

26 January 2021

Dear Senators:

COAG Reform Fund Amendment (No Electric Vehicle Taxes) Bill 2020

This submission has been prepared to document The University of Queensland E-Mobility Research Group's initial findings on the potential impact that proposed Electric Vehicle (EV) taxes could have on local EV sales, and in turn, future transport emissions.

Several State Governments have recently announced plans to introduce electric vehicle (EV) taxes from mid-2021. While details on the final designs of the schemes may change, initial reports suggest a 2.5 cent per kilometre charge will be introduced in some jurisdictions, strictly applied only to EV owners. In some cases there may also be a fixed cost component in addition to the per kilometre fee.

Unfortunately, these State Governments have not recognised that higher taxes will lead to lower EV sales, as is the case when any additional tax is applied to a product or service. Additionally, these jurisdictions have not released detailed modelling to quantify the impact of their proposed EV taxes on market adoption, emissions and other economic effects.

As part of a broader EV study undertaken by the E-Mobility Research Group that I lead at The University of Queensland, we recently surveyed 500 households on their preferences, including in terms of road pricing. The focus of this survey was Queensland, with households coming from a representative range of regional and urban areas. Despite the focus on Queensland, we are confident that preferences would be relatively similar in other states, and we plan to run a national survey in 2021 to verify this.

Based on this survey data, we are able to provide initial insight into the potential impact of these proposed EV taxes on local sales. While the analysis has not yet been published, we have released our preliminary results in the hope that it will prompt Australian Governments to be far more strategic on the issue of road pricing, and more closely review the evidence of what the result would be of a premature introduction of an EV road tax, without any significant financial incentives to reduce the upfront cost.

The introduction of the proposed EV taxes risks pushing Australia even further into the wilderness in terms of EV uptake, and is completely incongruent with mid-century Net Zero Emission targets, which easily roll off the tongues of politicians, but are not backed up by concrete actions to bring them to fruition.

State Governments that introduce EV taxes without any significant financial incentives for households and businesses to purchase these vehicles, are highly unlikely to meet their own emissions targets, and will rob Australia of the economic benefits that this technology transition can deliver. As such, the Australian Government should penalise jurisdictions that implement these punitive actions against Australians who have already purchased an EV, or are looking to do so. The Australian Government should also act given these taxes will hurt local, Australian business and jobs that have been created, and continue to expand through our local EV supply chain industry.

What do Australian consumers think about EV taxes?

In our survey we ran consumers through a series of hypothetical experiments where they had to choose between different vehicle purchase options so we could capture the trade-offs made as part of these decisions. This included seeing how different government policies would affect their willingness-to-pay for an EV – after controlling for other potential factors. The road pricing policies we tested included a per-kilometre fee, and a congestion tax - where drivers are charged for driving through inner-city areas.

We found that if a 2.5 cent per km EV tax was introduced, the consumer would see this as being equivalent to approximately a \$4,500 increase in the vehicle's purchase price. In other words, for a \$45,000 EV, the proposed EV road tax is predicted to have an effect approximately equivalent to an additional 10% tax, or doubling the current GST rate, in terms of consumer perception. A \$5 per entry congestion tax (capped at \$15 per day) was seen as being equivalent to a \$2,800 increase in the vehicle's purchase price.

On the flipside, we found that a \$1,000 credit towards EV owners' electricity bills – in exchange for purchasing an EV – would have the equivalent perceived effect to reducing the purchase price by over \$5,000. And if all existing road taxes were removed – including annual registration, stamp duty, GST, and road tolls – this would have the equivalent effect to reducing the purchase price by over \$10,000.

It is important to recognise that the willingness-to-pay (WTP) estimates above are not quantifying the actual monetary effect of different policies, but are an estimate of the perceived impact of different policies by consumers based on the stated preference experimental design implemented in this study. As with all taxes and incentives, it is not the monetary value that matters, but the perceived value that ultimately determines the impact on consumer choices. This perceived value also varies across demographics – which the published paper on this study will discuss in further detail.

