icct

www.theicct.org
communications@theicct.org
twitter @theicct

THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION
1500 K STREET NW | SUITE 650 | WASHINGTON DC 20005

Re: The Fuel Efficiency Standard – cleaner, cheaper to run cars for Australia (April 2023)
To: Ministry for Climate Change and Energy and Ministry for Infrastructure, Transport, Regional Development and Local Government
From: [redacted] International Council on Clean Transportation (ICCT)
Date: May 26, 2023

We cordially thank the Australian Government, Department of Infrastructure, Transport, Regional Development, Communications and the Arts for the opportunity to comment on the consultation for Australia's fuel efficiency standards. Our answers to questions are listed in this document below. In case of questions, please contact [redacted]

The questions listed below match the chapter numbers of the questions in the consultation document.

4. Principles for Setting a Fuel Efficiency Standard

GENERAL guiding principles for setting a fuel efficiency standard:

(a) Are these the right guiding principles? Are there other principles that you think we should keep in mind?

We agree with the guiding principles for FES. In terms of being effective in reducing transport emissions from light vehicles, the FES should follow the guidance of Australia's overall decarbonization target and be effective in putting Australia on track to meet its decarbonization target to reduce CO_2 emissions by 43% from 2005 level by 2030 and achieve net zero emission by 2050.

4.1 Design assumptions

GENERAL design assumptions:

(a) Are there any design assumptions that you think will put at risk the implementation of a good FES for Australia?

The FES should apply on both new and used vehicles entering the Australian market for the first time. We agree with other design assumptions.

(b) Are the exclusions for military, law enforcement, emergency services, agricultural equipment and motorcycles the right ones?

We agree with excluding these vehicles from this FES. However, we suggest separately developing fuel efficiency standards for heavy-duty vehicles and motorcycles, respectively, in order to accelerate the decarbonization of the entire on-road transportation sector.

5. FES design features

GENERAL FES design features

(a) Are there any particular FES features that you think we need to take particular care with?

Even though FES is to set the limits of the average type-approval CO_2 emissions, the overarching goal of an FES is real-world CO_2 emissions reduction. The gap between type-approval and real-world CO_2 emissions is not constant but has been shown to increase over time.[1] Therefore, it is important to monitor the real-world CO_2 emissions of all vehicles, using on-board fuel and energy consumption monitors (OBFCM).[2] In case of a growing gap, the manufacturers CO_2 targets should be adjusted accordingly, for achieving the intended CO_2 reduction rate in real-world emissions.

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.

5.1 The average annual emissions ceiling

GENERAL Starting emissions level limit and approach

(a) What principles should we consider when setting the targets?

Australia should adopt annual targets for FES to require annual improvement of the new vehicles sold to the market. This aligns with the principles of the fuel consumption/greenhouse gas emissions standards setting in the United States and China. The European Union sets stepwise targets every five years, which disincentivize manufacturers from making annual improvements and, instead, only reduce emissions at the last moment when the standards must be enforced (see Figure 1).

[1] Jan Dornoff, Uwe Tietge, and Peter Mock, "On the Way to 'Real-World' CO2 Values: The European Passenger Car Market in Its First Year after Introducing the WLTP" (Washington, D.C.: International Council on Clean Transportation, May 19, 2020), https://theicct.org/publication/on-the-way-to-real-world-co2-values-the-european-passenger-car-market-in-its-first-year-after-introducing-the-wltp/.
[2] 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/.

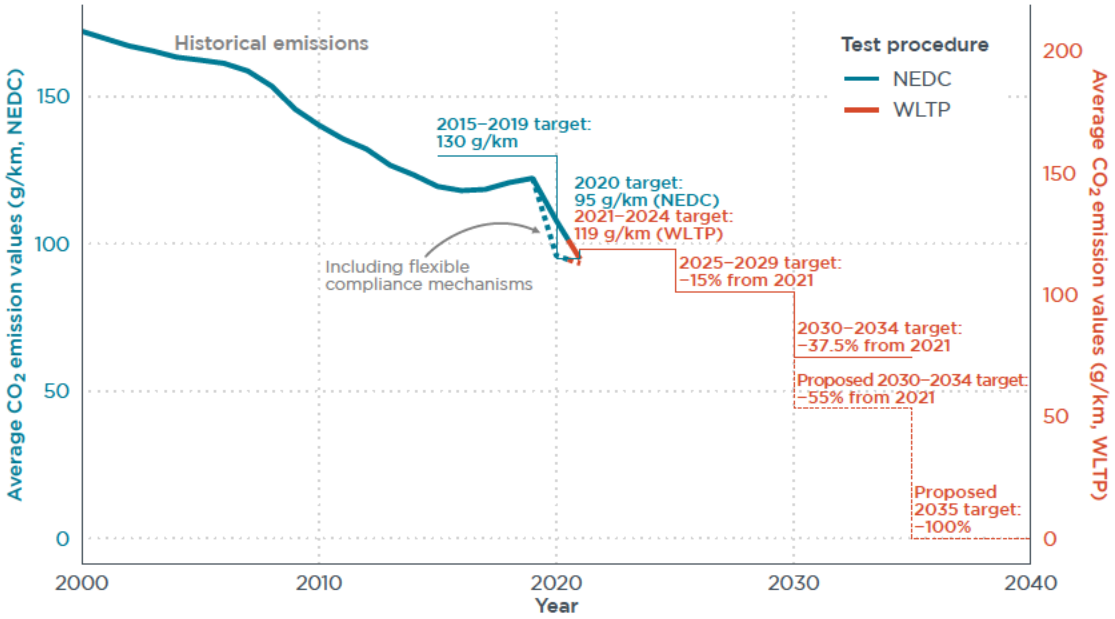

Figure 1: Historic CO_2 emissions and emission targets for passenger cars in the EU.[3] The stepwise targets result in manufacturers only reducing emissions the last moment when the new target applies.

