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THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION
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Re: National Electric Vehicle Strategy: consultation paper (September 2022)
To: Ministry for Climate Change and Energy and Ministry for Infrastructure, Transport, Regional Development and Local Government
From: Jan Dornoff, Zifei Yang, Tanzila Khan, International Council on Clean Transportation (ICCT)
Date: October 30, 2022

We cordially thank the Australian Government for the opportunity to comment on the consultation paper on the National Electric Vehicle Strategy. Our answers to questions are list in this document below. In case of questions, please contact Zifei Yang, Passenger Vehicle Program Lead (zifei.yang@theicct.org).

1. Do you agree with the objectives and do you think they will achieve our proposed goals? Are there other objectives we should consider?

We fully support Australia's goals of the national electric vehicle strategy and consider the objectives as helpful guidelines.

Two expressed goals however, that is the reduction of emissions and to save Australians money on fuel, are not in line with comprising plug-in hybrid vehicles (PHEVs) in the definition of electric vehicles (EVs). In recent studies on the real-world CO_2 emissions and thereby fuel consumption of PHEVs, we demonstrated conclusively that the share of electric driving is much lower than anticipated by the type-approval procedure in Europe.[1] Consequently, the real-world fuel consumption of PHEVs is 3-5 times higher than officially declared and communicated to consumers, resulting in real-world CO_2 emissions similar to those of pure internal combustion engine vehicles (ICEVs) and in excessive fuel cost compared to consumer expectations. Therefore, the European Commission recently adopted the Euro-6e amendment[2] to the European

[1] Patrick Plötz et al., "Real-World Usage of Plug-in Hybrid Electric Vehicles in Europe: A 2022 update on fuel consumption, electric driving, and CO_2 emissions" (Washington, D.C.: International Council on Clean Transportation, June 8, 2020), https://theicct.org/publication/real-world-phev-use-jun22/

[2] European Commission, "Commission Regulation (EU) …/… of XXX Amending Commission Regulation (EU) 2017/1151 as Regards the Emission Type Approval Procedures for Light Passenger and Commercial Vehicles," Comitology Register, July 22, 2022, https://ec.europa.eu/transparency/comitology-register/screen/documents/082562/2/consult?lang=en.

type-approval procedure regulation (EU) 2017/1151 which will lead to more real-world representative CO_2 emission values for PHEVs.

2. What are the implications if other countries accelerate EV uptake faster than Australia?

Resulting from policy measures, like increased stringency of CO_2 or fuel economy standards or the introduction of electric vehicles mandates, the uptake of electric vehicles has increased significantly in many countries and regions worldwide over the past years. For example, fostered by a more stringent 2020 CO_2 fleet target, the share of electric vehicles in the European Union increased from about 0 % in 2018 to almost 20 % in 2021, as shown in Figure 1.

Owed the global supply chain crisis and the limited raw material availability, the demand for electric vehicles has now exceeded the production capacity. This results in long delivery times for consumers and makes manufacturers shift their electric vehicle strategy to focus on larger, upper class vehicles, where margin and therefore profit are higher. Consequently, the availability of affordable, smaller electric vehicles becomes even more scarce. Furthermore, manufacturers are not incentivized to supply more electric vehicles to market than necessary for meeting the regulatory requirements since the margin on ICEVs is higher than for EVs, especially in the lower vehicle segment. We expect that Australia could face a similar effect when lagging on EV market share requirements. For profit maximization, we expect manufacturers will first satisfy the markets where EVs are required to satisfy the regulations and will use the other markets to continue selling old technology, high margin vehicles as long as possible.

