Australia adopts first-ever CO_2 standards for light vehicles

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On May 31, 2024, the Australian Government finalized the country's first carbon dioxide (CO_2) emission standards for new light-duty vehicles, the New Vehicle Efficiency Standard (NVES) Act 2024.[1] This came after the country's years of efforts to introduce mandatory fuel efficiency measures.[2] The NVES sets annual gCO_2/km emission targets from 2025 to 2029 for new passenger cars, sport utility vehicles (SUVs), utility vehicles (utes), and vans.

The adoption of the NVES is a critical step toward putting Australia on track to meet its 2050 decarbonization goal and catch up with regulations in other major markets.[3]

KEY FEATURES

» The annual gCO_2/km emissions targets, referred to as "headline targets" in the regulation, are set under the New European Driving Cycle (NEDC) test procedure (Table 1). The targets apply starting on January 1, 2025, and the limits become more stringent each year over the 5 years. The first review of the regulation is scheduled to take place in 2026 and is expected to consider targets for 2030–2035, among other things.[4]

» Passenger vehicles (PV) with gross vehicle mass (GVM) up to 3.5 tonnes and light commercial vehicles (LCV) with GVM up to 4.5 tonnes are subject to different headline targets. PVs, referred to as Type 1 vehicles, include cars and most off-road

1 New Vehicle Efficiency Standard Act 2024, No. 34, 2024, Fed. Reg. C2024A00034 (May 31, 2024), https://www.legislation.gov.au/C2024A00034/asmade/text.

2 Robin Smit, Tanzila Khan, and Zifei Yang, "How Australian Light-duty Vehicle CO_2 Emissions Compare with the Rest of the World" (International Council on Clean Transportation, 2024), https://theicct.org/publication/australian-ldv-co2-emissions-compare-to-the-rest-of-the-world-feb24/.

3 Australian Government, Department of Industry, Science, Energy and Resources, "Australia's Nationally Determined Contribution" (2022), https://unfccc.int/sites/default/files/NDC/2022-06/Australias NDC June 2022 Update %283%29.pdf.

4 Australian Government, Department of Infrastructure, Transport, Regional Development, Communications and the Arts, "Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard Impact Analysis" (March 2024), https://oia.pmc.gov.au/sites/default/files/posts/2024/04/Impact%20Analysis%20-%20NVES.pdf.

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passenger vehicles.[5] LCVs, or Type 2 vehicles, include utes, vans, and heavy off-road PVs with a ladder frame chassis or body-on-frame construction type and a towing capacity of at least 3 tonnes.

Table 1

NVES annual gCO_2/km targets by year and vehicle type in New European Driving Cycle

Year	Headline gCO_2/km targets for passenger vehicles	Headline gCO_2/km targets for light commercial vehicles
2025	141	210
2026	117	180
2027	92	150
2028	68	122
2029	58	110

» Targets for individual vehicles are determined by adjusting the headline targets based on the vehicle's mass in running order (MIRO) using a linear curve equation (Equation 1).[6]

$$\textit{Vehicle } CO_2 \textit{ target} = \textit{headline target} + \textit{mass adjustment factor} \times (\textit{designated MIRO} - \textit{reference MIRO}) \quad (1)$$

This linear mass adjustment curve is constrained by a lower and an upper mass breakpoint. All vehicles with a mass above the upper or below the lower mass breakpoint have the same CO_2 target as the vehicles with the respective breakpoint mass. For each of the 5 years (2025–2029) of the NVES, the lower and upper breakpoints are set at 1,500 kg and 2,200 kg for PVs and 1,500 kg and 2,400 kg for LCVs.

The mass adjustment factor, or slope of the curve, is determined as the best-fitting linear relationship of CO_2 emissions and vehicle mass. The reference MIRO, or the pivot point of the curve, is the fleet-average vehicle mass. For the 2025 and 2026 curves, these parameters are derived based on 2022 vehicle fleet data.[7] The slope value is set at 0.0663 for PVs and 0.0324 for LCVs, and the reference MIRO is set at 1,723 kg for PVs and 2,155 kg for LCVs. From 2027 onward, the parameters will be updated on a rolling basis using vehicle fleet data that is 2 years old.[8]

» The NVES allows the banking and trading of compliance credits and imposes penalties, effective from July 1, 2025. For each newly registered vehicle in a given calendar year, the compliance value is calculated as the difference between the emissions performance and the emissions target. At the end of the calendar year, the compliance values of all vehicles registered per manufacturer are summed up. A manufacturer receives credits if the calculated sum is less than zero, and debits if the sum is greater than zero. Credits or debits, whichever applies, are set equal to the absolute value of the sum, and 1 credit or debit is equivalent to 1 gCO_2/km.

