover advantage in claiming an ongoing revenue stream that is stable, reliable, and immune to inflation or economic downturns. In an environment of tightening fiscal settings, a new and sustainable source of revenue is an attractive proposition.

All governments have a clear imperative for change. This paper provides a pathway for that change. We look forward to working closely with governments, industry and the community to make it work.

EXECUTIVE SUMMARY

The need to change how Australian motorists pay for roads is well-established. Since at least the early 1990s, policy leaders including the Industry Commission¹ (and in its later incarnation) the Productivity Commission,² Infrastructure Partnerships Australia,³ the Harper Review,⁴ Infrastructure Australia⁵ and Infrastructure Victoria⁶ have argued that road pricing is a crucial, productivity-enhancing reform. The Federal Government even agreed to advance reform in 2016,⁷ but no progress has eventuated.

Over the past few years, the need for reform has become more acute. While our population and the total distance travelled on our roads have grown substantially, improvements in the fuel efficiency of vehicles has eroded the revenue collected through fuel excise. The result has been mounting congestion in cities, worsening road quality in many regions, and a lack of certainty about how we will meet Australia's future transport needs.

The arrival of electric vehicles has made the need for reform even more urgent. Although electric vehicles form only a small part of the vehicle fleet today, this is likely to shift rapidly as the price of new vehicles falls and eventually reaches price parity with internal combustion engine vehicles. This point may come within the next five years.

The arrival of electric vehicles brings enormous potential benefits for Australia:

- More vehicles with zero tailpipe emissions will dramatically improve air quality in our cities and bring substantial health benefits.
- Deployed effectively, the storage capacity of electric vehicles could help to stabilise the electricity grid during peak periods.
- The capacity to power electric vehicles by renewable energy – whether sourced from home solar and storage systems or large-scale generators – can help Australia to substantially reduce its carbon emissions and achieve its international targets.
- Reduced reliance on international supplies of petroleum and oil can reduce living costs for Australian households, improve national fuel security and insulate our economy from disruptions to supply.

But electric cars don't float. They will still use roads, so we need to keep paying for them. And all motorists should pay their fair share. Without reform, fewer road users – particularly those who cannot afford a new vehicle or motorists in regional areas who drive vast

distances – will increasingly subsidise electric vehicle motorists. Road funding will also have to be drawn from the broader tax base, taking away resources from critical services such as health and education.

While rapid uptake of electric vehicles comes with its challenges, it also presents a unique opportunity for reform that will provide lasting benefits without short-term pain. The timing for reform is perfect – governments should implement a road user charge on electric vehicles now while there are few on the roads.

To be clear, this reform is not about deterring uptake of electric vehicles. On the contrary, this reform would provide certainty to potential electric vehicle owners about their future costs, and how the roads they rely on will be paid for. It would also bring clarity for businesses and investors – both in transport technologies and the economy more broadly – about Australia's future transport direction, providing much-needed confidence and policy stability.

Governments can and should ensure that electric vehicle owners will pay no more than other motorists. Some governments may wish to ensure electric vehicle owners pay less than their internal combustion engine counterparts to encourage uptake and unlock the widespread personal and societal benefits that electric vehicles bring sooner. This is rightly a call for governments based on their policy agenda. What is most important is getting a system in place that enables some level of charge for road use and enables governments to manage their networks and sustainably fund their maintenance and upgrades over time.

Conversely, this reform would not penalise those who wish to continue driving internal combustion engine vehicles. The existing road charging arrangement for petrol and diesel-powered vehicles can and should remain the same. In this way, fuel excise can be allowed to decline over time as more of the fleet becomes electric-powered, but road user charging will remain an 'opt-in' decision for motorists, tied to their choice of new vehicle. In this way, our proposed approach is resilient to any uptake scenario and is fair for all road users. All motorists should pay for the roads they use, and none should pay both excise and a road user charge.

A road user charge for electric vehicles does not need to be complex. In fact, this reform will be most easily implementable and understandable for communities if it is simple, transparent and effective. Figure 1 outlines a simple model of a road user charge that could be implemented today.

1. Industry Commission, 1994, *Urban transport* 2. Productivity Commission, 2014, *Public infrastructure*, and 2017, *Shifting the dial* 3. Infrastructure Partnerships Australia, 2014, *Road pricing and transport infrastructure funding: Reform pathways for Australia* 4. Prof Ian Harper, 2015, *Competition Policy Review* 5. Infrastructure Australia, 2016, *Australian Infrastructure Plan* 6. Infrastructure Victoria, 2016, *The road ahead* 7. Australian Government, 2016, *The Australian Government's response to Infrastructure Australia's Australian infrastructure plan*.



The charge should be simple, distance-based and cover the whole of the road network



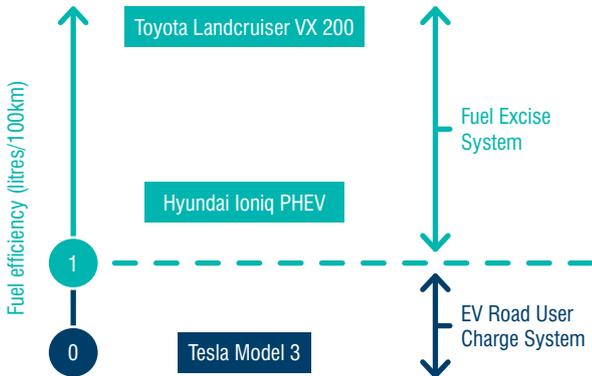
A per-kilometre charge should be set or capped to ensure electric vehicle motorists pay no more than those paying fuel excise



Governments may wish to provide a time-limited discount period to encourage uptake and provide certainty for prospective electric vehicle buyers



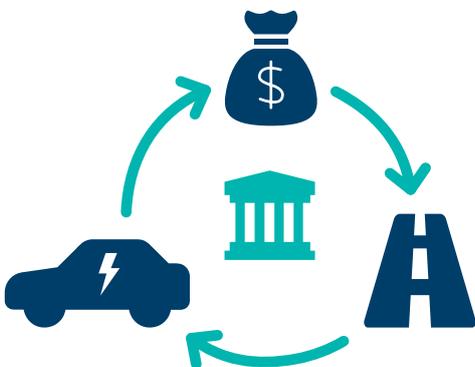
Charges could be the same or different across states and territories, but should be based on the same methodology and a compatible approach



The charge should capture all vehicles with manufacturer-rated fuel use below 1 litre per 100 kilometres



The charge should be indexed in line with inflation



Funds raised should be retained in the jurisdiction they are raised and reinvested in maintenance and new transport capacity



Motorists should submit (or vehicles transmit) odometer readings every six or 12 months

Over time, governments may wish to make a road user charge more sophisticated by moving from a distance-based charge to a location, time and mass-based charge. This would enable a road user charge to help address congestion or support broader policy objectives. In some cases, this will require the use of technologies to measure where and when users travel. It is important that governments should have time to engage communities on and install appropriate safeguards for users' information. In the meantime, it is important that today's governments do not rule out any future options until this engagement has occurred.

A government that implements a distance-based charge in the near term does not make the implementation of a location, time and mass-based charge inevitable over time. Nor does the implementation of a distance-based charge preclude governments from introducing a more sophisticated system at a later date.

This reform could be initiated by the Federal Government, by state and territory governments in collaboration, or by any of the state and territories

individually. Each of these options has potential advantages and challenges. There may be some constitutional limitations to the Federal Government implementing a charge on state-owned roads, or in varying charges across jurisdictions, placing state and territory governments in the box seat to initiate reform in the short term.

With the state-led reform pathway, it is essential that jurisdictions work together to ensure compatibility – if not consistency – of approaches to road user charging across jurisdictions. Without this collaboration, we risk creating 'Rail Gauge 2.0,' repeating the mistakes of early Australian governments in establishing incompatible railway lines across state borders.