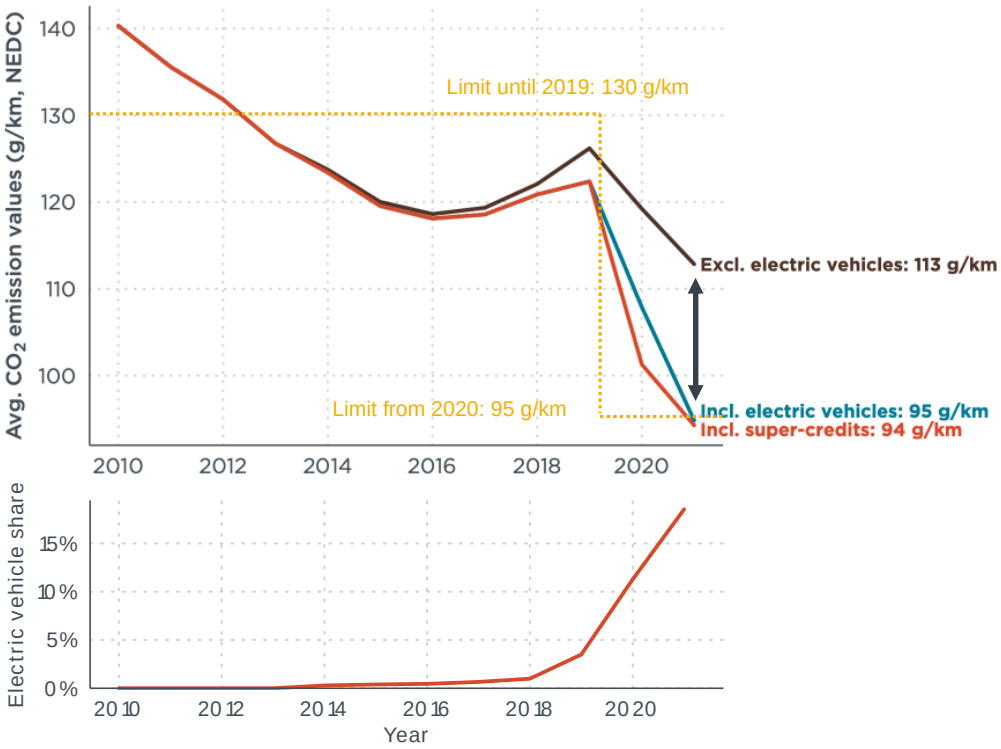

Figure 1: Passenger car fleet average CO_2 emissions and electric vehicle sales share in the European Union, Source: https://theicct.org/publication/co2-new-passenger-cars-europe-aug22/

Furthermore, markets with a high EV registration share will develop faster a considerable second-hand market, making EVs also affordable for lower-income households. This way, not only the wealthier part of the population benefits from low-cost electric mobility.

Another important aspect of a fast EV market uptake is the earlier gained independence from oil imports and thereby a shift to more predictable energy prices.

The shift towards electromobility not only has a positive impact on greenhouse gas emissions and air quality. It also generates new business areas, for example charging industry, vehicle-to-grid technologies, increased demand for solar power plants, battery manufacturing, etc. Late technology adopting countries will likely miss these opportunities and face a fully developed industry from abroad that can offer their services and products faster and at lower price.

3. What are suitable indicators to measure if we are on track to achieve our goals and objectives?

We suggest defining target electric vehicle uptake trajectories per vehicle category supporting the desired greenhouse gas reduction. The EV market uptake can then be verified constantly against the target and regulations can be adjusted if necessary.

In addition, we suggest monitoring the real-world fuel consumption of ICEVs. For this purpose, we would recommend introducing on-board fuel and energy consumption monitors (OBFCM).[3] In the EU, OBFCM has been mandatory for all new passenger vehicles since January 2021 and small light commercial vehicles since January 2022. The real-world fuel consumption data recorded on-board of every vehicle is analyzed by the European Commission and compared to the type-approval values to verify that the real-world CO_2 reduction follows the reduction intended by the CO_2 standards regulation.

Manufacturing of electric vehicles, especially of the battery, is an energy intensive process. Local manufacturers could greatly benefit from Australia's outstanding potential for renewable energy[4], which likely provides them with a competitive advantage in times of rising energy prices.

4. Are there other measures by governments and industry that could increase affordability and accessibility of EVs to help drive demand?

Electric vehicles are currently more expensive than comparable ICEVs. To still ensure a fast market penetration and to make EVs affordable to households of any income, financial measures are necessary to reduce the price for the consumers.

We suggest introducing a bonus-malus sales tax system, also referred to as feebate system. In a feebate system, purchasers of vehicles with no or very low CO_2 emissions receive a bonus payment, offsetting the extra cost of an EV. To finance this bonus, vehicles with CO_2 emissions above a certain threshold are associated with an additional sales tax. The tax preferably increases exponentially with CO_2 emission value. If balanced right, a feebate system is cost neutral but has a strong steering effect towards low emission vehicles. There are several countries that have CO_2-based feebate system in place, including France, Singapore, Sweden, and New Zealand[5].

A feebate system preferably takes the electric energy consumption into account as well, ensuring that consumers are rewarded for purchasing smaller, higher efficiency vehicles.

Furthermore, setting zero-emissionn vehicle targets for fleets can accelerate the market uptake of EVs. Since fleet and company cars are often driven high annual mileages, a fleet mandate is a targeted measure to quickly reduce the total fleet CO_2 mass

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[3] Jan Dornoff, "One Goal, Multiple Pathways: A Review of Approaches for Transferring on-Board Fuel Consumption Meter Data to the European Commission" (Washington, D.C.: International Council on Clean Transportation, October 22, 2019), https://theicct.org/publication/one-goal-multiple-pathways-a-review-of-approaches-for-transferring-on-board-fuel-consumption-meter-data-to-the-european-commission/.