TECHNICAL Starting emissions level limit and approach

(a) What should Australia's CO2 FES target be?

The Australia's FES target should get Australia on track to meet its decarbonization targets. Based on the ICCT's working paper on fuel efficiency standards for Australia published in December 2022, the only policy pathway that can almost fully decarbonize Australia's on-road light-duty vehicle (LDV) fleet by 2050 is to align with the world-leading standards (Figure 2).[4] The world-leading standards include New Zealand's CO_2 emissions standards for 2025; California's Advanced Clean Car (ACC)-II requirement of 68% EV sales by 2030; and the European Union's 0 g CO_2/km standards by 2035, which implies 100% zero-emission vehicle (ZEV) market share.

For Australia, the world class standards mean setting fleet-average CO_2 emissions targets of **110 gCO_2/km by 2025** (39% reduction from 2019 baseline) and **50 gCO_2/km by 2030** (72% reduction from 2019) on the **NEDC test cycle**, and **0 gCO_2/km by 2035** for the new LDV fleet, starting the standards from 2024. As shown in Figure 2, implementing these targets under the world class scenario (shown in blue lines) can reduce well-to-wheel CO_2 emissions from Australia's on-road LDV fleet (stock) by 95% in 2050 compared to 2019 level.

[3] Uwe Tietge et al., "CO2 Emissions from New Passenger Cars in Europe: Car Manufacturers' Performance in 2021" (Washington, D.C.: International Council on Clean Transportation, August 3, 2022), https://theicct.org/publication/co2-new-passenger-cars-europe-aug22/.
[4] Tanzila Khan et al. *Fuel Efficiency Standards to Decarbonize Australia's Light-Duty Vehicles*, (ICCT: Washington DC) 2022, https://theicct.org/publication/pv-australia-co2-standards-dec22/

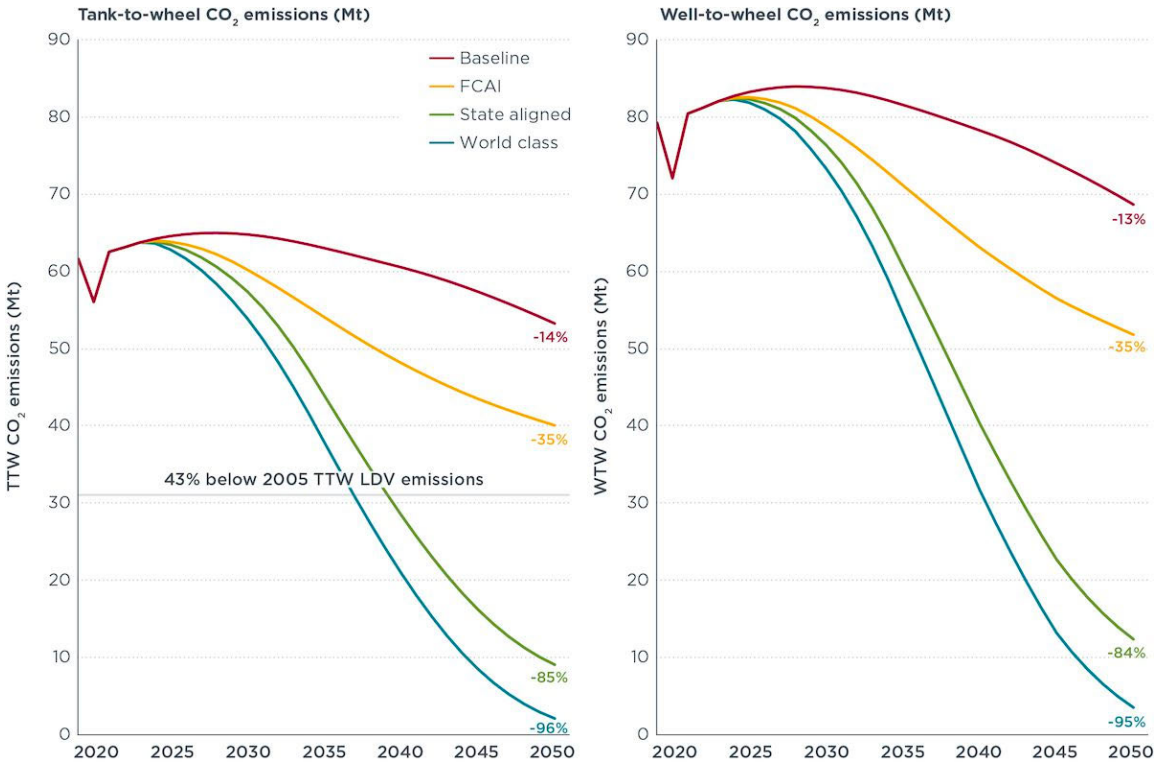

Figure 2 Estimated CO_2 emissions (million tons, Mt) under four policy scenarios for Australia's light-duty vehicle stock from 2019 to 2050 using ICCT's Roadmap model.

An alternative, less stringent option could be the State aligned scenario (in green lines in Figure 2), which assumes a national fuel efficiency standard aligned with Australia's state-level EV sales targets. Table 1 shows the major EV sales targets in Australian states, listed in descending order of their share of the national market for all LDVs as of 2021. Five out of eight Australian states that account for 87% of national LDV sales in 2021, have set 100% EV sales by 2035–2036.