Whichever reform pathway Australia's governments adopt, they will have the full backing of Infrastructure Partnerships Australia. Reform of Australia's transport networks can be a major catalyst for improvements in productivity and quality of life in the twenty-first century. But unless we act now to update our road funding system, Australia is going to be stuck in the slow lane.

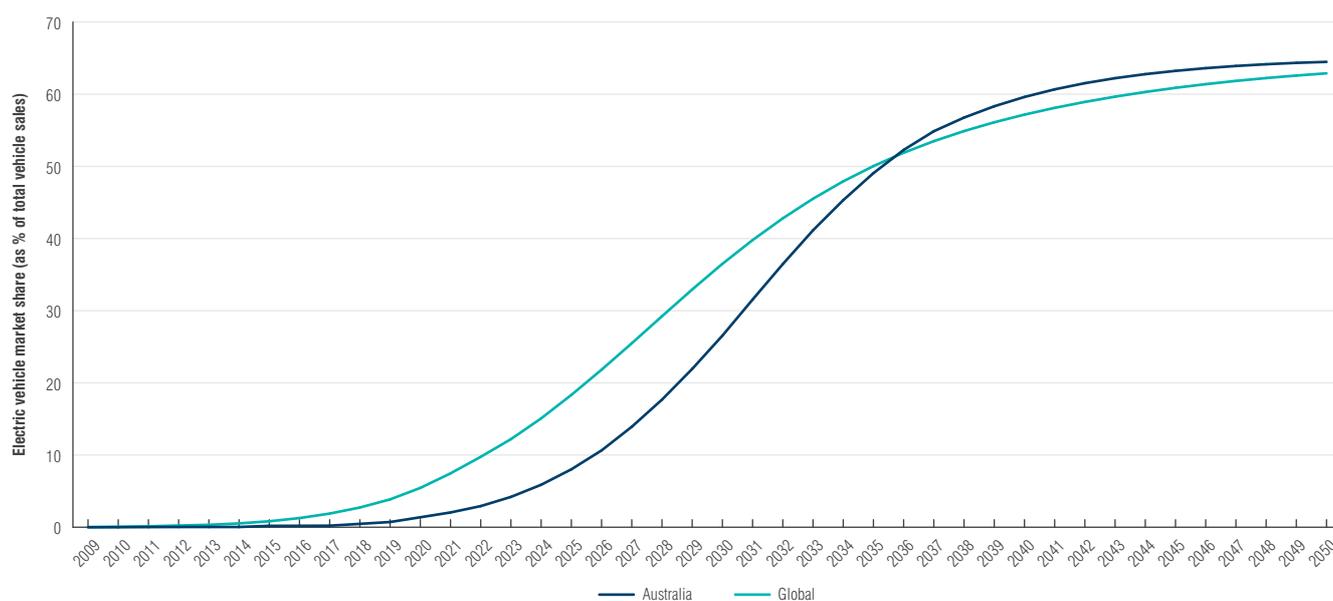


ELECTRIC VEHICLES ARE COMING, AND THAT'S A GOOD THING

Australian electric vehicle uptake is rising

Over the coming decades, electric vehicles are expected to dominate the new car sales market. While there are a range of forecasts of the rate of electric vehicle uptake, even conservative estimates indicate that by 2046, at least 60 per cent of new car sales are likely to be electric-powered (Figure 2).⁷

Figure 2: Projected electric vehicle uptake in Australia vs globally



Source: Bureau of Infrastructure, Transport and Regional Economics, 2019

The proportion of Australia's light vehicle fleet that is electric – approximately 0.076 per cent^{8,9} – is lower than in many other developed countries. In the near term, internal combustion engine vehicles will continue to make up the majority of the fleet.

However, the declining cost, increasing efficiency, ease of maintenance and reliability of electric vehicles over the next decade is likely to result in a growing proportion of electric vehicle sales. A major cost driver of electric vehicles – the battery – is becoming cheaper.¹⁰ With the price per kilowatt hour falling, the variety of reasonably priced electric vehicles is growing.

An increasing number of manufacturers are offering low- and medium-priced electric vehicles. Several vehicle manufacturers offer electric vehicles in Australia for less than a \$50,000 sticker price, including Hyundai, Nissan and Renault. There are more expensive options

such as from BMW, Jaguar and Tesla. At least five more manufacturers will introduce electric vehicles to Australia over the next two to three years.

Every year, the proportion of Australian motorists in the market for electric vehicles grows. More than a third of Australians considered buying an electric vehicle in 2018, compared to 28 per cent in 2017.¹¹ It is likely that, once price parity between electric and internal combustion engine vehicles is reached, electric vehicle uptake in Australia will grow rapidly. Price parity in Australia is expected to be reached by 2024.¹²

This paper uses the term 'electric vehicles' as shorthand for a range of different electric vehicle and low-emissions vehicle technologies. Box 1 outlines how this paper defines electric vehicles and outlines the different forms of electric vehicle technologies.

8. Bureau of Infrastructure, Transport and Regional Economics, 2019, *Electric vehicle uptake: Modelling a global phenomenon* 9. International Energy Agency, 2019, *Global EV Outlook 2019* 10. Australian Bureau of Statistics, 2019, *Motor Vehicle Census, Australia, 31 Jan 2019* 11. Bloomberg New Energy Finance, 2019, *Lithium-ion battery pack price outlook* 12. EY analysis for Infrastructure Partnerships Australia, 2019 13. Energeia for ARENA and the CEFC, 2018, *Australian electric vehicle market study*

MYTH BUSTED

Myth 1: Electric vehicle uptake relies on government investment in charging

The charging network is also expanding with more sites across urban and regional areas. As this network grows, coupled with improving battery technology, 'range anxiety' among prospective electric vehicle buyers will diminish.

Governments have made some investments in charging infrastructure. The most significant of these is the Queensland Government's 'Electric Super Highway', which provides over 30 charging stations from Cairns to Coolangatta and inland to Toowoomba.

However, there is no clear market failure in the delivery of charging infrastructure. Nor is there

a need for government subsidies to charging providers. As the number of electric vehicles grows, so too will the commercial case for expanding the charging network. Government investment in charging only risks distorting the market and creating perverse incentives for delayed investment by charging providers.

Charging infrastructure will follow uptake in a commercially responsible and efficient way, meaning taxpayers aren't on the hook for infrastructure that could be redundant within a matter of years.

Box 1: What do we mean by electric vehicles?

This paper considers electric vehicles to be cars and other light vehicles powered by an electric motor, whether the fuel is electricity from a battery, hydrogen fuel cell, or any other source. This includes all vehicles that are not powered by petrol, diesel, or LPG – since each of these currently pays excise duties on the fuel consumed.

There are currently three main types of electric vehicles: Battery electric vehicles (BEVs), Plug-in hybrid electric vehicles (PHEVs) & fuel cell electric vehicles (FCEVs).

Battery electric vehicles

These use an electric motor powered by electricity stored in an internal battery. The battery is re-charged via plug-in to an external electricity source.

Plug-in hybrid electric vehicles

These contain both electric and combustion engines. They are powered by battery stored electricity but have additional range-extending petrol or diesel fuel tanks. The vehicle can be run using either fuel source however it is expected the battery will be primarily used given the lower cost of electricity relative to fossil fuels.

Fuel cell electric vehicles

These use an electric motor powered by electricity generated from an electrochemical 'fuel cell' within the car. The fuel cell utilises a chemical reaction, typically hydrogen and oxygen, to create electricity. Unlike a battery, which is plugged into a power source when flat, the fuel cell is refilled with hydrogen in a similar manner to petrol or diesel cars.

Other vehicles

Beyond these electric vehicles is a fourth category – the non-plug-in hybrid electric vehicle (HEV). HEVs use a combustion engine assisted by a battery and an electric motor to dramatically increase fuel efficiency. The battery is recharged using excess power from the engine and through regenerative braking.