[4] Kingsmill Bond et al., "The Sky's the Limit - Solar and Wind Energy Potential Is 100 Times as Much as Global Energy Demand" (Carbon Tracker, April 2021), https://carbontracker.org/reports/the-skys-the-limit-solar-wind/.

[5] Sandra Wappelhorst, "Incentivizing zero- and low-emission vehicles: the magic of feebate programs". (Washington, D.C.: International Council on Clean Transportation, June 8, 2022), https://theicct.org/magic-of-feebate-programs-jun22/.

emissions. Due to the short first owner holding period of fleet vehicles, a fleet mandate can also accelerate the development of a large secondhand market.

Another measure to increase affordability and accessibility to EVs is incentivizing home-charging especially if combined with solar power. This technology substantially lowers the EV ownership cost and reduces the pressure on the public charging infrastructure. Furthermore, it contributes to the transition of the energy generation sector towards renewable energy.

5. Over what timeframe should we be incentivising low emission vehicles as we transition to zero emission vehicles?

A feebate system, as proposed under question 4, can be applied continuously because of its cost neutrality. More generally, battery electric vehicles should be subsidized until cost parity is reached and until a secondhand market has developed to ensure access to electromobility for the broad population.

6. What information could help increase demand and is Government or industry best placed to inform Australians about EVs?

We expect that the largest driver for EV demand is the purchase price. Even though the total cost of ownership of an EV is already lower than for a similar ICEV for some vehicles, consumers usually don't discount fully for fuel/energy cost when buying a vehicle. Therefore, we consider a feebate system that makes the purchase of EVs cheaper than purchasing the equivalent ICEVs will have a strong effect on the demand side.

The fiscal-related information of vehicles can be shown on the fuel efficiency labels of the vehicles to better inform the public about the impact of fiscal incentives and fuel cost saving. The government website can also be an extension of the label to the EV information in more details, including showing all EVs models and models eligible for incentives to increase transparency and help consumers make informed choices.

In addition, consumers need to be informed about the real-world performance of electric vehicles, especially about the range. We therefore recommend that energy consumption and electric range are determined during type-approval under real-world conditions. That means considering the energy consumption of air conditioning and heating at representative summer and winter conditions as well as the energy consumed for battery conditioning before and during charging.

7. Are vehicle fuel efficiency standards an effective mechanism to reduce passenger and light commercial fleet emissions?

As shown in Figure 2 by the solid lines, fuel efficiency or CO_2 standards are an effective mechanism to drive down the type-approval CO_2 emissions of road vehicles. For this reason, many regions and countries have introduced this regulatory instrument and

continue this path by setting more stringent targets for the future as indicated by the dashed line in the figure.