The state aligned scenario would reduce well-to-wheel emissions by 84% in 2050 from 2019 level and would result in 165 Mt more cumulative CO_2 emissions than the World-class standards scenario from 2019 to 2050. Thus, this is a bit less effective scenario than the world class scenario and could be a relatively conservative approach for Australia. Aligning with this state-level scenario means to set the fleet-average CO_2 emissions targets of **131 gCO_2/km by 2025** (27% reduction from 2019), **82 gCO_2/km by 2030** (54% reduction from 2019) and **19 gCO_2/km by 2035** (89% reduction from 2019), all on NEDC test cycle.

Table 1 Summary of state-level EV sales targets.

State	National market share[a]	EV sales target		Source	
		2030	2035	2030	2035
New South Wales	31%	~50%[b]	100%	NSW EV strategy[c]	COP26 signatory[d]
Victoria	26%	50%	100%	Victoria's zero-emissions vehicle roadmap[e]	
Queensland	22%	50%	~100%[f]	Queensland's new zero-emission vehicle strategy[g]	
South Australia	7%	—	100%		COP26 signatory
Australian Capital Territory	1%	—	100%		COP26 signatory
Northern Territory, Tasmania, Western Australia[h]	13%	No target			
National average		~45%[i]	~86%[i]		

[a] Estimated based on 2021 sales data by state. *Source*: Mike Costello, "VFACTS: Australia's 2021 New Car Sales Detailed in Full," *CarExpert*, January 6, 2022, https://www.carexpert.com.au/car-news/vfacts-australias-2021-new-car-sales-detailed-in-full

[b] 52% by 2030–2031

[c] New South Wales Government. *NSW Electric Vehicle Strategy*, June 2021, https://www.energy.nsw.gov.au/sites/default/files/2022-09/nsw-electric-vehicle-strategy-210225.pdf

[d] Government of the United Kingdom, *COP26 Declaration on Accelerating the Transition to 100% Zero Emission Cars and Vans*, updated November 17, 2022, https://www.gov.uk/government/publications/cop26-declaration-zero-emission-cars-and-vans/cop26-declaration-on-accelerating-the-transition-to-100-zero-emission-cars-and-vans

[e] Victoria State Government, *Victoria's Zero Emissions Vehicle Roadmap*, May 2021, https://www.energy.vic.gov.au/__data/assets/pdf_file/0031/583726/Zero-emission-vehicle-roadmap.pdf

Queensland's 100% target is for 2036

[g] "Queensland's New Zero Emission Vehicle Strategy," Queensland Government, updated September 20, 2022, https://www.qld.gov.au/transport/projects/electricvehicles/zero-emission-strategy

[h] EV sales targets for government fleet only are in Western Australia: 25% EV sales by 2025 to 2026; Tasmania: 100% EV sales by 2030; and Northern Territory: increase number of EVs by 200 by 2030.

[i] State-level EV sales targets were weighted by their individual national market share. For 2030, we assumed that the states with a 100% EV target by 2035 will reach 50% EV sales by 2030, even if there is no interim target announced for 2030.

Table 2 lists the proposed annual fleet-average CO_2 emissions targets on NEDC cycle, starting from 2024 and the respective %reductions in emissions from 2019 baseline value, under the ambitious world-class scenario and the alternative state aligned scenario. As discussed above, we would recommend adopting the world-class scenario targets for achieving an almost decarbonized on-road LDV fleet by 2050. The state aligned scenario targets could be an alternative, relatively conservative pathway for Australia. Nevertheless, any standards that are less stringent than the world-class ambition will delay Australia's progress in fully decarbonizing its LDV fleet by 2050.

Table 2 ICCT proposed fleet-average CO_2 emissions targets by year under NEDC test cycle, for the new light-duty vehicle fleet for two policy scenarios.

Year	Proposed CO_2 emissions target (g/km) – World class scenario	%Reduction in CO_2 emissions from 2019 – World class scenario	Alternative CO_2 emissions target (g/km) – State targets aligned scenario	%Reduction in CO_2 emissions from 2019 – State targets aligned scenario
2024	140	22%	151	16%
2025	110	39%	131	27%
2026	97	46%	120	33%
2027	84	53%	110	39%
2028	72	60%	100	44%
2029	61	66%	91	49%
2030	50	72%	82	54%
2031	39	78%	68	62%
2032	29	84%	55	69%
2033	18	90%	42	77%
2034	9	95%	30	83%
2035	0	100%	19	89%

The FCAI scenario (in orange lines in Figure 2) assumes national fuel efficiency standard aligns with the voluntary CO2 emissions targets set by the Federal Chamber of Automotive Industries (FCAI) from 2024 to 2030.[5] This scenario would reduce CO_2 emissions by only 35% in 2050 from the 2019 level. The baseline scenario (in red lines) is a business-as-usual scenario with no mandatory CO_2 emission standard and no EV policies at the national level.

Recalling that Australia has a new target of 43% economywide CO_2 emissions reduction below the 2005 level by 2030.[6] Compared to the reported tank-to-wheel emissions from the LDV fleet in 2005[7], the World-class and State aligned scenarios would achieve about a 43% CO_2 emissions reduction from the LDV stock by 2037 and 2039, respectively. In 2030, both scenarios have roughly the same emissions level as the reported 2005 level.

Thus, even with the most ambitious and stringent standards adopted, there will be delays reaching a given level of emissions reduction below 2005 level by 2030 for Australia's LDV fleet. To achieve substantial emissions reduction from 2005 level in the short term, e.g., by 2030, and to fully decarbonize the LDV fleet by 2050, Australia will likely need additional measures such as accelerated fleet turnover to phase out internal combustion engine vehicles (ICEV) as early as possible and a faster transition to a decarbonized grid.