Impact of different government policies on willingness-to-pay for an EV



This research does not suggest that road pricing should not be implemented. On the contrary, I am a long-standing advocate for serious, national road tax reform that looks to transition away from the blunt road tax measures that governments currently levy, and move towards cost-reflective pricing that can be used to achieve multiple policy outcomes e.g. lower congestion, lower emissions, improved safety.

What these preliminary results highlight is that the proposed EV road taxes would need to be paired with significant financial incentives to offset the negative impact of the taxes.

Arguably, we should also not only be focussing on EVs for road pricing, but taking a much broader view on how road pricing could be progressively introduced for all vehicles in a manner that leads to the introduction of a more transport and fair road tax system; and importantly, does not impede Australia's ability to transition to electric vehicles, and jeopardise our ability to capture the enormous economic benefits, including:

- Redirection of more than \$20B spent each year on powering petrol and diesel cars with imported foreign fuel, towards support the generation of Australian-made electricity, using Australian resources to power EVs, while saving Australian households and businesses around \$2,000 per vehicle per year in transport fuel costs.
- Improving national security by reducing Australia's reliance on imported, foreign fuel, and ensure we plot a pathway towards energy independence.
- Reducing the estimated up to 2,000 premature deaths, and thousands of respiratory related illnesses caused in Australia each year due to motor vehicle pollution; noting this is higher than the number of Australians killed in road accidents each year. Diesel is a class 1 carcinogen (designated by the World Health Organisation), is linked to lung cancer, and combined with other fossil fuel emissions, is having a severe impact on Australians health.
- Supporting the creation of local jobs in the EV supply chain, beyond the existing local success stories, like Brisbane-based Tritium – now one of the world's largest manufacturers of EV fast charging infrastructure, Victoria-based SEA Electric and JetCharge, and NSW-based Nextport.
- And the immediate reduction in lifecycle emissions of vehicles by 30-40% based on charging EVs from the current electricity grid mix, with an eventual reduction of over 90% as low carbon electricity generation continues to increase, and is supported by the smart charging of EVs.

What would EV taxes mean in terms of future EV uptake?

To further understand the potential impact of the proposed EV taxes and incentive policies we forecast EV uptake from 2020 to 2050¹. We found that if a 2.5 cents/km EV tax was to be implemented nationally it could result in the share of electric vehicle sales being as low as 30-40% by 2050. In other words, over the next 30 years, these proposed EV taxes could result in 35-68% lower sales, or 4.9 to 9.5 million fewer EVs being sold in Australia (see light blue and red lines in graphs over page).

The relatively wide range of potential outcomes reflects the uncertainty regarding how significant an impact these policies could have on market supply i.e. whether manufacturers will send EV models to Australia or not. The lower impact (light blue line) assumes little to no effect, and the higher impact (red line) assumes EV supply to Australia is further limited until international EV manufacturing supply is less constrained in the 2030s. EV market supply to Australia is already being limited by a lack of supportive policies, and EV road taxes, without incentives, is likely to further exacerbate this major barrier to uptake – noting that there are already more than 300 EV models available globally, and this is predicted to increase to over 700 by the end of 2022, yes in Australia we currently only have access to around 30 (including model variants e.g. standard vs long range battery options).

The Federal Government's own modelling² (and our business-as-usual scenario) suggest that around 65% of new car sales will be EVs by 2050 without EV road taxes, but also without incentives. Unfortunately, even at this level, this is far below what is required for the transport sector to reach net zero emissions by 2050, and would likely result in no emissions reduction by 2050 (relative to 2020) given the vehicle fleet is projected to continue to grow, and not peak until the 2040s (optimistically assuming a shift towards shared/autonomous vehicles in the 2030s/2040s).