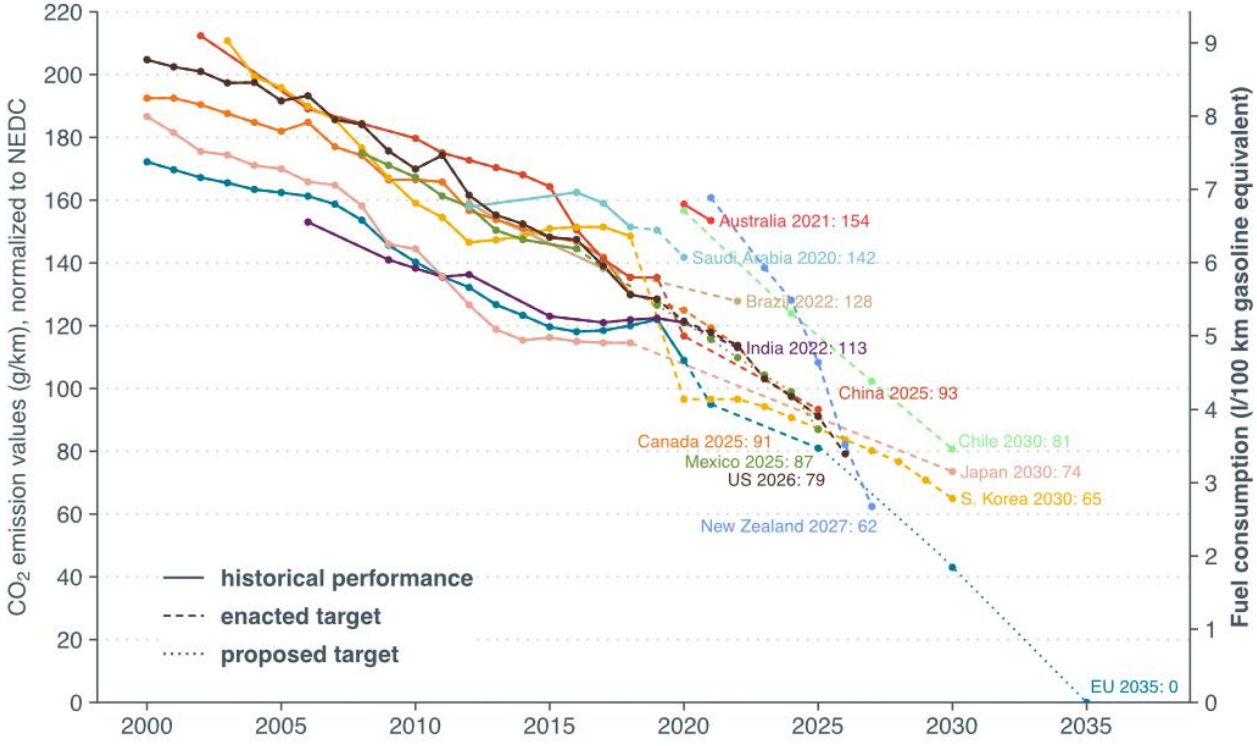

Figure 2: Passenger car type-approval CO2 emissions and equivalent fuel consumption values normalized to NEDC. Source: https://theicct.org/wp-content/uploads/2021/08/plot_nedc_pc_SAFEGHG-aug2021.pdf

At the same time, a comparison of real-world and type-approval fuel consumption revealed a continuously growing gap in the EU, reaching a maximum divergence of 40 % in 2016 as shown in Figure 3. This means that the intended effect of the CO_2 standards was largely undermined by manufacturers exploiting regulatory loopholes and the achieved real-world CO_2 reduction was much lower.

This emphasizes the need for monitoring the real-world fuel consumption to achieve the same or better real-world reduction as required for the type-approval values.

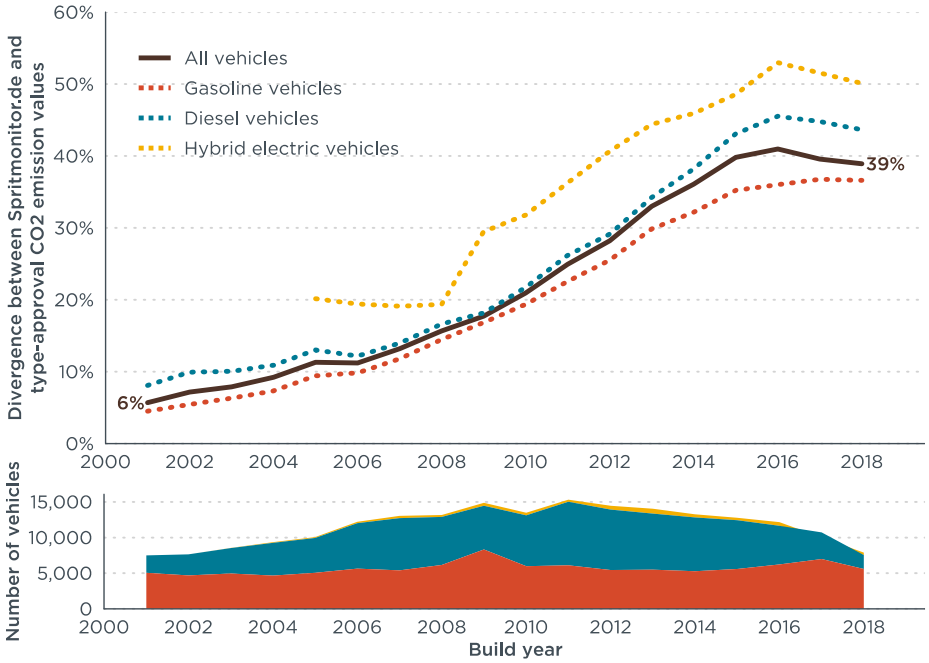

Figure 3: Divergence between real-world and type-approval NEDC CO_2 emission values by fuel/power train type. The bottom graph displays the number of vehicles per fuel/power train type and build year.
Source: https://theicct.org/wp-content/uploads/2021/06/On-the-way-to-real-world-WLTP_May2020.pdf

The European Union CO_2 standards have also proven to be a strong driver for electrification of the vehicle fleet. As shown in Figure 1, the strong increase in electric vehicle market share is directly linked to a step change in stringency from 2019 to 2020. However, because of the only stepwise strengthening of the targets, with the next step being only in 2025, in combination with a very lenient 2025 target, manufacturers have no incentive to further increase the share of electric vehicles. Consequently, together with the global supply chain crisis, the market share growth in the EU seems to have stalled in 2022.