For hybrid vehicles, the existing fleet can be considered as regular petrol or diesel vehicles. Over time, however, hybrids will become more fuel efficient and rely more on their electric motors. As such, future 'ultra hybrids' – those that are more fuel-efficient than vehicles currently on the market – should also be considered as electric vehicles for the purposes of a road user charge.

The world is transitioning to electric vehicles

Globally, the transition to electric vehicles is well underway. Over two million electric vehicles were sold in 2018, and this is projected to rise to 10 million in 2025 and 28 million in 2030.¹⁴

Uptake has been driven by a range of government interventions, including incentives to reduce purchase and operation costs, preferential parking for electric vehicles, and access to bus and transit lanes. Some governments have introduced a number of taxes on new internal combustion engine vehicles to make electric vehicles more cost-competitive. In Norway, these taxes have helped to make electric vehicles more affordable than their petrol or diesel alternative.

As Table 1 shows,¹⁵ a Volkswagen e-Golf is cheaper than the petrol Golf for Norwegian retail customers despite a 50 per cent differential in import price, and even before the electric vehicle's cheaper lifetime running costs are taken into account.

Table 1: Illustrative comparison of Volkswagen retail prices in Norway

	Volkswagen Golf	Volkswagen e-Golf
Import price	€22,046	€33,037
CO2 tax (113 g/km)	€4,348	-
NOx tax	€206	-
Weight tax	€1,715	-
Scrapping tax	€249	€249
25% VAT	€5,512	-
Retail price	€34,076 (AU\$54,777)	€33,286 (AU\$53,507)

Source: Norsk Elbilforening, 2019

A growing list of nations have also announced plans to ban sales of some or all passenger vehicles powered by fossil fuels over the coming decades. The world's largest car market, China, is also developing a timeline for phasing out petrol vehicle sales, while several states in the USA, the second largest market, have announced future bans. In another approach several countries are placing targets on electric vehicle sales, including Japan and India.¹⁶

Manufacturers are also committing to a future dominated by electric vehicles. Car manufacturer Volvo will phase out combustion engines from 2019,¹⁷ while Volkswagen is planning almost 70 new electric models by 2028,¹⁸ and General Motors 20 by 2023.¹⁹ One of the world's largest car-parts manufacturers, Continental, has also announced investment cuts to conventional engine parts because of a faster-than-expected fall in demand.²⁰

Electric vehicles can improve environmental and health outcomes

Transport is the second largest contributor to total greenhouse gas emissions after energy. It is also the fastest growing, increasing from 11 per cent in 1990 to 21 per cent in 2016. Light vehicles are responsible for roughly half (46 per cent) of transport emissions.²¹

Electric vehicles could help to substantially reduce greenhouse emissions when they are powered by clean energy. This remains a significant hurdle in unlocking the environmental benefits of electric vehicles. Although investment in renewable energy generation capacity in Australia has grown rapidly over recent years, with one of the world's highest per-capita renewable installation rates,²² fossil fuels still dominate the energy mix. Black and brown coal accounted for 71 per cent of total output in the National Electricity Market in FY2018-19, with gas contributing a further 8 per cent of the energy mix.²³

Until renewables comprise more of the generation mix, electric vehicles will remain primarily fossil-fuel powered, and Australia will miss out on the emissions reduction benefits of electric vehicle uptake.

Noxious tailpipe emissions from internal combustion engines – in the form of oxides of nitrogen and sulphur, particulate matter, hydrocarbons, and carbon monoxide – worsen air quality and have adverse health impacts. These emissions have been shown to contribute to cardiovascular disease, respiratory illness and cancer.²⁴

Uptake of electric vehicles will help to improve air quality – particularly in dense urban areas – and lessen the health costs of noxious emissions. The estimated health benefits gained through greater electric vehicle adoption and improved air quality are estimated to be \$28 billion by 2050.²⁵

Electric vehicles could reduce living costs and bring wider benefits

Prospective electric vehicle buyers currently face a cost premium for electric vehicles at the dealership. However, this difference in costs is declining, and the whole-of-life costs of an electric vehicle are likely to become far lower than for regular internal combustion engine vehicles.

Electric vehicles have fewer moving parts than internal combustion engine vehicles and require fewer consumables (such as oil and spark plugs), resulting in lower maintenance costs. Fuel is also vastly cheaper.

14. Bloomberg New Energy Finance, 2019, *Electric vehicle outlook 2019* 15. Norsk Elbilforening, 2019, *Norwegian EV policy* 16. International Energy Agency, 2019, *Global EV Outlook 2019: EY analysis for Infrastructure Partnerships Australia*; and Oliver Wyman, 2019, *Embracing an electric future* 17. Volvo, 2019, *Volvo Cars to go all electric* 18. Volkswagen, 2019, *Volkswagen plans 22 million electric vehicles in ten years* 19. General Motors, 2017, *We believe the future is all-electric* 20. Continental, 2019, *Powertrain business to change course and focus on the electric future and clean air* 21. EY analysis for Infrastructure Partnerships Australia, 2019 22. Blakers et al, 2019, *Australia: the renewable energy superstar* 23. Australian Energy Regulator, 2019, *State of the energy market – Data update November 2019* 24. Australian Government Department of the Environment and Energy, 2018, *submission to the Senate Select Committee on Electric Vehicles: Inquiry into the use and manufacture of electric vehicles in Australia* 25. EY analysis for Infrastructure Partnerships Australia, 2019

The Queensland Government estimates electric vehicle charging costs to be \$3.75 to \$5.00 per 100 kilometres, or 60 to 90 per cent cheaper than fossil fuel costs.²⁶

It may also be viable over the medium term for electric vehicles to enhance grid stability during peak periods. Technology is being developed that would enable electric vehicle batteries to share energy with the grid through two-way plugs. This could help to enhance grid stability and avoid blackouts or offset investment in new capacity. For users, this could provide a new source of revenue, help to better integrate their assets, and expand the effective capacity of household solar and storage systems.

Electric vehicles can also help to improve Australia's fuel security. Australia imports refined petroleum and crude oil from a range of countries, with nearly 60 per cent of domestic refined fuel consumption met by imports. While some of our fuel products are refined in Australia, these rely on imports for three-quarters of their feedstock.²⁷

Reduced reliance on international supplies of petroleum and oil can help to make the Australian economy more resilient to global shocks, including disruptions to supply and fluctuations in price. Greater reliance on domestically-generated energy can also help to improve our balance of trade and reduce living costs for Australian households.



²⁶. Queensland Government, 2019, *Compare electric vehicles costs* ²⁷. Australian Government Department of Environment and Energy, 2019, *Australian energy update 2019*

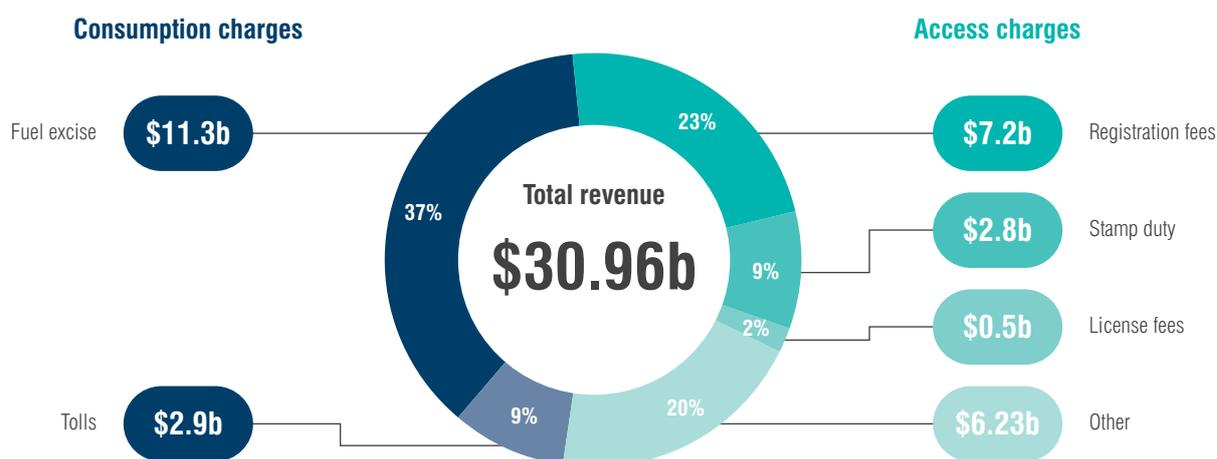
HOW WE PAY FOR ROADS NEEDS TO CHANGE

Fuel excise is in decline, making road funding unsustainable

Fuel excise has for many decades provided a relatively simple and fair way of charging for road use, and of raising revenue for road upgrades and maintenance. Levied by the Federal Government and collected from fuel retailers, fuel excise has provided a stable and consistent revenue stream that has been easy to raise and hard for users to avoid.