---

[5] Federal Chamber of Automotive Industries, *CO2 Standard: Rules for Calculating Brand Targets and Assessing Brand Compliance*, (Kingston, ACT, March 12, 2020), https://www.fcai.com.au/library/publication/fcai_rules_for_calculating_co2_compliance.pdf

[6] "Australia," Climate Action Tracker, https://climateactiontracker.org/countries/australia/

[7] CO_2 emissions from LDVs in Australia were 54 Mt in 2005, per the Australian Government Department of Industry, Science, Energy and Resources, *Australia's Emissions Projections 2021* by Department of Industry, Science, Energy and Resources, https://www.dcceew.gov.au/sites/default/files/documents/australias_emissions_projections_2021_0.pdf

The scenarios shown in Figure 2 are modeled using the ICCT's roadmap model[8] and are defined based on combinations of ICEV emissions reduction and EV sales shares. More details can be found in the ICCT working paper cited above.

(b) How quickly should emissions reduce over what timeframe?

Please see answers to the previous question. The standard should start in 2024 and target at 100% CO_2 emissions reduction by 2035.

(c) Should the Australian FES start slow with a strong finish, start strong, or be a straight line or take a different approach?

Please see answers to the previous questions. Australia does not have to start too cautious, since vehicles with low CO_2 are already available, only not in the Australian market yet. In addition, prior analyses of the standards adopted by the United States and the European Union have shown that the standards significantly reduce fuel costs for car owners of more efficient and low-emitting vehicles and the savings in fuel cost over the ownership period outweigh any incremental cost of technology needed to meet a CO_2 emissions target. Our recent blog for Australia explained these cost-benefits assessment of LDV fuel efficiency standards and new technologies such as EVs based on the ICCT works for the EU and the U.S., and U.S. EPA's regulatory assessment.[9] For example, for the EU's 2035 target of 0 gCO_2/km, the net savings from reduced fuel cost over an 8-year ownership period are nearly four times higher than the incremental technology cost of a vehicle purchased in 2035. For an assumed scenario of 4% to 6% reduction in fuel-use per year from 2025 to 2030 in the U.S., fuel savings for a vehicle purchased in 2030 over the lifetime of the vehicle was estimated two to three times larger than the associated incremental technology cost. Furthermore, U.S. EPA's estimates for the enacted 2023–2026 LDV greenhouse gas emission standards show that the consumer fuel savings over the lifetime of a 2026 model year vehicle outweigh the initial increase in vehicle cost by $1,080 relative to a no-action scenario, resulting from a fleet-average greenhouse gas emissions reduction of 18% from the no-action scenario.

Thus, introducing stronger standards will bring consumers those benefit earlier. The FES should be combined with a ZEV mandate to ensure that EVs are introduced in the market even though CO_2 limits are still high.

GENERAL adjustments of limit level

(a) How many years ahead should the Government set emissions targets, and with what review mechanism to set limits for the following period?

As in previous comments, the standards should start from 2024 and require 100% reduction target by 2035 in order to meet the net zero carbon emissions by 2050. The targets should be reviewed regularly, e.g., every 4-5 years, to adjust for any deviations in reaching the 2050 climate target.

[8] ICCT Roadmap model version 1.9, (2022), https://theicct.github.io/roadmap-doc/versions/v1.9/
[9] Tanzila Khan and Zifei Yang. *Explained: Why Australia's fuel efficiency standards are expected to reduce costs for car owners*. (ICCT: Washington DC), 2023. https://theicct.org/australia-fuel-efficiency-costs-explained-may23/

(b) How should the Government address the risks of the standard being found to be too weak or too strong while it is operating?

The government can refer to the similar standard-making in other leading major markets. Technologies that are cost-effectively available in the mass market in those markets, can also be introduced to meet similar levels of standards in Australia. The government should monitor compliance with the standards and technology trends of the vehicle fleet. Adjustments can be made during the periodic review of the standards.

For climate protection, real-world CO_2 emissions are of relevance. Real-world and type-approval emissions are only weakly associated and the gap changes over time.[10] Therefore, it is of importance to monitor the real-world CO_2 emissions and ensure they follow the type-approval value.

TECHNICAL Attribute-based emissions limit curve

(a) Should an Australian FES adopt a mass-based or footprint-based limit curve?

Footprint is a more effective index attribute than vehicle mass for the standards.[11] In contrast to a mass-based standard, a footprint-based standard is technology neutral, equally push for the adoption of lightweight technologies and use of lightweight materials in addition to other technologies to reduce CO_2 emissions and fuel consumption, do not reward larger engines with less stringent standards, and is less prone to gaming. Mass-based limit curve does not incentivize lightweight design [12]. U.S., Canada, and Mexico use the footprint-based greenhouse gas emission standards.

Any limit value curve creates the risk of undermining the average CO_2 fleet targets. If the average mass/footprint is above the reference mass/footprint, the average CO_2 emissions are above the target value. Therefore, the reference mass/footprint and slope of the limit value curve should be adjusted annually. The reference mass/footprint for the next year(s) should take into account projections based on the fleet development in the latest years.