Therefore, to achieve a continuous and sustainable EV market growth, annual and ambitious CO_2/fuel economy targets are needed.

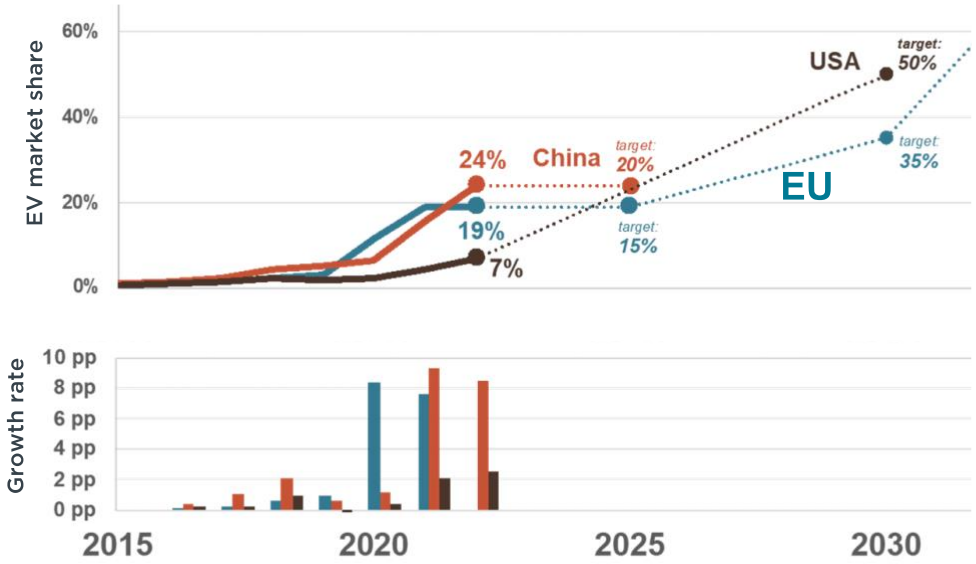

Figure 4: Historic and future target electric vehicle market share and growth rate for EU, USA and China. Source: https://theicct.org/2022-update-ev-sales-us-eu-ch-aug22/

8. Would vehicle fuel efficiency standards incentivise global manufacturers to send EVs and lower emission vehicles to Australia?

Stringent fuel efficiency standards leave manufacturers with two options, to either sell EVs and efficient ICEVs in Australia or to leave the market. While manufacturers that currently don't have battery electric vehicle in their portfolio might choose the first option, many new manufacturers have appeared in the past years that will likely take their spots.

9. In addition to vehicle fuel efficiency standards for passenger and light commercial vehicles, would vehicle fuel efficiency standards be an appropriate mechanism to increase the supply of heavy vehicle classes to Australia?

Yes. Australia should consider carrying over the EU CO2 emission standards for heavy-duty vehicles, including the certification methodologies.

10. What design features should the Government consider in more detail for vehicle fuel efficiency standards, including level of ambition, who they should apply to, commencement date, penalties and enforcement?

Australia should adopt a national standard aligned with the state-level policies for the near-term and the world-class targets (0 g/km by 2035) in the long term in order to meet its 43% by 2030 compared with 2005 and net zero decarbonization target by 2050.

The state-level governments in Australia have generally been active in accelerating state-level EV uptake.[6] Five out of eight states, that together account for 87% of the LDV sales, have committed to 100% EV sales by 2035-2036 and few of them have interim targets of around 50% EV sales by 2030. Assuming the states with 100% EV sales target by 2035 will reach approximately 50% EV sales by 2030, meeting these targets would lead to nationwide EV sales shares of 45% by 2030 and 86% by 2035.

A national standard aligned with these state-level EV targets will require a stringency level for fleet-average emissions of 82 g/km in 2030 and 19 g/km in 2035 along with ICEV emission reduction. A standard aligned with world-class scenario would need to reach 50 g/km fleet average emissions in 2030 and 0 g/km in 2035.

We used ICCT's Roadmap model to evaluate the CO_2 emission impacts of different policy scenarios to identify what policy pathway is needed for Australia to decarbonize their LDV fleet by 2050[7]. We used Australia's grid emissions to estimate the well-to-wheel (WTW) emissions for each policy scenario from 2019 through 2050. We evaluated four policy scenarios from 2019 through 2050 including a baseline scenario assuming no fuel efficiency standards and three other alternative policy scenarios in which standards are assumed to start from 2024 onwards. The three alternative policy options include a scenario assuming Australia adopts the current voluntary 2020-2030 CO_2 emission standards proposed by the FCAI; a scenario that is a cumulative effect from the progressive state-level EV sales targets; and a more aggressive policy scenario considering Australia aligns with the most ambitious world-leading fuel efficiency standards and EV sales targets.