As shown in Figure 3, revenue is raised from a range of road-related sources. Fuel excise, levied by the Federal Government as a set rate on sales of fuel for on-road use, represents by far the largest single source of road-related revenue, contributing \$11.3 billion, or 37 per cent of the total funds raised from road users in FY2017-18. This fuel excise figure represents the net revenue raised after rebates on diesel use for heavy vehicles. Beyond fuel excise, major sources of road revenue, such as stamp duty on vehicle sales, registration and licence fees, are levied by state and territory governments. Other charges include GST on road-related purchases and fringe benefits tax on vehicles.

Figure 3: Road revenue was raised from a range of sources in FY2017-18



Source: EY analysis for Infrastructure Partnerships Australia, 2019

Government investment in roads, underpinned by fuel excise, has proven to be an adequate means of ensuring most Australians have access to jobs and services for most of the twentieth century. While road revenue is not directly hypothecated to funding road construction and maintenance, the total road revenue is historically comparable to what is spent on roads every year.

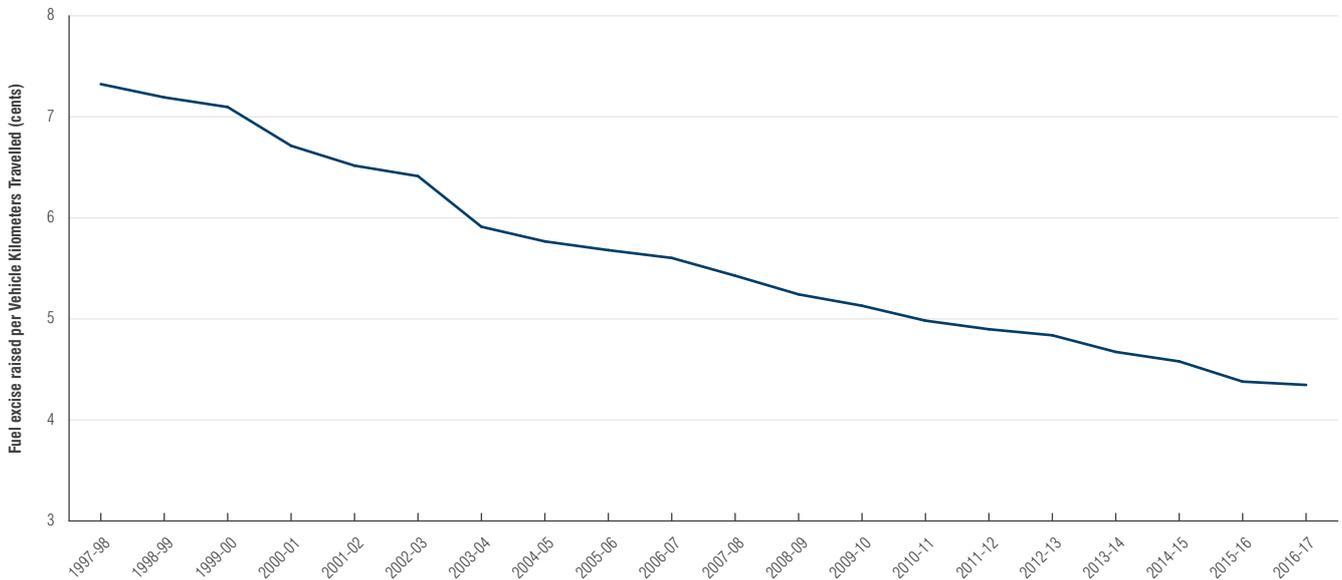
However, over recent decades, increasingly fuel-efficient vehicles have led to a decline in fuel excise. This means that the balance between funding and spending no longer holds true.

The decline in fuel excise is occurring despite a rise in vehicle kilometres travelled across the country. While the re-introduction of indexation on fuel excise in 2014 has helped to stem the decline somewhat, the key relationship between demand and supply is fundamentally broken.

This is shown by Figure 4,²⁸ which demonstrates that fuel excise is recovering far less from each kilometre travelled on Australia's roads than 20 years ago. Declining funding from road users is being stretched further to cover a steep increase in demand for roads. While electric vehicles can bring substantial benefits for Australia, mass market uptake will only accelerate and exacerbate the funding shortfall.

28. Bureau of Infrastructure, Transport and Regional Economics, 2018, *Yearbook 2018 – Australian Infrastructure Statistics*

Figure 4: Funding raised for each kilometre travelled is in freefall



Source: Bureau of Infrastructure, Transport and Regional Economics, 2018



How we pay for roads is also inequitable

Over time, fuel excise has also become increasingly unfair. Since fuel excise is paid per litre of fuel consumed, it penalises those who:

- require their vehicles for work and therefore consume more fuel, such as tradespeople
- cannot afford newer, more fuel-efficient vehicles, and
- live in areas with poor transport options, such as regional and outer suburban areas, and have little choice but to drive to access jobs and services.

By contrast, electric vehicle motorists pay nothing at the pump, and only contribute to the road network through state-based road access charges such as registration and licence fees. Under the current system, more electric vehicles will mean less funding for roads. Over time, this could result in growing congestion, poorer quality transport networks and rising costs for goods and services for all Australians. Road funding will need to be drawn from the broader tax base, taking away resources from critical services such as health and education.

Increasingly, those who drive internal combustion engine vehicles – particularly those in older, less fuel-efficient vehicles – will subsidise electric vehicle owners. This is not fair or equitable and will have a regressive impact on households by charging the most fuel excise to those who can afford it least.



Broader changes in transport increase the imperative for reform

Occurring in parallel with the electrification of the fleet, emerging trends in the light vehicle market will exacerbate the decline in road revenues and amplify the need for reform.

Growth in shared fleets

The current model of private car ownership, with at least one car in every driveway, may be unrecognisable in a generation's time. Many Australians have already opted for car-sharing programs or ridesharing for some or all of their trips. This trend is likely to become more widespread as parking becomes harder to find, and more people seek to avoid the costs and hassles of car ownership. Approximately half of all vehicle sales in Australia already are to fleet buyers – though many of these are still leased by individuals.²⁹

By using shared vehicles, users pay no direct fee for road use – with fees flowing to third-party operators. Shared vehicles are typically used more often than private vehicles, so reduced individual car ownership will also undermine the second-largest source of road-related revenues, vehicle registration, which is levied by state and territory governments.

Shared fleet owners and ride-share operators also have a greater incentive to move to electric vehicles sooner, especially if they pay no charge for road use. Growth in shared fleets could therefore accelerate electric vehicle uptake beyond current projections, and lead to even more rapid decline in road revenues.