Our preliminary modelling suggests that a national 2.5 c/km EV road tax could result in a 2050 EV sales rate that is at least 25% lower than business-as-usual (40% vs 65%), and worryingly, an EV tax without any significant incentives, could actually result in total light vehicle emissions increasing by more than 40% by 2050 – taking us completely in the wrong direction.

As such, it is difficult to see how any State Government's net zero emissions target could be considered credible without a clear plan for reaching greater than 80% EV sales before 2040; and this is highly unlikely to be achieved without significant financial incentives to reduce upfront costs

Encouragingly, however, there is a pathway to achieving this magnitude of EV uptake – and notably it could still include a future road pricing mechanism. We modelled two options:

1. a 2.5 c/km fee is introduced as a replacement for most existing road-related taxes i.e. annual registration fees, stamp duty, GST on vehicle purchases, and road tolls (dark grey line in graphs).
2. in addition to the above, a \$1,000 electricity bill credit incentive is offered for EV purchases (orange line in graphs).

Under both of these scenarios we can see that substantial EV uptake could be achieved, as the phase-out of existing road taxes acts as a significant financial incentive to drive EV adoption.

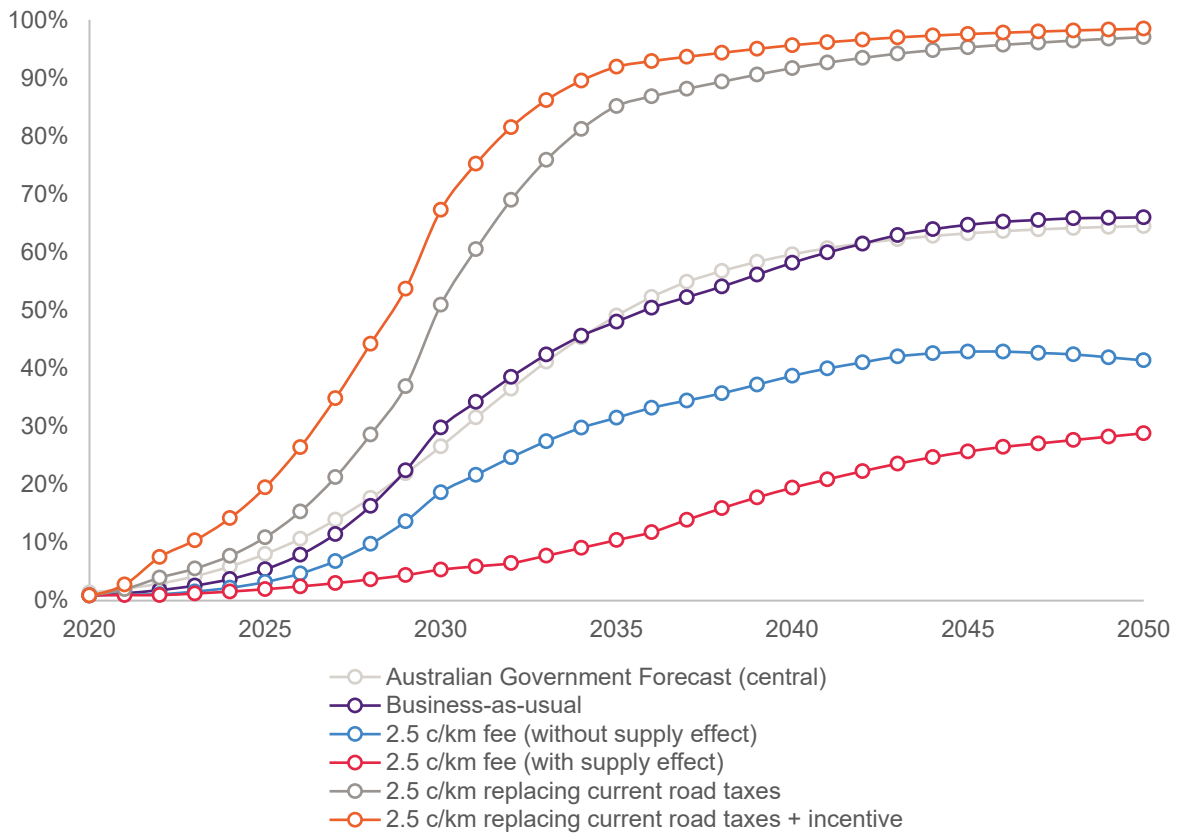
This finding supports our argument that instead of introducing an extra tax for EVs, we should be looking to completely reform the current, complicated system of federal and state road taxes, and replace them with a simpler, fairer scheme. Arguably, this should not just apply to EVs, but we should be looking to support national road tax reform for all vehicles, regardless of fuel type.