As Figure 5 shows, only the aggressive world class standards scenario would be able to nearly decarbonize Australia's LDV stock by 2050 by reducing nearly 100% of CO_2 emissions, on both tank-to-wheel (TTW) and WTW basis. The state-target aligned scenario can reduce WTW emissions by about 84% in 2050 but still way off than the world class trajectory.

[6] Electric Vehicle Council (2022). https://electricvehiclecouncil.com.au/wp-content/uploads/2022/03/EVC-State-of-EVs-2022.pdf; wheels (2021). "News Australia's EV policies: What's happening in each state and territory in 2021 – updated". https://www.whichcar.com.au/news/australian-states-territories-ev-policies-september-2021

[7] Tanzila Khan, Zifei Yang, Arijit Sen, Josh Miller (2022). "Fuel efficiency standards to decarbonize Australia's light duty vehicles". ICCT paper (to be published).

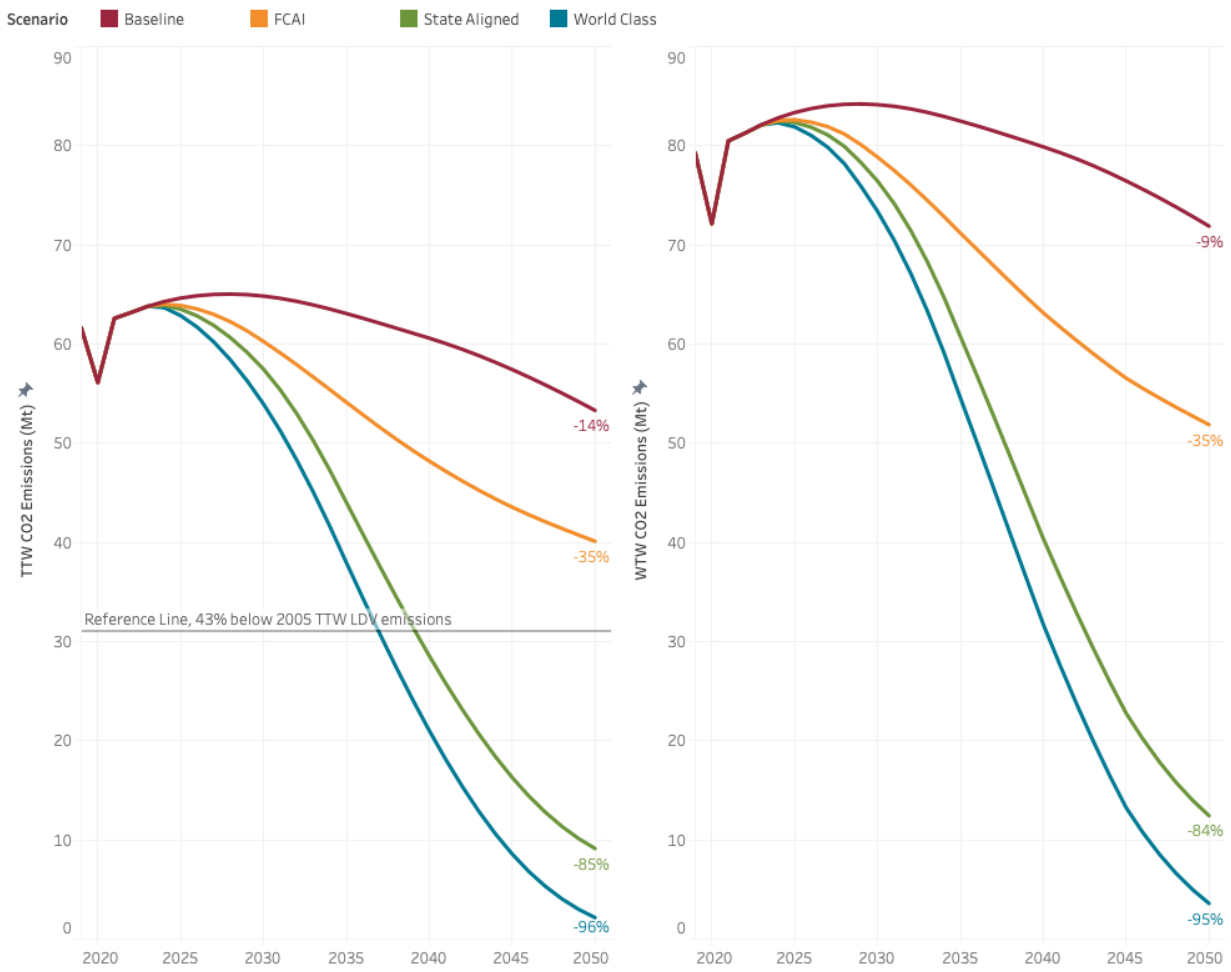

Figure 5 Estimated tank-to-wheel (TTW) and well-to-wheel (WTW) CO_2 emissions impacts of the four policy scenarios for Australia's LDV stock from 2019 to 2050.