Rollout of autonomous vehicles

Estimates for the mass market arrival of autonomous vehicles vary widely. While the specific timeline for rollout of the technology is unclear, 'level five automation' – where fully self-driving cars require no driver or steering wheel – may arrive at some point over the coming decades.

These autonomous vehicles will almost certainly be electric, and – given the level of technology required – it is unlikely they will be within the price range of average motorists. Fleets of electric, autonomous vehicles owned by a few major companies without a price signal for road use would leave taxpayers with the full burden of paying for roads.

Both ride-sharing and autonomous vehicles are also susceptible to 'empty running', where vehicles carrying no passengers take up vital road space. Without a road user charge in place, this phenomenon will only exacerbate congestion, and the increasing demand for road space will mean operators will be able to charge a premium to travel. This would benefit those who can afford to pay more, and penalise those with fewer transport options, while leaving governments with little control over transport service delivery on publicly-funded roads.

Clearly, a road user charge is required before these developments eventuate, and the approach recommended by this paper is robust under each of these scenarios. The sooner a road user charge is in place, the better the outcomes will be for future road users and taxpayers.

29. Fleetcare, 2017, *Fleet buyers dominant in record vehicle sales*

WE NEED A ROAD USER CHARGE FOR ELECTRIC VEHICLES

Mounting challenges bring a clear opportunity for reform

The rise of electric vehicles presents a clear need for reform. It is unsustainable for a growing subset of Australia's motorists to pay no charge to reflect their use of roads. It is not fair that other motorists – among them, those who cannot afford an electric vehicle – will shoulder a growing funding burden. In addition, the effectively free use of roads for electric vehicles can only lead to growing congestion on many urban roads.

Clearly, how we pay for roads needs to change. Electric vehicles present a unique opportunity to attach reform to the rise of an emerging technology. A road user charge for electric vehicles is a no-regrets reform that would benefit Australians for generations to come. By aligning reform to the rise of electric vehicles, Australia has an opportunity to deliver a future-proof, fairer way to pay for transport infrastructure that is the first of its kind in the world.

Done well, reform can also accelerate many of the benefits that electrification of the fleet brings. Cleaner air in our cities and a reduction in greenhouse gas emissions could help Australia to meet its international emissions reduction targets, and to create healthier and more sustainable places.

This chapter outlines Infrastructure Partnerships Australia's recommended approach to introducing a road user charge for electric vehicles. This approach should be a simple, distance-based charge that covers the whole of the road network. This would ensure all road users contribute their fair share of funding for roads, and provide a fairer and more sustainable of paying for maintenance and upgrades of the transport networks we all rely on.

The need for road reform is well-established

Successive inquiries, reviews and reports have pointed to the need to reform our road funding and user charging system. Each of these have drawn the same conclusion that the current system for funding and investing in our roads is inefficient, unfair and unsustainable. These include:

- The Productivity Commission's *Public infrastructure* (2014)
- Professor Ian Harper's *Competition policy review* (2015)

- Infrastructure Australia's *Australian infrastructure plan* (2016)
- Infrastructure Victoria's *The road ahead* (2016)
- Productivity Commission's *Shifting the dial* (2017), and
- Infrastructure Australia's *Australian infrastructure audit* (2019).

The Federal Government, in response the 2016 Australian Infrastructure Plan, even committed to an inquiry into road reform. However, three years later, this inquiry has failed to materialise.

Infrastructure Partnerships Australia has consistently argued for national road reform and implementation of a user charging system for the past decade. This includes publishing *Road Pricing and Transport Infrastructure Funding* in 2014 and advocating for change through a variety of inquiry processes, formal submissions, public forums and news publications.

A road user charge on electric vehicles would bring wide-ranging benefits

A road user charge would benefit all Australians by providing a sustainable funding base for transport maintenance and investment, as well as improving transport outcomes for users and encouraging electric vehicle uptake.

Reform would also bring clear benefits for a broad cross-section of the community. A road user charge for electric vehicles:

- **is better for non-electric vehicle motorists** as it ensures all road users pay for their road use, regardless of the type of vehicle they drive
- **is better for other transport users** because it ensures that all transport users pay their fair share for the transport services they use, and
- **is better for taxpayers** as all revenue generated by a road user charge can and should be directed to transport upgrades.

This is a fairer, more efficient and sustainable system of paying for roads, and allows flexibility to address further policy challenges such as congestion and productivity.

Those who continue to use an internal combustion engine vehicle will pay nothing extra, since the road user charge is only applied to electric vehicles. Therefore, regional users and lower income earners who continue to use an internal combustion engine vehicle will not be worse off. They will continue to pay what they currently do and nothing more.

**MYTH
BUSTED**

Myth 2: A road user charge on electric vehicles will discourage electric vehicle uptake

While this paper recommends introducing a simple, distance-based charge road user charge on electric vehicles, this need not deter sales or use of electric vehicles. On the contrary, a road user charge could provide the catalyst for strong growth in the electrified fleet by providing potential electric vehicle buyers with certainty about the future road funding arrangements. This allows potential buyers to purchase vehicles with confidence, while providing surety that governments will retain sufficient funding to pay for maintenance and upgrades of the roads they will use over the life of their electric vehicle.

Also, a road user charge provides governments with a simple, powerful tool to manage electric vehicle

uptake. Governments can provide guarantees to electric vehicle motorists that revenue raised through a road user charge will not exceed what they would have otherwise paid in fuel excise, and that revenue will go directly to transport investment.

Depending on their policy agenda, a government may also choose to provide a discount on a road user charge or registration fees for a number of years, ensuring electric vehicles will pay less than their petrol or diesel equivalents, in recognition of the wider environmental and economic benefits electric vehicles can bring.

These factors, combined with the declining gap in whole-of-life costs for electric vehicles can provide strong incentives for motorists to move to electric vehicles.



Box 2: Electric vehicle owners will still benefit under a well-structured road user charge

Electric vehicle uptake is likely to be driven by individual consumer choice. To explore the choices potential electric vehicle buyers face, and the impact of a road user charge on that choice, Infrastructure Partnerships Australia commissioned EY to analyse the whole-of-life cost of equivalent electric vehicle and internal combustion engine vehicles.

The analysis found that:

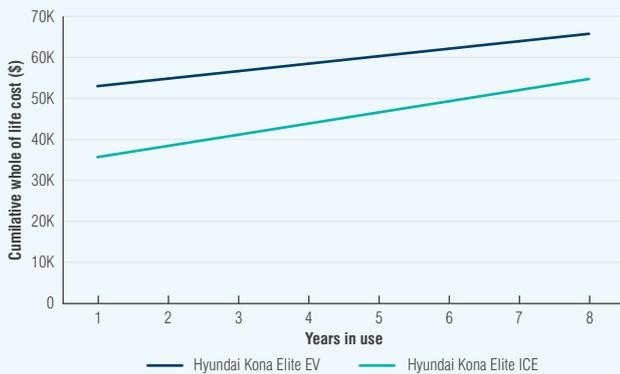
- while electric vehicles are more expensive now, their sticker prices are falling
- the cheaper ongoing costs of electric vehicles mean they will be cheaper to own over their lives
- a road user charge can be applied at a rate that equalises the tax contributions of electric vehicles and internal combustion engines, and
- with a road user charge applied, electric vehicles will still be cheaper to own and run than internal combustion engine vehicles.

Three scenarios were considered for the analysis: current prices, sticker price parity, and sticker price parity with a road user charge implemented.

Scenario 1: Current prices

Currently, electric vehicles are more expensive than internal combustion engine vehicles because of the higher upfront sticker price, which outweighs any maintenance or fuel savings over the life of the vehicle. For example, a Hyundai Kona Elite is \$15,500 or 53 per cent more expensive as an electric vehicle rather than as the petrol equivalent.³⁰ However, as Figure 5 shows, cheaper running costs of an electric vehicle mean the difference in cumulative costs narrow over time.