Finally, the applied limit value curve should always be flatter than the slope of the CO_2 vs utility parameter linear least square regression, to incentivize lightweight and aerodynamic design and to encourage manufacturers to produce smaller vehicles. The slope of the curve should also take into account of the increased penetration of electric vehicles, because the tailpipe emissions of battery and fuel cell electric vehicles are zero

[10] Jan Dornoff, Uwe Tietge, and Peter Mock, "On the Way to 'Real-World' CO2 Values: The European Passenger Car Market in Its First Year after Introducing the WLTP" (Washington, D.C.: International Council on Clean Transportation, May 19, 2020), https://theicct.org/publication/on-the-way-to-real-world-co2-values-the-european-passenger-car-market-in-its-first-year-after-introducing-the-wltp/.
[11] John German and Nic Lutsey. Size or Mass? *The Technical Rationale for Selecting Size as an Attribute for Vehicle Efficiency Standards*, (ICCT: Washington DC) 2010, https://theicct.org/publication/size-or-mass-the-technical-rationale-for-selecting-size-as-an-attribute-for-vehicle-efficiency-standards/
[12] Peter Mock, Uwe Tietge, and Jan Dornoff, "Adjusting for Vehicle Mass and Size in European Post-2020 CO2 Targets for Passenger Cars," Briefing (Washington, D.C.: International Council on Clean Transportation, August 8, 2018), https://theicct.org/publication/adjusting-for-vehicle-mass-and-size-in-european-post-2020-co2-targets-for-passenger-cars/.

regardless of the difference in weight and size. Therefore, the slope of the curve should be even flatter after incorporating the impact of electric vehicle uptake. In the recently released U.S. multi-pollutant emissions standards proposal for model years 2027 and later light- and medium-duty vehicles, the U.S. Environmental Protection Agency (EPA)[13] significantly flattened the standard curve compared with the previous standards after considering the significant uptake of electric vehicles from 2027 and on.

(b) If Australia adopts a mass-based limit curve, should it be based on mass in running order, kerb mass, or another measure?

It should align with the Worldwide harmonized Light vehicles Test Procedure (WLTP) test mass, which includes the mass of the optional equipment of each vehicle and a representative payload.

(c) Should Australia consider a variant of the New Zealand approach to address incentives for very light and very heavy vehicles? If so, noting that new vehicles that weigh under 1,200 kg are rare, where should the weight thresholds be set?

It is important to incentivize the sale of smaller, lightweight vehicles by limiting the CO_2 allowance per mass/footprint increase beyond a certain threshold. Furthermore, the options for smaller or lighter vehicles to further reduce CO_2 emissions is less than for larger, heavier and often more expensive vehicles. It is therefore justified to cap the CO_2 emission limit for these vehicles for equity and affordability concerns. The disadvantage of this approach is less transparency and more uncertainty if the fleet average emissions are at or below the fleet target.

It is also justified to cap the CO_2 emission limit for very heavy vehicles to disincentivize vehicles from becoming bigger and heavier.

TECHNICAL Multiple targets

(a) Should an Australian FES adopt two emissions targets for different classes of vehicles?

ICCT's briefing paper on light-duty vehicle classification for Australia shows that One-curve approach would be the best approach for Australia, which means one standard curve for all types of LDVs including passenger cars (PC, including non-SUV cars and SUVs) and light commercial vehicles (LCV).[14] In the paper, we reviewed the LDV classification practices in the EU and the U.S. and quantified the long-term CO_2 emissions impacts of various fuel efficiency standard design approaches for Australia.

One-curve approach is the most stringent and logical approach. The reasoning is: PCs and LCVs have similar construction and power train technologies, and technologies that reduce fuel consumption or CO_2 emissions in PCs can also be applied to LCVs. In addition, if the standard curve is attribute-based, then the difference in vehicle mass or footprint already accounts for the difference in the stringency level. For example, LCVs that are typically bigger and heavier would be subject to less stringent targets than PCs

[13] Office of the Federal Register, "40 CFR Parts 85, 86, 600, 1036, 1037, and 1066 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," May 2023, https://www.govinfo.gov/content/pkg/FR-2023-05-05/pdf/2023-07974.pdf.
[14] Tanzila Khan and Zifei Yang. *Light-Duty Vehicle Classification for Australia's Fuel Efficiency Standards*, (ICCT: Washington DC) 2023, https://theicct.org/publication/pv-australia-vehicle-classification-apr23/

by the design of a one-curve standard. Therefore, developing a separate curve for LCVs results in setting even more lenient targets for LCV class than PCs with the same attributes.

Our modeling results showed that One-curve approach yields the lowest cumulative CO_2 emissions from 2019 to 2050 for Australia than the other approaches including two standard curves without split of SUV segment (Two curves–PC/LCV) and two standard curves with SUV split (Two curves–SUV split) as light and heavy SUVs. Even with the most ambitious world-leading targets (such as California's EV mandate for 2030 and EU's 0 gCO_2/km by 2035), the Two curves–SUV split approach would yield 35 million tons (Mt) and 48 Mt more cumulative CO_2 emissions, respectively, than the Two curves–PC/LCV approach and One-curve approach. The emissions from a split approach would be even higher if the adopted standards are less stringent than the world leading targets.

If Australia chooses to adopt two standard curves, we recommend designing one standard curve for all light duty passenger vehicles under the "M" category including MA, MB, and MC, and a separate standard curve for LCVs that fall under the "NA" category or light goods vehicle class in the Australian Design Rule. This means keeping the same set of targets for all SUVs and passenger cars, including SUVs that are classified as off-road vehicles under the MC category.

Globally, the typical practice is to have two standards curves such as in the European Union, New Zealand, and Japan, where they keep SUVs and non-SUV cars in one category under passenger cars, and LCVs or light trucks to a separate category. Non-SUV cars, SUVs, and LCVs all have similar patterns of CO_2 emissions versus vehicle mass in the European Union. Because the same emission reduction technologies can be applied to all LDV types, even if Australia adopts the two-curves approach, there is no need to split the SUV segment and allow certain heavier SUVs to be in a separate class with light trucks.