Based on best practices from other regions, we recommend the following elements for a fuel efficiency standard:

- To ensure a constant reduction of the CO_2 emissions and a continuously increasing market share of EVs, we recommend introducing limits that increase annually in stringency.
- To establish only one standard curve for passenger cars and light-commercial vehicles (e.g. for MA, MC, and NA). The experience in the United States shows the tendency of vehicles (e.g. SUVs) to switch to light-commercial (or light-truck) category in order to be subject to less stringent standards.
- The success in reducing CO_2 emissions and increasing the EV market share should be evaluated annually and target adjustments should be applied timely if deviations are determined.
- By introducing fleet average CO_2 targets, manufacturers are flexible in investing in more advanced fuel-saving technologies for ICEVs or in meeting the targets by higher shares of electric vehicles.

- One goal of a fuel efficiency standard is the reduction of real-world fleet CO_2 emissions. Given the better real-world representativeness of WLTP test cycle than the NEDC cycle and emerging global adoption of the WLTP cycle for type approval procedure, we recommend that Australia should consider switching to WLTP cycle and develop standards based on WLTP. Since the standards usually regulate the official type-approval fuel consumption, it is important to ensure that the real-world fuel consumption achieves the same or better fuel consumption reduction as intended by the standards. Therefore, we recommend introducing monitoring of the real-world fuel consumption by using OBFCM and to adjust the manufacturer targets accordingly if their real-world fuel consumption gap is larger than the average gap or is growing over time.
- The penalties for exceeding the set limits should be substantially higher than the required compliance cost and should have a deterrent character.
- To ensure that manufacturers do not use defeat devices to reduce fuel consumption during type-approval, strong in-service conformity (ISC) provisions should be introduced that require authorities to perform ISC tests and in addition allow any interested party to verify the fuel consumption values. ISC investigations should not only verify fuel consumption values but also the road load parameters declared by the manufacturer, that are the basis for correctly simulating the vehicle power demand on the chassis dynamometer. Cost for ISC testing should be borne by the manufacturers and the results should be made public. Furthermore, all vehicle information required to perform the ISC tests should be stored electronically in the vehicle and should be accessible to everyone through the on-board diagnostic interface using standardized readers.
- Manufacturers perform the transition to electromobility at different speeds. To ensure that also the laggards are not left behind and reward the more ambitious manufacturers at the same time, we recommend introducing a fuel consumption credit trading system. This would allow over-achieving manufacturers to sell their credits and are thereby rewarded for their risk to commit earlier to the EV technology. An alternative approach would be the European mechanism, which allows manufacturers to pool together, to reach on average the fleet target.
- Besides a trading mechanism, we recommend refraining from flexibility and incentive mechanisms as much as possible, as those have proven to create loopholes with counterproductive effects on the average fuel consumption or EV market uptake.
- Before electric vehicles became a mainstream technology, CO_2 reduction required time-consuming developments of new or optimized engine and vehicle components. However, considering that a substantial CO_2 reduction can now be achieved in very short time by introducing electric vehicles in the market, manufacturers can meet ambitious fuel economy standard in a shorter time frame.

11. What policies and/or industry actions could complement vehicle fuel efficiency standards to help increase supply of EVs to Australia and electrify the Australian fleet?

Incentives for manufacturers to produce EVs and their components in Australia could increase the supply of EVs to the Australian market.

12. Do we need different measures to ensure all segments of the road transport sector are able to reduce emissions and, if so, what government and industry measures might well support the uptake of electric bikes, micro-mobility and motorbikes?

An important element in reducing transport related emissions is the shift away from individual, high-power motorized vehicles towards public transportation and/or low-energy and low-resource-intensive vehicles. However, this requires making these alternative methods safe and convenient, for example by building a comprehensive, high quality bike lane network, or by building fast, frequently operating, and reliable public transportation systems. At the same time, using private vehicles needs to be made less attractive and more expensive to drive the shift.

13. How could we best increase the number of affordable second hand EVs?

As long-term strategy, the share of newly registered EVs needs to be increased fast to bring EVs into the market. This can be complemented with a one-time subsidy for used vehicles sold within a certain period after first registration. For a just transition, such subsidy is preferably tied to the buyer's income and capped at an upper vehicle sales price.

14. Should the Government consider ways to increase the supply of second hand EVs independently imported to the Australian market? Could the safety and consumer risks of this approach be mitigated?