This sensible, and strategic approach would be real road tax reform and could deliver levels of EV uptake that would be congruent with the level of emissions reduction required to achieve net zero by 2050. But this will require coordinated action between State and Federal Governments, ideally carried out through COAG's Transport Infrastructure Council (TIC).

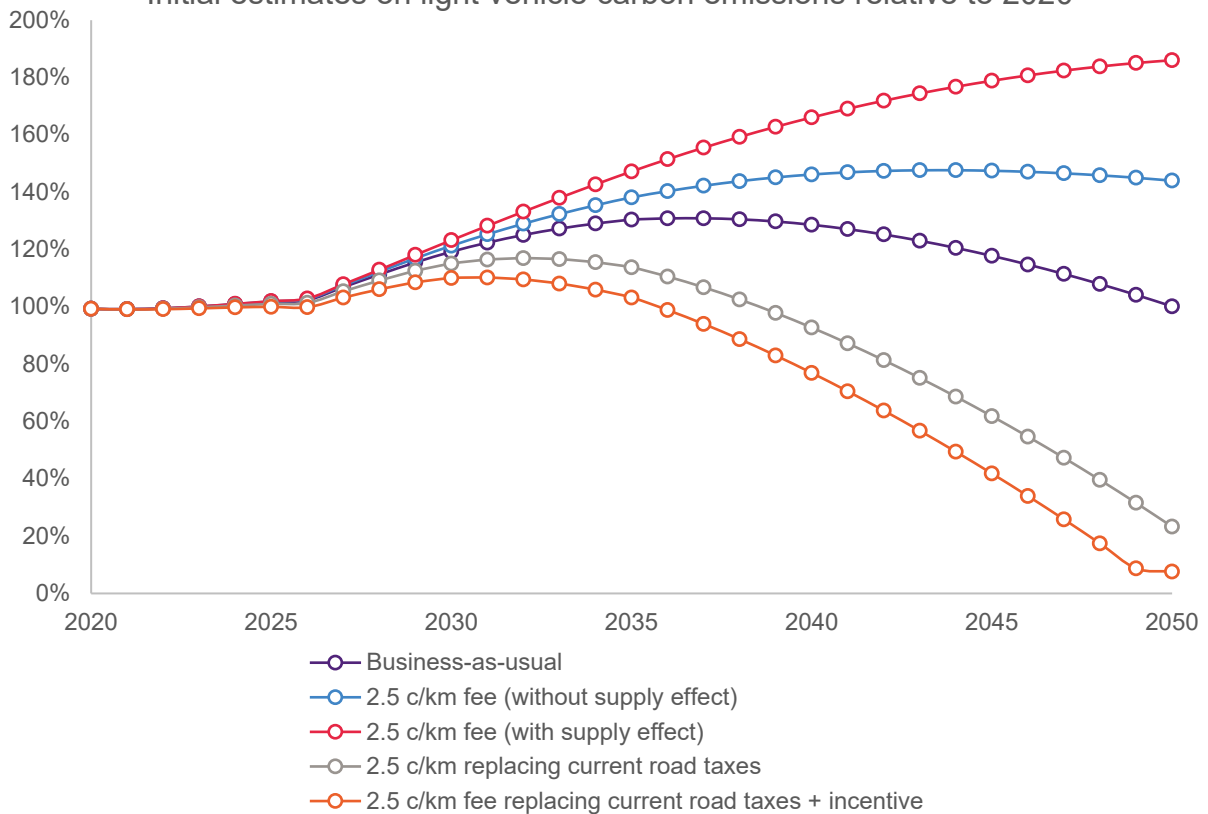
¹ These estimates should be considered as preliminary results as our analysis is still ongoing. We are releasing these initial findings in the hope that it will prompt others and government to take a more serious look at the potential impact of the proposed EV taxes on sales, and devise a strategy for supporting a transition to EVs that is congruent with a net zero emission target by 2050. Other than the business-as-usual scenario, all other scenarios modelled assume the per km fee would gradually increase from 2.5 cents/km in 2021 to 5 cents/km by 2050, and additionally that a 6 cents/km tax is introduced for petrol/diesel cars in the 2030s in response to other countries introducing bans on the sale of petrol and diesel cars. The increase in per km fee is envisaged to be linked to EV sales targets i.e. as the EV market matures the per km fee can progressively increase; although in reality it would be recommended to start below 2.5 cents/km. These estimates have been produced using a mixed logit model.