U.S. is an example of a major vehicle market where SUVs have been differentiated as car SUVs and truck SUVs, and being subject to different standard curves. Such classification has contributed to a significant increase in sales of truck SUVs, from 2% of the U.S. LDV market in 1975 to 45% in 2021. These trends are contributing to the relatively modest fleet-wide efficiency improvements in the U.S. in recent years. Such an outcome runs counter to the goal of an effective fuel efficiency standard. In the recently released U.S. multi-pollutant emissions standards proposal for model years 2027 and later light- and medium-duty vehicles, the U.S. Environmental Protection Agency (EPA) indicated that "The design differences for many cross-over vehicle models that are offered in both a two-wheel drive (2WD) and an AWD version (aside from their driveline) are difficult to detect.[15] They often have the same engine, similar curb weight (except for the additional weight of an AWD system), and similar operating features (although AWD versions might be offered at a premium trim level that is not required of the drivetrain). " And "Many crossover vehicles and SUVs exhibit similar towing capability between their 2WD and AWD versions (there are some exceptions in cases where AWD is packaged

[15] Office of the Federal Register, "40 CFR Parts 85, 86, 600, 1036, 1037, and 1066 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," May 2023, https://www.govinfo.gov/content/pkg/FR-2023-05-05/pdf/2023-07974.pdf.

with a larger more powerful engine than the base 2WD version)." The U.S. EPA's analysis of its recent vehicle fleet from Model Year 2019 echoes our suggestion to regulate all SUVs with the same standard curve as the non-SUV passenger cars.

Merging certain heavy SUVs in Australia with LCVs in "NA" class, would risk similar consequences as in the U.S. SUVs already grew from 30% to 55% of the Australian LDV market from 2012 to 2021. While heavy SUVs were only 14% of the Australian LDV market in 2021, light SUVs had a 41% share, and the heavy SUV market will likely increase substantially in the future if those vehicles are granted less stringent standards. The impact of this would be less CO_2 emissions reduction than could otherwise be achieved by the standards, as discussed in the modeling results above.

(b) Is there a way to manage the risk that adopting two targets erodes the effectiveness of an Australian FES by creating an incentive to shift vehicle sales to the higher emission LCV category?

As in our comments to the previous question, it should be clearly defined what LCVs and PCs are. LCVs should only be vehicles that are designed primarily for carrying goods and, therefore, have a loading area that is separated from the passenger compartment. Furthermore, it could be required that the loading area is either open or has no windows in case it is closed. Based on the U.S. EPA's analysis, since many crossover vehicles and SUVs exhibit similar towing capabilities between their 2WD and AWD versions, all SUVs should be categorized and regulated together under the passenger car curve. This prevents vehicles with similar designs and functions from shifting to LCV in order to be subject to less stringent targets.

(c) Is there anything else we should bear in mind as we consider this design feature?

Please see answers above.

(d) Are there other policy interventions that might encourage more efficient vehicle choices?

A bonus-malus vehicle taxation system should complement FES. This system, also called a feebate system, provides a purchase subsidy for efficient vehicles and sets a penalty for purchasing vehicles with high CO_2 emissions. If appropriately designed, such a taxation system is revenue neutral.

5.2 Additional flexibility mechanisms to minimise impacts on consumers

TECHNICAL Credit banking, transferring and pooling

(a) To what extent should the Australian FES allow credit banking, transferring and/or pooling?

We recommend a banking and trading scheme to incentivize the early adoption of electric and low-CO_2 emission vehicles. We do not recommend a borrowing scheme as it further delays the introduction of more efficient vehicles in the Australian market. It is also not needed if trading is combined with the slow start-strong finish approach when setting annual CO_2 targets.

Open manufacturer pools are not needed when banking and trading are allowed. However, closed manufacturer pools, that is, pools of manufacturers belonging to one larger entity, can simplify the trading scheme and administrative burden.

(b) Should credits expire? In what timeframe?

Credits should expire to avoid those credits earned in the early phase, when targets are less ambitious, from compromising the emission reduction target in later years when stringent requirements apply. This would be even more important when applying a progressively increasing stringency of the annual targets (slow start – strong finish). We recommend a rolling expiration time of 2 years after the credits have been accrued. That means if credits are earned in year X, they should expire if not used up in year X+2. This should also apply to purchased/transferred credits. All credits should expire the year when 100% CO_2 reduction is required.

5.3 Bonus credits for new/innovative technologies

TECHNICAL Multipliers for LZEVs

(a) Should an Australian FES include multiplier credits for LZEVs?

An ICCT study[16] analyzing the electric vehicle multipliers in the U.S. and Europe found that the use of electric vehicle multipliers comes with a substantial environmental cost. The positive aspect of these incentives is that they greatly improve the cost-effectiveness for automakers of using electric vehicles as a compliance strategy, significantly reducing the cost per CO_2 reduction. However, as electric vehicle shares continue to increase above 5%, vehicle efficiency improvements are increasingly undermined due to the excessive preferential credit given to electric vehicles from such multipliers.

(b) If so, what level should the multipliers be, should they apply equally to both classes of vehicle (if adopted) and for how long should they apply?

Please see answer above.

(c) Should the total benefit available from these credits be capped?

Please see answer above.

(d) If not, should the Government consider another approach to incentivising the supply and uptake of LZEVs?

A bonus-malus taxation system or feebate system can be introduced to reduce the upfront cost of electric vehicles when the cost of electric vehicles is still higher than their conventional vehicle counterparts at the early stage.