Credits can be banked for up to 3 years after their year of issuance and can be used for meeting future targets, balancing debits from prior years, and trading with other manufacturers. Debits must be cleared with credits from within 2 years after the issuance year. Debits not balanced within the allowed time frame are subject to a civil penalty rate of AU$100 per gCO_2/km.

5 Vehicle Standard (Australian Design Rule – Definitions and Vehicle Categories) 2005, Fed. Reg. F2024L00446 (April 15, 2024), https://www.legislation.gov.au/Details/F2022C01069.

6 Mass in running order is defined in the final regulatory impact analysis as the mass of the vehicle with all fluids, standard equipment, and weight of a person (75 kg) in the vehicle.

7 Australian Government, "The Australian New Vehicle Efficiency Standard Impact Analysis."

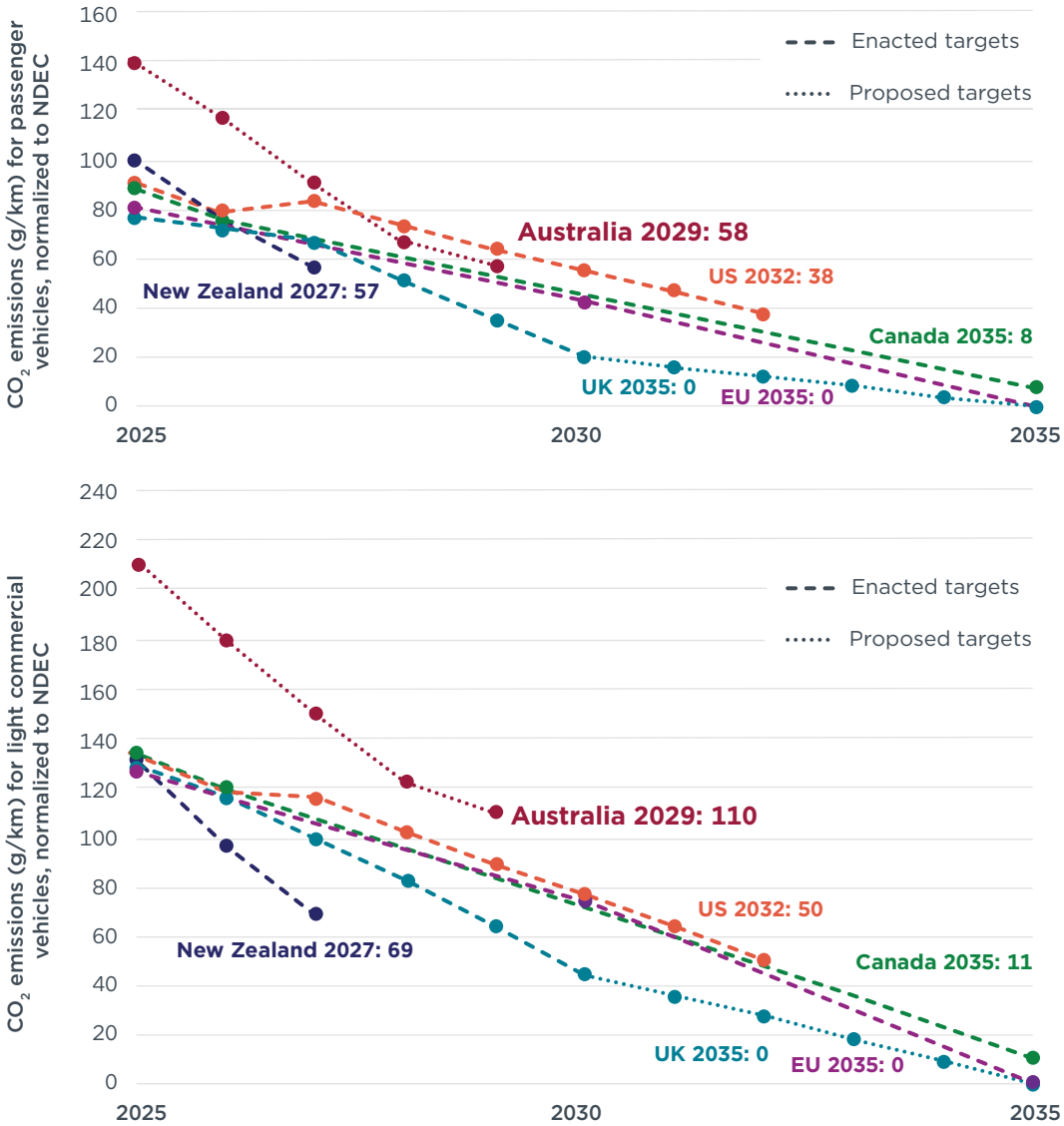
8 Australian Government, "The Australian New Vehicle Efficiency Standard Impact Analysis."