² <https://www.bitre.gov.au/publications/2019/bitre-report-151>

Proportion of new car sales that are predicted to be electric in Australia: 2020-2050



Initial estimates on light vehicle carbon emissions relative to 2020



But what about the road funding issue? Can we really afford to do this?

We are currently working through the economic analysis of these different scenarios to understand the various costs and savings in terms of:

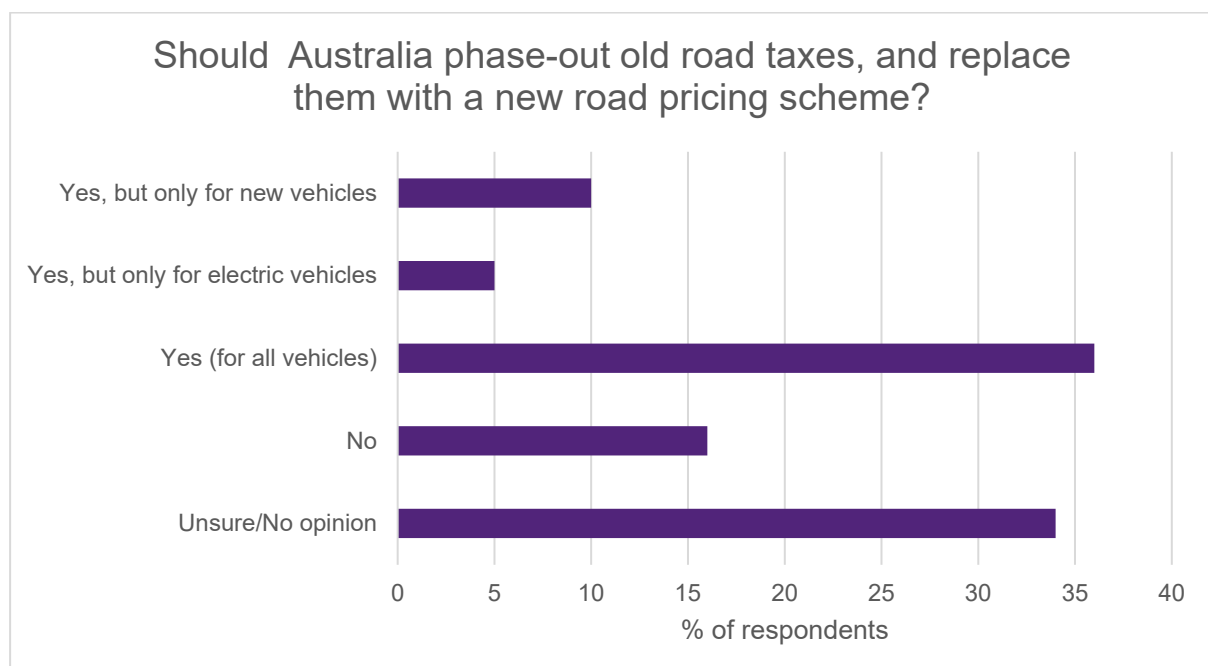
- Emissions costs
- Health costs due to vehicle pollution
- Australian household and business fuel costs □ with any savings assumed to be spent in the local economy
- Tax revenue, and
- Other potential considerations (infrastructure costs, job creation, purchase of Australian-made energy for EV charging, other energy system benefits such as EV charging supporting renewable energy uptake, etc).