---

[16] Nic Lutsey. *Integrating electric vehicles within U.S. and European efficiency regulations*, (ICCT: Washington DC) 2017, https://theicct.org/wp-content/uploads/2021/06/Integrating-EVs-US-EU_ICCT_Working-Paper_22062017_vF.pdf

TECHNICAL Off-cycle credits

(a) Should an Australian FES include off-cycle credits for specified technologies?

Off-cycle credits dilute the effective annual CO_2 targets, while their effects on real-world emission reduction rely on various estimates and are not verifiable. Therefore, an off-cycle credit mechanism creates loopholes in the regulation. We recommend monitoring of the real-world to type-approval CO_2 emissions gap instead, using OBFCM data, and introducing a mechanism that adjusts a manufacturer's target in case of a growing gap. Such a mechanism will ensure that manufacturers apply technologies that result in CO_2 emissions reduction not only during type-approval but also during real-world operation.

To incentivize introducing technologies with a higher real-world reduction potential than can be demonstrated during type-approval, the FES could relax the CO_2 target for manufacturers for which the real-world to type-approval gap reduces over time.

(b) If so, should the per-vehicle benefit be capped and how should an Australian FES ensure that off-cycle credits deliver real emissions reduction?

Please see answer above.

(c) Should the Government consider any other form of off-cycle credits for an Australian FES?

Please see answer above.

TECHNICAL Air conditioning refrigerant gas credits

(a) Should an Australian FES include credits for using low global warming potential air conditioning refrigerants, and if so, for how long should this credit be available?

Refrigerants with low global warming potential are widely available and in use in mobile air conditioning applications.[17] We therefore recommend banning the use of high global warming potential refrigerants instead of weakening the CO_2 reduction effort of an FES by providing credits for using a technology that is already established in the market.

(b) Could the issue of high global warming potential refrigerants be better dealt with by another policy or legislative framework?

Please see answer above.

(c) If such a credit is permitted, should the emissions target be lowered to ensure consumers realise the fuel cost savings and LZEV availability benefits of a FES?

Please see answer above.

[17] Liuhanzi Yang et al., "Measures for Reducing Greenhouse Gas Emissions from Motor Air Conditioning in China," 2022, https://theicct.org/publication/mac-ghg-china-lvs-feb22/.

5.4 When should a FES start?

TECHNICAL When should a FES start?

(a) When do you think a FES should start?

An FES should start as soon as possible. We recommend rather start early with relatively low reduction targets in the first years than delaying the introduction to start with more ambitious targets directly.

(b) How should the start date interact with the average annual emissions ceiling?

Please see answer above.

(c) Should the Government provide incentives for the supply of LZEVs ahead of a FES commencing? If so, how?

Incentives could be provided through a bonus-malus taxation scheme as mentioned before. Such a system steers consumers towards high-efficient or preferably zero-emissions vehicles while being revenue neutral if designed right.

We also recommend combining the CO_2 standards with a zero-emission vehicle (ZEV) mandate, setting minimum annual electric vehicle sales share thresholds, with increasing stringency over time. A combination of ZEV mandate and CO_2 standards can effectively increase the uptake of electric vehicles while ensuring that CO_2 emissions of the remaining non-ZEVs do not increase or even reduce.

5.5 Penalties for non-compliance and enforcement mechanisms

TECHNICAL Penalties for each gram per kilometre

(a) What should the penalties per gram be? Would penalties of AUD$100 per gram provide a good balance between objectives? What is the case for higher penalties?

One way to assess whether a non-compliance penalty is proportionate or not is a comparison to the cost of direct air carbon capture of a vehicle's lifetime emissions. Assuming an average vehicle lifetime of 240,000 km and a correction factor of 1.4 to account for the average gap between real-world versus NEDC cycle, the proposed penalty of AUD$100 per gram of CO_2, results in a CO_2 cost of about AUD$300 per ton CO_2, which is equivalent to about-USD 195 per ton CO_2.

The international energy agency states the direct air carbon capture cost is USD143 – 342 per ton.[18] Therefore, we consider AUD$100 being too low.

Also, in international comparison, the suggested penalty is low. In the EU, a more than 50% higher excess premium of 95 EUR (= AUD$155) per gram CO_2 per km applies already since 2009.[19] And in its proposal for a combined Zero emission vehicle mandate

[18] International Energy Agency, "Levelised Cost of CO2 Capture by Sector and Initial CO2 Concentration, 2019 – Charts – Data & Statistics," IEA, October 26, 2022, https://www.iea.org/data-and-statistics/charts/levelised-cost-of-co2-capture-by-sector-and-initial-co2-concentration-2019.

[19] Regulation (EU) 2019/631 of the European Parliament and of the Council of 17 April 2019, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02019R0631-20230515

and CO_2 standard[20], the UK government suggests a penalty of 86 GBP (= AUD$161) per gram of CO_2 per km.

Therefore, we would recommend a penalty of at least AUD$160 per gram of CO_2 exceedance per km.

5.6 Information disclosure

TECHNICAL Small volume and niche manufacturers

(a) What, if any, concessional arrangements should be offered to low volume manufacturers and why? If so, how should a low volume manufacturer be defined?

Considering the low impact on total CO_2 emissions and the lower R&D budget of low volume manufacturers, it would be justified to exempt these manufacturers from the base FES scheme. However, we recommend requiring that CO_2 emissions of these manufacturers do not increase over time, and low-volume manufacturers should not be exempted from a 100% CO_2 reduction target. We suggest following the CO_2 standards and ZEV mandate proposed by the UK, which exempts manufacturers selling less than 1,000 vehicles per year.[21]

TECHNICAL Information that suppliers will need to keep and supply

(a) The Government is keen to ensure any regulatory administrative costs are kept to a minimum while ensuring that outcomes are robust. What should the department keep in mind in designing the system for suppliers to provide information and in relation to record keeping obligations?
We don't have comment.