COMPARISON WITH OTHER MARKETS

Figure 1 compares Australia's CO_2 target trajectories for new PVs and LCVs with trajectories in other major vehicle markets: Canada, the European Union, New Zealand, the United Kingdom, and the United States. All targets are converted to NEDC-equivalent CO_2 emission values using the ICCT's cycle conversion factors.[9]

Figure 1

CO_2 emission targets for light-duty vehicles in major global vehicle markets (normalized to New European Driving Cycle-equivalent CO_2 emissions)



Note: The UK fleet-average targets were estimated based on non-zero-emission vehicle CO_2 emissions and its zero-emission vehicle mandate. The Canada 2035 target was estimated based on Canada's 2035 zero-emission vehicle mandate.

Source: https://theicct.org/pv-fuel-economy/

9 Jörg Kühlwein, John German, and Anup Bandivadekar, "Development of Test Cycle Conversion Factors among Worldwide Light-duty Vehicle CO_2 Emission Standards" (International Council on Clean Transportation, 2014), https://theicct.org/publication/development-of-test-cycle-conversion-factors-among-worldwide-light-duty-vehicle-co2-emission-standards/; ZifeiYang, "Improving the conversions between the various passenger vehicle fuel economy/CO_2 emission standards around the world," *ICCT Staff blog*, December 3, 2014, https://theicct.org/improving-the-conversions-between-the-various-passenger-vehicle-fuel-economy-co2-emission-standards-around-the-world/.

The annually tightening NVES targets are stringent enough to allow for average annual emission reductions of about 16% for PVs and 12% for LCVs from 2025 to 2029, although the trajectories flatten somewhat in the end year 2029. The limits are generally weaker than those in other markets because Australia's standards start from a much higher emissions level.

NVES targets for PVs catch up with the U.S. NEDC-equivalent targets by 2028, but the LCV targets are consistently weaker than the U.S. targets. The European Union and United Kingdom have the most ambitious and longer-term targets of 0 gCO_2/km target or 100% zero-emission sales requirement by 2035. That the 2025–2029 NVES targets are far from those in the other markets means that Australia will need to aim for more ambitious targets for 2030–2035 to catch up and be on track to meet decarbonization goals by 2050.

ANALYZING NVES

The regulation has many elements that reflect the best practices in other leading markets. It also contains some areas for improvement that could be addressed in the 2026 review process.

Strengths

- *Emissions reduction of 20 million tonnes through 2030.* Based on the regulatory impact analysis, the standards will significantly reduce CO_2 emissions by about 61% for PVs and 48% for LCVs in 2029, compared with the projected 2024 levels.[10] This could lead to cumulative CO_2 emissions reduction of 20 million tonnes through 2030 and 321 million tonnes through 2050.
- *No weakening through credits.* The standards exclude any extra credits related to air-conditioning, super credits for electric vehicles (EVs) or plug-in hybrids, and technologies that are mainly active outside the type-approval test cycle, often referred to as off-cycle or eco-innovation credits. This is in line with the latest developments in other major markets, including China, the European Union, South Korea, and the United States, which have all either already phased out or will be phasing out EV super credits and/or other CO_2 credits in the next few years.[11] Years ago, when the leading markets first introduced emission standards, these credits were intended to incentivize early uptake of low-emission technologies and technologies that resulted in vehicle emission reductions that were not reflected in the test procedure. As most of the technologies are now widely available in the global market or required by other laws, having such credits could potentially introduce the risk of double-counting or over-crediting the benefits, which affects the effectiveness of the standards.
- *Benefits greatly outweigh the costs.* The regulatory impact analysis estimated that from 2025 through 2050, the total benefits, valued at AU$126.6 billion, are more than three times larger than total cost of compliance, estimated to be AU$40.6 billion. These benefits include AU$95 billion in fuel savings for consumers and AU$5 billion in public health benefits, among other items. We estimate that the NVES will help Australians spend nearly AU$1,000 less on fuel costs per new car in 2029, compared with the fuel costs in 2024.[12]