While we are not yet ready to publicly release this modelling, it is clear that the high EV uptake scenarios could deliver the greatest economic benefits, and conversely, where an EV road tax is introduced without any significant financial incentives, this would not only reduce EV uptake and increase emissions, but overall likely lead to a significant economic loss. The proposed EV road taxes could also result in up to an estimated additional 9,500 premature deaths by 2050 (above BAU), due to continuing increases in vehicle pollution.

Rather ironically, our results also suggest that the proposed EV taxes are likely to raise far less road pricing revenue over the next 30 years (~\$30B-\$70B), as a result of lower EV uptake, compared to the scenarios that include significant EV incentives to drive EV uptake (\$170B-\$200B).

Our proposed alternative approach of introducing incentives, and replacing existing road taxes with a cent per km road pricing fee, could deliver sustainable road funding by 2050 if GST on vehicle purchases is reintroduced in the late 2030s/early 2040s, and congestion taxes are introduced for all vehicles (petrol, diesel, electric) driving into inner-city areas from the late 2020s. These congestion taxes would also subsidise existing toll roads that direct road traffic around CBD areas, and could vary based on time of day, and tailpipe emissions ratings to reduce inner-city pollution.

The results from our survey also suggest that there is a high-level of support from the general public in moving away from the old road tax model, and replacing existing taxes with a road pricing scheme. The key is the new scheme must be a replacement for the old, current model; not an additional tax. Only 5% of respondents thought that such a scheme should target only EVs – noting these results are from an approximately representative sample of consumers, spread across urban and regional Queensland, with less than 1% of the sample being current hybrid and/or EV owners.



Where to from here?

As someone with two PhDs involving road pricing, and a long-standing public record of supporting congestion pricing, I am a strong supporter of reforming our current road taxation model. The current approach is complicated, inefficient and plainly unfair. It does not support desired policy outcomes in terms of lower emissions, higher efficiency, and lower congestion, and if we do not start planning for a transition today, the economic costs will only continue to get greater – not as a result of EV uptake, but due to continuing increases in road congestion, and low efficiency, high polluting vehicles, that lead to high transport costs for Australians.

EV owners already pay a significant amount in road taxes under the current tax model, and despite some lobby groups trying to perpetuate a class warfare argument, most EV owners are average Australian households and businesses – not multi-millionaires - who are simply trying their best to make a choice that supports better health and environmental outcomes for our community.

It is true that not everyone can afford an EV today, but the best way to address this is through further incentivising uptake now to ensure Australia is not left behind, and can secure access to affordable, attractive EV models being sold in other parts of the world, that are currently not being brought to Australia due to our lack of EV support.

I support a road pricing scheme being introduced, however, with the following design:

- Initially it should be a voluntary opt-in scheme, available to all vehicle owners regardless of fuel type. A mandatory switch-over should be planned for the late 2020's/early 2030's to give consumers time to plan and budget for the change.
- In exchange for opting-in to the new road pricing scheme, the vehicle owner (regardless of fuel type) would be made exempt from existing state and federal road taxes (excluding fuel excise which should remain as a pseudo fuel efficiency tax).
- As part of the quid pro quo, EV owners would also receive a GST discount/exemption until EV sales reach 25-35% of new vehicle sales.
- Ideally other State-based incentives would also be available to EV owners, such as electricity bill credits representing up to 2-3 years of 'free' fuel. This type of policy should also require the owner to install a smart charger to support positive electricity grid outcomes, and encourages households and businesses to remain connected to the electricity grid in order to ensure that the most vulnerable Australian households are not burdened with increased electricity costs if a significant number of Australian households that could afford to disconnect from the grid, did so.
- The new road pricing scheme would have different rates depending on tailpipe emissions rates; with the pricing rate for EVs less than or equivalent to \$0.01 per km; and the rate for petrol and diesel cars greater than \$0.08 per km.
- The road pricing scheme rates would increase in line with EV sales targets, reaching a sustainable pricing rate once EVs represent more than 50% of new vehicle sales.
- Congestion pricing schemes would also be introduced in all major cities from the late 2020's, with higher rates levied for higher polluting vehicles to tackle urban air pollution.
- A road pricing scheme should also be developed to apply to heavy vehicles (buses, trucks, etc).
- Special consideration should apply to regional/remote communities to ensure they are not unfairly disadvantaged; noting they already pay more in transport costs due to higher fuel consumption and EVs – including plug-in hybrids – provide a pathway to reducing transport costs for these communities.

This approach would provide a genuine financial incentive to switch to a road pricing scheme, as a quid pro quo in exchange for receiving an exemption from existing taxes, and as a result, also encourage the uptake of EVs, and support Australia's pathway towards reaching net zero emissions by 2050, all while leading to the creation of a road pricing scheme that will deliver sustainable road tax revenue.

Anything short of this is not a credible solution. Anything short of this will lead to thousands more Australians dying from motor vehicle pollution; Australian households spending hundreds of billions more on fuel than they should; and Australia being left further behind on the transition to a clean transport future.



I strongly urge the Australian Government, including Senators considering this bill, to lead on the development of a fair, transparent, future road pricing scheme that does not unfairly penalise EV ownership. The Australian Government should ensure that any State Government that introduces additional taxes on EVs, without significant financial incentives, is held accountable and penalised – as one such mechanism to do so is presented in the bill this committee is considering.

If you have any further questions regarding my research on this topic, please feel free to contact me and I would be happy to attend any private and/or public hearings/briefings on the matter.

Yours sincerely,

Dr Jake Whitehead
PhD (Transport Sci.) PhD(Transport Eng.) LicEng(Transport Systems) MEng (Transport Eng.) BEng(Civil)(Hons)

Tritium E-Mobility Fellow
Lead, UQ E-Mobility Research Group
UQ Dow Centre for Sustainable Engineering Innovation
The University of Queensland

Note:

The study outlined above does not investigate heavy vehicles (buses, trucks) or the contribution they make in terms of emissions and reaching a net zero target. City buses and trucks are already transitioning to electric drivetrains internationally, and form another important component of Australia reaching a net zero emission target by 2050; particularly considering the challenges faced in decarbonising many marine and shipping applications, which aren't expected to be viable for the foreseeable future.

Disclosures:

Dr Jake Whitehead is the Tritium e-Mobility Fellow, and lead of UQ's E-Mobility Research Group at the UQ Dow Centre for Sustainable Engineering Innovation at The University of Queensland. He holds an Advance Queensland Industry Research Fellowship focussed on how electric vehicles can deliver co-benefits to the energy sector, is a Member of the International Electric Vehicle Policy Council, is a Lead Author for The Intergovernmental Panel on Climate Change (IPCC), and Director of Transmobility Consulting and Odin Pass Pty Ltd. He has previously received government funding for several sustainable transport projects, including research on both hydrogen and electric vehicles. He does not own any shares, or receive any cash funding from the electric vehicle industry, however, he does own an electric vehicle. His UQ position is not funded by Tritium, and he does not receive any income from the company. His endowed chair is named in recognition of this internationally-successful, Brisbane-based, advanced manufacturing company being founded by former engineering graduates from The University of Queensland.