Building up a broad EV second-hand market with good availability and fair and reasonable prices is key for making electromobility a solution for the masses. All regions are facing this challenge and it seems therefore unlikely that second hand EVs will be available for import. Furthermore, due to the scarce resources, the increasing protectionism and resulting deglobalization, the need for sustainability, and the high value of EV raw materials, it can be expected that vehicles will be recycled in the regions they were sold and used and not sold to other regions of the world.

Australia can also consider adopting efficiency standards for imported used vehicles, thus reducing the risk of being the dumping ground of less-efficient used vehicles.

15. What actions can governments and industry take to strengthen our competitiveness and innovate across the full lifecycle of the EV value chain?

No comment on this question.

16. How can we expand our existing domestic heavy vehicle manufacturing and assembly capability?

No comment on this question.

17. Is it viable to extend Australian domestic manufacturing and assembly capability to other vehicle classes?

No comment on this question.

18. Are there other proposals that could help drive demand for EVs and provide a revenue source to help fund road infrastructure?

Increasing demand for EVs while maintaining tax revenue can be established by introducing a mileage-based road pricing scheme. This pricing scheme can start small and gradually increase as needed to ensure adequate funding for road infrastructure.On-board fuel and energy consumption meters (OBFCM), introduced in our feedback to question 3, also record the driven distance. Therefore, OBFCM data transmitted automatically and wireless to the Australian authorities can be used to determine the road price for each vehicle owner. This approach also av oids the need for setting up a nationwide road toll infrastructure.

To steer the EV market towards more efficient and less resource intensive vehicles, additional metrics can be taken into account for calculating the road price like real-world or type-approval energy consumption, vehicle mass and/or vehicle footprint, the former a metric for road wear and the latter as a metric for public space usage.

Since only new vehicles can be covered by an OBFCM data-based taxation scheme, measures to disincentivize the use of combustion engine vehicles should be introduced in parallel, e.g. by increasing the fuel price taxes.

19. What more needs to be done nationally to ensure we deliver a nationally comprehensive framework for EVs?

A comprehensive framework for the transition to electromobility needs to address the following topics:

Goal	Approach
Increase the number of vehicles brought to the market by manufacturers	• Ambitious CO_2 or fuel economy standards that can only be met by introducing EVs • Ensure continuously increasing stringency to achieve a continuous growth in market share • Complement CO_2 standards with ZEV mandate for fleets
Increase EV acceptance and demand by consumers	• Rules for public and private charging infrastructure, including power generation and grid, to ensure that the charging infrastructure does not hinder the comfortable EV usage • Incentivize private charging, especially in combination with private renewable energy production • Compensate for price difference until EVs reach cost parity with combustion engine vehicles

Reduce CO_2 emissions, energy consumption and resource intensity	• Consider only battery electric vehicles as EV. Plug-in hybrid vehicles do not have considerably lower real-world CO2 emissions than combustion engine vehicles. • Complement the CO2/fuel-economy standards with EV efficiency standards.
Make electromobility affordable for all	• Subsidize low-price EVs and cap subsidies above price threshold • Subsidize second-hand EVs • Introduce a social leasing scheme for EVs • Complement the CO2/fuel-economy standards with EV efficiency standards to force manufacturers to sell smaller, more efficient and supposedly lower-cost EVs.
Reduce transition cost and maintain tax revenue from transportation	• Introduce a feebate vehicle sales taxation system to refinance the EV subsidies and steer consumers away from large combustion engine vehicles towards efficient EVs. • Introduce a road pricing scheme

20. How can we best make sure all Australians get access to the opportunities and benefits from the transition?

The transition towards electromobility is a challenge, especially for middle to low-income households that cannot afford the upfront investment in a battery electric vehicle. This situation is made worse if manufacturers only introduce large and premium electric vehicles.

To counteract this trend observed in other markets, an efficiency standard limiting for example a manufacturers fleet average energy consumption, can force manufacturers to introduce also small, low consumption models to the market.

Furthermore, subsidies can be made inversely proportional to the brochure vehicle price and ceased completely for vehicles above a continuously lowered price threshold.
To address the equity issue and accelerate the transition, France has chosen an approach which is referred to as social lease. The government will fund a program that instead of purchasing will allow low-income households to lease a full electric vehicle for a price as low as 100 EUR per month.[8]
Infrastructure investments should also prioritize public funding support to ensure infrastructure buildout in an inclusive manner that does not leave any community behind. Public-private partnerships can also be structured to allow infrastructure development in profitable areas provided investments are also made in less profitable areas.

[8] https://europe.autonews.com/automakers/france-prepares-100-month-ev-leasing-plan