Figure 5: An electric vehicle is more expensive than a petrol equivalent at current prices

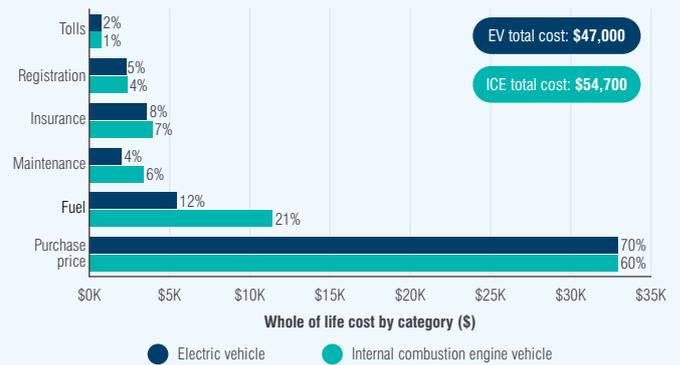


Source: EY analysis for Infrastructure Partnerships Australia, 2019

Scenario 2: Price Parity

Once electric vehicles cost the same as internal combustion engine vehicles at the dealership, lower running costs make them cheaper over the life of the vehicle. As demonstrated in Figure 6, fuel and maintenance will only comprise 16 per cent of an electric vehicle's whole-of-life cost, compared to 27 per cent for an internal combustion engine. This represents a \$7,700 reduction over the life of the vehicle.

Figure 6: Once price parity is reached, electric vehicles will provide savings to owners³¹



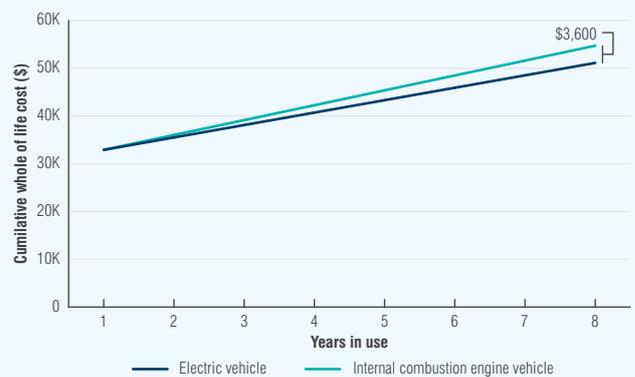
Source: EY analysis for Infrastructure Partnerships Australia, 2019

Scenario 3: Road user charge applied

Electric vehicles remain cheaper even when a road user charge is applied. With a charge of up to four cents per kilometre, an electric vehicle will save at least \$3,600 over an eight-year lifespan (see Figure 7). Four cents per kilometre was used, as it reflects a similar charge to fuel excise. A road user charge at this level is required to equalise tax contributions of electric vehicles and internal combustion engines.

If a road user charge was applied today, the operating costs of an electric vehicle would still be cheaper than an internal combustion engine. As sticker prices continue to fall, this will further level the whole-of-life costs. On this basis, a road user charge need not hinder uptake.

Figure 7: Even with a road user charge, electric vehicles would be cheaper over their lives



Source: EY analysis for Infrastructure Partnerships Australia, 2019

30. Prices accurate at the time of analysis 31. Figure 5 depicts the whole-of-life costs of an electric vehicle and a comparable, moderately-priced internal combustion engine vehicle

A road user charge should be a whole-of-network charge

It is important that implementation of a road user charge is network-wide and not isolated to specific area or type of road. It should not be confused with a congestion charge or subscription style transport services.

A road user charge allows the pricing of road use on the entire network. Previous work by Infrastructure Partnerships Australia and Infrastructure Australia has shown a network-wide charge is the most effective and fairest approach to funding road and wider transport network maintenance and investment.

This road user charge should charge each motorist for the roads they use. While transport markets may evolve to provide subscription-style packages, where users pay

a third-party provider for access to transport services, this does not alleviate the need for a road user charge. Under this approach – often labelled as mobility-as-a-service – the roads would need to be funded separately to the transport services provided on those roads.

The same is true for Netflix in the telecommunications sector. Third-party ‘over-the-top’ service providers do not pay for the infrastructure that carries the goods users receive. Netflix is delivered to users via data packets over a mobile or fixed network that is paid for by an internet subscription.

For roads that are provided by private operators, such as toll roads, the same approach as today could be maintained. There is no need to apply a separate treatment for private or tolled roads. Users currently pay fuel excise for use of these roads, so a distance-based road user charge would mirror the existing approach.

MYTH BUSTED

Myth 3: A congestion charge would be more effective than a whole-of-network charge

Some commentators have proposed that a congestion charge, whereby motorists would be charged a price to drive into designated zones around major city CBDs, would be a better solution than a whole-of-network charge. However, a congestion charge is the wrong tool for the job.

A congestion charge does little to counter the most pressing challenge for the future of Australia’s transport networks – the imminent sharp decline in fuel excise caused by the arrival of electric vehicles. It would leave the vast majority of roads with an effective price of zero. This would leave no way to manage demand outside of the major cities, and would leave regional roads with an ever-growing funding backlog.

A congestion charge alone would also be a poor way of managing demand. While it may help to lessen congestion in some parts of the city, at least two-thirds of people commute to areas outside the CBD and surrounding regions of Sydney,

Melbourne and Brisbane.³² As a result, a CBD-based cordon charge would have limited impact on users’ travel patterns, while incentivising ‘rat-running’ on local streets outside the congestion charge zone.

This form of charging would also be regressive and unfair, penalising those who have no option but to drive, and cannot afford to live closer to jobs and services. Conversely, it would reward those who can afford to pay the most, and who live in inner areas serviced by good public transport, by reducing congestion for their commute. This has proved to be the case in London.

Furthermore, a congestion charge would be difficult to implement. Australian cities are vastly different to London, Stockholm and others that have implemented congestion charges. Our major cities lack a natural inner-city ring and are far less densely populated. For example, Greater London could fit inside Sydney seven times.

32. Australian Bureau of Statistics, 2018, *Census of population and housing: Commuting to work*

A road user charge can be simple to design, implement and operate

The technology to implement a simple and effective road user charge already exists. This means that a road user charge can be implemented in the short-term, and be in place well before electric vehicle sales take off.

For a simple distance-based charge, no new hardware is required. Odometer readings could be taken every six or twelve months and could be implemented alongside existing registration processes. For vehicles with the capacity to transmit readings, owners may choose to submit this way, or simply take a photograph of their odometer as evidence. Enforcement could be undertaken using software to detect fraudulent submissions and manually at random – similar to the way tax returns are checked.

There would be no need for authorities to know when or where a vehicle has been. Governments would require no more information about a vehicle than what could be gathered by a glance at its odometer.

This proposed approach would impact a limited number of motorists – only those who already own electric vehicles or are actively considering buying one. Governments could set rates on charges to ensure electric vehicles pay no more than the equivalent internal combustion engine vehicle.

Those who drive vehicles powered by petrol, diesel or LPG currently pay excise on the fuel they consume. This system could be allowed to continue, with no change to current arrangements. This would mean that no driver is worse-off, whether they move to a road user charge for electric vehicles or not.

This would also mean that the road user charge system is opt-in, as motorists choose to move to the new model when they choose to purchase an electric vehicle. Regional or outer urban motorists would therefore not be unduly affected. No motorist is compelled to move to the new system or buy a certain type of vehicle.

The broad approach Infrastructure Partnerships Australia proposes can be found in Box 3.

MYTH
BUSTED

Myth 4: A road user charge will require access to detailed personal data

A simple distance-based road user charge, as this paper recommends, does not require any more information than is already provided

to transport agencies. It does not require personal data collection such as where motorists have travelled. Governments do not need to know where you have been, when you travelled or how fast you travelled.