(b) What should the reporting obligations be? What information should be published and how regularly?

As in the EU, we recommend that for each vehicle registered, comprehensive vehicle information is reported together with the fuel consumption, electric energy consumption, and CO_2 emission values.[22] We recommend making this information public, preferably in a publicly accessible database. Like in the EU, the data should be published in a preliminary version as soon as available and complemented with a final version once reviewed by the manufacturers.

In addition to the data published in the EU, we recommend that additional vehicle information is published for verifying and analyzing the reported data. This includes road

[20] "A Zero Emission Vehicle (ZEV) Mandate and CO2 Emissions Regulation for New Cars and Vans in the UK," GOV.UK, May 24, 2023, https://www.gov.uk/government/consultations/a-zero-emission-vehicle-zev-mandate-and-co2-emissions-regulation-for-new-cars-and-vans-in-the-uk.
[21] Ibid
[22] European Commission, "Guidelines for Reporting Countries on the Monitoring and Reporting of CO2 Emissions from Light-Duty Vehicles," December 15, 2022, https://circabc.europa.eu/ui/group/4cf23472-88e0-4a52-9dfb-544e8c4c7631/library/454bc5b7-1f9d-4674-a996-a6027de81386/details.

load parameters, aerodynamic drag coefficient, frontal area, transmission type, number of cylinders, traction battery capacity, and number of electric motors.

In addition to the type-approval values, we recommend that manufacturers are required to report real-world fuel and energy consumption values from on-board fuel and energy consumption monitors (OBFCM), as in the EU. This information is indispensable for determining the real-world to type-approval CO_2 and energy consumption gap, and thereby, for assessing if the real-world CO_2 emissions reduce at least at the same rate as type-approval values. If not, the CO_2 targets per manufacturer and/or vehicle category should be adjusted to compensate for any surplus CO_2 from a widening gap.

We recommend that OBFCM data is published at least annually with the same level of vehicle detail as the type-approval data.[23] As in the EU, OBFCM data of plug-in hybrid electric vehicles should be reported separately for the different operating mode, that charge sustaining and charge depleting mode.

(c) How long should suppliers keep required information?

We don't have comment on this.

(d) Is a penalty of 60 penalty units appropriate for this purpose?

We don't have comment on this.

5.7 Governance arrangements and other matters

TECHNICAL Other regulatory mechanisms

(a) Should the regulator be the department? What other options are there?

The regulator should be the government entity that has the legislative power to enforce the compliance of the FES and apply penalties for noncompliance.

(b) How should the regulated entity be defined in an Australian FES?

We don't have comment on this.

(c) What reasons are there to depart from the standard regulatory tool kit for an Australian FES?

We don't have comment on this.

(d) Should an Australian FES use WLTP test results in anticipation of the adoption of Euro 6 and if so, what conversion should be applied to existing NEDC test results, or how might such a factor be determined?

[23] 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/.

Australia should develop the FES standards in WLTP and require all new vehicles to be certified under WLTP. This will standardize the compliance procedure in Australia and minimize the uncertainties and potential for loopholes in the future.

Switching the type-approval test procedure for determining CO_2 emissions creates challenges in the definition of CO_2 targets. NEDC-based CO_2 targets were maintained in the EU until the transition to WLTP was completed. For vehicles already type-approved under WLTP, an equivalent NEDC value was determined using the European Commission's CO2MPAS tool.[24]

If WLTP-based CO_2 targets should be used before WLTP is fully introduced would require converting the NEDC values to WLTP. Considering the wide range of WLTP-to-NEDC CO_2 ratios observed during the correlation exercise in the EU, using empiric factors for the conversion does not seem a viable approach. And since the NEDC test procedure covers a much small range of operating conditions than WLTP, a simulation of WLTP values from NEDC measurement data is not possible.

Therefore, we recommend applying the same approach as in the EU: defining NEDC-based targets until the transition to WLTP is completed and converting the CO_2 emission values of WLTP-type-approved vehicles using CO2MPAS. To avoid the potential loopholes of this procedure, the WLTP-to-NEDC ratio to determine the WLTP equivalent target could be carried over from the EU.

As an alternative approach, both an NEDC and WLTP target could be defined using the fleet average ratio of measured WLTP and declared NEDC CO_2 emissions determined for the EU fleet or adopted by New Zealand[25]. A manufacturer's target could then be calculated as the sales weighted average between WLTP and NEDC target and compared to the average NEDC and WLTP CO_2 emissions of the vehicles registered. However, this approach would require a more in-depth analysis and thorough risk assessment, to ensure that gaming can be prevented and that the CO_2 standards remain fair and effective.

[24] Dornoff, Tietge, and Mock, "On the Way to 'Real-World' CO_2 Values: The European Passenger Car Market in Its First Year after Introducing the WLTP."
[25] New Zealand Legislation. *Land Transport Rule Vehicle Efficiency and Emissions Data 2022*. https://www.nzta.govt.nz/assets/resources/rules/docs/vehicle-efficiency-and-emissions-data-2022.pdf

About the ICCT

The ICCT is an independent, nonprofit organization that provides first-rate, unbiased research and policy analysis on clean transportation to government officials and other relevant stakeholders from civil society and industry. Our mission is to improve the environmental performance and energy efficiency of road, marine, and air transportation to benefit public health and mitigate climate change. The ICCT is the world's leading research organization dedicated solely to clean fuel and vehicle policies and the decarbonization of the transport sector by mid-century.