As shown in New Zealand (Box 4), a road user charge does not require GPS tracking and can accommodate private road use exemptions.

Even under a more sophisticated road user charge, the data collected would be less detailed than is already collected from most modern cars:

- Almost all vehicles sold today include GPS-tracking as a standard feature. Most are operated by third parties such as vehicle manufacturers, which provide navigation information and accumulate vast volumes of data about when and where motorists travel.
- Many transmissions of data between vehicles and operators are two-directional, with limited

or no regulatory oversight.

- Almost all vehicles, regardless of when they were made, have a cheap and effective radio transponder for reading by toll gantries.
- Number plate recognition is already used in many car parks across the country, as well as by police for traffic rule enforcement and identifying stolen vehicles.
- Indeed, the technology most Australians carry with them – smartphones – already collect data to a far greater extent than would be required to enable GPS-based road user charging.

Although these technologies are already widely in use and accepted by motorists, governments should be aware that a minority of users may hold reservations about the use of these technologies for road user charging. These privacy concerns can be easily mitigated through effective and proven safeguards. The experience of introducing public transport cards, such as Myki in Victoria, Opal in NSW and go card in Queensland, shows that users are quick to embrace these technologies, and any privacy concerns soon subside.

Box 3: What a road user charge for electric vehicles should look like

- The charge should be simple, distance-based and cover the whole of the road network.
- A per-kilometre charge should be set no higher than fuel excise for regular petrol or diesel vehicles to ensure electric vehicle motorists pay no more than the equivalent vehicle would in fuel excise.
- Governments may wish to provide a time-limited discount period to encourage uptake and provide certainty for prospective electric vehicle buyers. However, there is a limited policy case for this approach.
- Charges may be the same or different across states and territories, but should be based on the same methodology, a compatible charging approach and interoperable legislation.
- The charge should capture all vehicles with manufacturer-rated fuel use below 1 litre per 100 kilometres, meaning existing hybrids will be excluded and future 'ultra-hybrid' vehicles cannot be developed to avoid road user charges.
- The charge should be indexed in line with inflation.
- Funds raised should remain in the jurisdiction in which they are raised, providing more autonomy to the states and territories to manage their transport networks.
- Funds should be reinvested in new transport capacity. This investment should be 'modally agnostic' and flow to the projects that will provide the greatest improvements to transport outcomes over time.
- Motorists would submit or vehicles transmit odometer readings every six or 12 months.

A road user charge can be made more efficient and fairer over time

A whole-of-network charge by kilometre will be effective in ensuring all road users pay their fair share, and we can continue to fund roads into the future. However, this approach treats all kilometres travelled equally and does not reflect a road user's impact on the broader network. Over time, governments may wish to consider moving to a location, time, and mass-based charge:

- A location-based charge that is higher on inner urban roads could help to manage congestion and provide discounts for travel in outer urban and regional areas, where users may need to travel further to access jobs and services, and where public transport options are limited.
- A time-based charge could help to spread peak travel periods, resulting in lower levels of congestion. This would also help to defer or avoid additional investment in new transport capacity.
- A mass-based charge would allow motorists to pay for the impact of their vehicles on roads. A number of jurisdictions already use a proxy of this charge through different rates of annual registration charges. Australian toll roads operators also apply a higher toll for heavy vehicles.

Introducing the time, location and mass dimensions of road user charging would likely require the use of technologies. These already exist today, and their use is widespread. However, building community acceptance around a more efficient form of road user charging is important. Governments may need to undertake pilots to provide proof-of-concept, and public education campaigns can help to build understanding.

That is why Infrastructure Partnerships Australia recommends that governments introduce a simple, whole-of-network, distance-based charge on electric vehicles in the short term to ensure it is in place before mass uptake occurs. Introducing the new dimensions of time, location and mass can be considered over the coming years and implemented if and when governments have secured the support of communities for this approach.

A government that implements a distance-based charge in the near term does not make the implementation of a location, time and mass-based charge inevitable over time. Nor does the implementation of a distance-based charge preclude governments from introducing a more sophisticated system at a later date.



Box 4: The Kiwi experience of road user charging

New Zealand has had a variable mass- and distance-based charging regime in place since 1987. A road user charge applies to all vehicles over 3.5 tonnes gross-vehicle-mass and all light vehicles powered by diesel and other fuels which are not taxed when sold.³³ This includes electric vehicles, however they are currently exempt from the charge until they reach two per cent of the vehicle fleet.³⁴

The Kiwi experience with operating a road user charge is a valuable case study. Vehicles under the scheme are required to pre-purchase a distance (in 1000-kilometre intervals) with their licence and install a distance recorder to track the distance travelled. Once the

licenced distance is reached, a new licence must be purchased. Distances travelled on non-public roads can be claimed back, so vehicle owners do not pay for use on private property.³⁵

Originally only sold over the counter, today the licence can be purchased online on the New Zealand Transport agency website. There are four distance recorders approved by the government for light vehicles, all developed by private entities.

The fact that this road user charge was implemented before the advent of smartphones or widespread personal use of GPS means a road user charge need not be complicated.

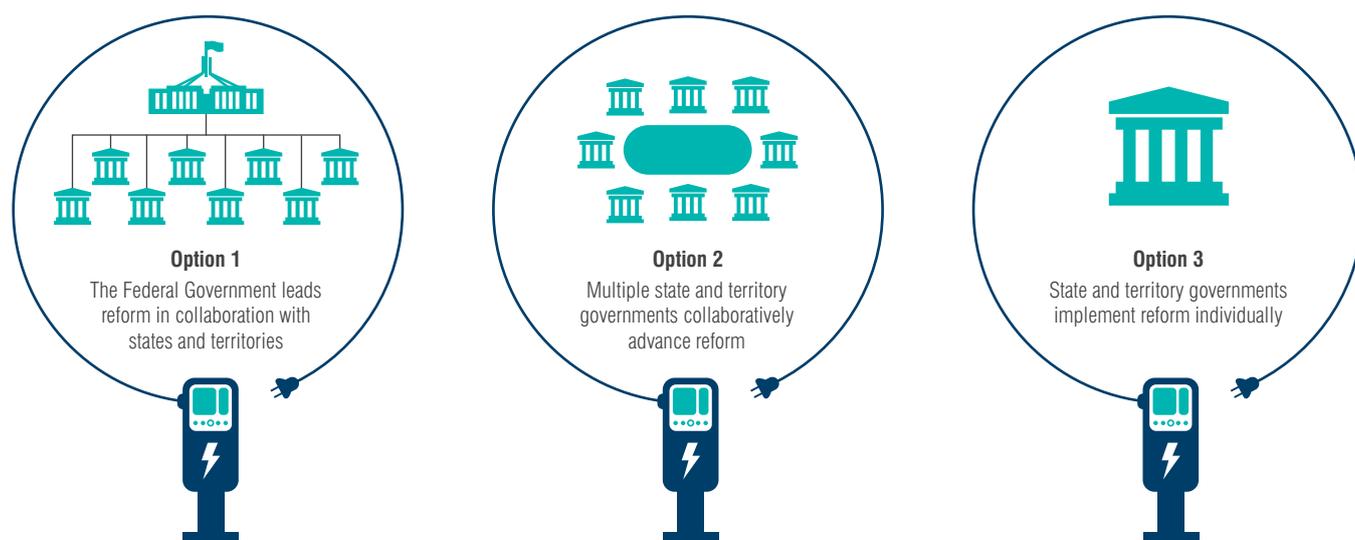
³³. Infrastructure Partnerships Australia, 2014, *Road pricing and transport infrastructure funding: Reform Pathways for Australia* ³⁴. New Zealand Government, 2016, *Road user charges exemption for electric vehicles extended*
³⁵. New Zealand Transport Agency, 2019, *Road user charges handbook*

THE ROADS TO REFORM ARE CLEAR

We are at a fork on the pathway to reform

Unusually for a potential reform, change could be initiated by the Federal Government, or by any of the state and territory governments. While each of these options has potential advantages and challenges, each is a viable way of advancing reform.

Figure 8: There are three options for advancing reform



Across all cases, there are important outcomes that governments considering a road user charge for electric vehicles should seek to deliver:

- **National compatibility** is essential for users, investors and operators of transport services. We need to avoid 'Rail Gauge 2.0'³⁶ with eight separate and potentially competing mechanisms that carry different risks and costs and are not interoperable.
- **Transparency** is important for building public support for road user charging and communicating the rationale for its introduction.
- **Fairness** is important to ensure the road user charge doesn't repeat the unfairness of the current fuel excise system. Certain users, such as regional, lower-socioeconomic or those who require the roads for work (for example, taxi drivers and tradespeople) must be considered.
- **Flexibility and scalability** should be embedded through policy design. Infrastructure Partnerships Australia recommends a simple distance-based charge be implemented in the short term. However, governments should ensure the system can evolve to meet changing needs.



36. This refers to the evolution of Australia's rail network from the colonial era, where each state chose a different rail gauge width. The standardisation of our interstate network began in the 1930s and was only completed in 1995.



Option 1: Federal leadership

Historic calls for reform have centred on the Federal Government taking the lead. This is because fuel excise is currently collected by the Federal Government, so they have a clear incentive to implement reform to ensure the road revenues they collect are sustainable in the face of electric vehicle uptake. A federally-led road user charge would also allow national policy objectives, such as productivity gains and emission reductions, to be managed consistently across the nation.

However, despite persistent signals to implement reform from Infrastructure Partnerships Australia, the Productivity Commission, Infrastructure Australia, and others, this reform process has not been initiated by the Federal Government.

There are Constitutional challenges with a road user charge being levied by the Federal Government. While fuel excise has been levied by the Federal Government on petrol since Federation, and on diesel since 1929,³⁷ a road user charge would constitute a Commonwealth charge on roads, which are state property. Section 114 of the Constitution expressly prevents the Federal Government from levying a charge on state property – which includes the majority of Australia’s road network.

A workaround could theoretically be achieved by allowing the transfer of state assets to the Federal Government or by levying a road user charge as a form of excise (for example, a charge on electricity for motor vehicle use). However, this would introduce complexity that may detract from the transparency and effectiveness of a road user charge and would most likely require the agreement of states and territories.

Also, while the national consistency of a federally-led charge could have benefits, it may also be a limitation. If the charge was to be levied federally, Sections 99 and 51(ii) of the Constitution require that duties be levied uniformly. This introduces challenges for applying a location-based charge, where congested inner urban roads could be charged more per kilometre than other parts of road networks. This limitation may also be worked through the use of separate location-based charges by states and territories, but this kind of measure would also introduce another layer of administrative complexity and reduced transparency.

Option 2: States and territories collaborate

The pathway to reform that appears to present the fewest hurdles to implementation is for state and territory governments to work together to introduce a compatible – if not consistent – road user charge for electric vehicles. Given that road networks are largely state-owned, there do not appear to be Constitutional barriers for the states and territories to introduce a charge for road use.

There is a substantial carrot for states and territories that embrace this reform – the opportunity to tap into a new source of revenue. This would enhance the autonomy of jurisdictions to manage both the supply and demand of their road networks, including directing investment to transport networks with less reliance on, or intervention from, the Federal Government.

While the revenue raised is unlikely to be substantial in the short term, it could rise rapidly as electric vehicle uptake grows – into the hundreds of millions each year for a large state by the mid-2020s and the billions by 2030. Such opportunities for new state-sourced revenue are rare, especially for a recurrent and growing source of funds.

Another advantage of this approach would be the autonomy of states and territories to apply a road user charge to support their policy objectives. For a distance-based charge, jurisdictions may wish to set the per-kilometre charge at varying rates, and may wish to provide incentives such as discounts on registration or concessional rates for a set period to encourage electric vehicle uptake. Under a more sophisticated location, time and mass-based road user charge, the states and territories could use this measure to manage demand, spread peak periods or incentivise behaviours that benefit other transport users.

This approach would also enable states and territories to retain the road revenue raised on their roads. This would support greater autonomy by jurisdictions on how and when to invest in new capacity, or to invest in longer term maintenance programs with greater certainty over future road funding. As a new, ongoing revenue stream it would be stable, reliable, and immune to inflation or economic downturns – a highly attractive proposition at a time of tightening fiscal settings across most governments.

37. Parliamentary Library of Australia, 2000, *Petrol and diesel excises*



A major challenge of state-led reform would be ensuring compatibility across borders. Without this compatibility, road reform risks introducing inconsistencies in regulation and technology that would deter investment and cloud broader policy objectives.

There is, however, no need to design a policy to account for road use by light vehicles outside their registered state or territory. Cross-border travel forms a relatively small proportion of total road use by light vehicles, and an even lower proportion of road use by electric vehicles. Levying the charge through vehicle registration also helps to avoid motorists travelling across borders to avoid a road user charge.

These issues can be mitigated by sourcing agreement to a common approach through national forums such as the Council of Australian Governments or the Board of Treasurers – the group of eight state and territory government Treasurers established in 2017.

Jurisdictions would also need to consider how a road user charge would affect existing streams of funding from the Federal Government, including GST distributions. Similarly, the impact of state-led road user charge on current Commonwealth Grant and horizontal fiscal equalisation processes (such as GST allocations) will need to be addressed through these forums.

Option 3: States and territories go it alone

If the Federal Government or the states & territories cannot establish a consistent approach to a road user charge, individual jurisdictions implementing the reform individually remains a viable option – and one that is vastly preferable to the status quo.

In this reform pathway, the first state or territory to implement a road user charge will have the advantage of selecting the design and technology that best meets their policy objectives. Contrary to other types of reform, an early mover on a road user charge is also most likely to encounter the least public resistance to change. That is because those who will be immediately impacted – electric vehicle owners – will be at their lowest ebb. Reform can only become more difficult over time as more motorists embrace the technology.

The benefits of this pathway mirror those of Option 2, however there is one additional risk – a lack of cross-jurisdiction agreement leading to multiple incompatible charging methods. While the first movers carry a high degree of autonomy in system design, subsequent jurisdictions will face the challenge of either being tied to the approach and technology implemented by others, or introducing a new system that will bring cost and complexity.

Under this scenario, sharing experiences of reform and seeking agreement to a nationally compatible system of road user charging through COAG or other appropriate bodies will be important.



The window of opportunity for change is closing

Whichever reform pathway eventuates, the best time for implementing a road user charge on electric vehicles is now, when these vehicles only form approximately 0.076 per cent of the light vehicle fleet.^{38,39} We know that electric uptake is an inevitable wave, just over the horizon. Once price parity is reached, and electric vehicles become the default choice for households across the country, the window of opportunity for reform will have closed, and mass market uptake will have made this sensible reform electorally unachievable.

Action is required now to ensure there is a road user charge on electric vehicles before this coming wave. The potential rapid growth of electric vehicles through shared and autonomous fleets raises the stakes.

Putting a price on roads for electric vehicles in the short term will avoid significant pain for all transport users and taxpayers over the long term. Crucially, a road user charge would provide certainty for existing or prospective electric vehicle owners about future transport costs to inform their decisions.

Delays in implementing a road user charge on electric vehicles will erode the funding available to invest in transport infrastructure, due to continued decline in fuel excise. The further this revenue falls, the harder it will be to restore to levels that can sustainably fund the investments in new infrastructure our cities and regions require, and to overcome a mounting transport maintenance backlog.

Reform of Australia's transport networks can be a major catalyst for improvements in productivity and quality of life in the twenty-first century. But unless we act now to update our road funding system, Australia is going to be stuck in the slow lane.



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