10 "The Australian New Vehicle Efficiency Standard Impact Analysis."

11 International Council on Clean Transportation, "Passenger Vehicle Greenhouse Gas Emissions and Fuel Consumption," updated April 2024, https://theicct.org/pv-fuel-economy/.

12 We calculated the fuel costs for 2024 and 2029 by multiplying the respective fuel consumption (l/100 km) values with fuel price ($/l) and annual vehicle-kilometers traveled (VKT) per car (km/car). Fuel consumption values were converted from the gCO_2/km values (projected for 2024 and target value for 2029), and all input values were taken from the final impact analysis report: fuel price = AU$2.24/l, and annual VKT = 11,340 km/car.

» *Vision for switch to the Worldwide harmonized Light-vehicles Test Procedure (WLTP).* Australia's current NEDC-based type-approval procedure will move to WLTP, which is more representative of CO_2 emissions generated during real-world driving.[13] The transition is expected to happen to meet the recent Euro 6d requirement for criteria pollutants emission standards, to be implemented from December 2025 (for new model vehicles) to July 2028 (for all vehicle models).[14]

Opportunities for improvement

» *Pathway to zero-emission.* To be in line with Australia's 2050 decarbonization goal and catch up with other major vehicle markets, the post-2029 targets need to get 0 gCO_2/km or 100% zero-emission vehicle sales by 2035 at the latest.[15]

» *Regulate SUVs under the PV class.* Under the NVES, certain heavy SUVs are subject to the less-stringent targets of the LCV class, and these are nearly 20% of all new SUVs.[16] This could incentivize a shift to heavy SUVs, and thus affect the overall effectiveness of the standards.[17] A similar vehicle classification in the United States led to the market share of truck SUVs increasing from 2% in 1975 to 44% in 2022; this resulted in higher fleetwide fuel consumption and emissions than would have otherwise been possible.[18] Following the approach of Europe and China and regulating all SUVs as PVs would avoid a harmful shift in the fleet structure.

» *Monitor real-world emissions.* Australia is already implementing on-board fuel and energy consumption monitoring requirements for all new vehicles starting from December 2025, under the recently adopted Euro 6d standards for criteria pollutants.[19] The same monitoring data could be used for the purpose of NVES as well, to monitor real-world CO_2 emissions and electric energy consumption performance. Measures to counteract a growing gap between type-approval and real-world CO_2 emissions would strengthen the regulation.

» *Tighten the standards through adjusted limit curves.* To tighten the targets, the slope and reference mass in the standard curves could be gradually lowered over the years, rather than using vehicle fleet data from 2 years prior. A steeper slope makes targets more lenient for heavier vehicles, which potentially encourages import of heavier vehicles. The slope for the 2025–2026 standard curve for PVs is much steeper than in other countries that also have a mass-based emissions limit curve.[20]

» *Consider lowering mass breakpoints.* The lower breakpoint for PVs in the NVES is 1,500 kg, which means vehicles lighter than this would be subject to the same lenient targets. As 1,500 kg is only 13% lower than the average mass of the PV fleet, a potentially large share of PVs with mass below 1,500 kg are not incentivized to adopt advanced technologies and reduce CO_2 emissions.

13 "The Australian New Vehicle Efficiency Standard Impact Analysis."

14 Vehicle Standard (Australian Design Rule 111/00 – Advanced Emission Control for Light Vehicles) 2024, Fed. Reg. F2024L00446 (April 15, 2024), https://www.legislation.gov.au/F2024L00446/latest/text.

15 Tanzila Khan, Zifei Yang, Arijit Sen, and Josh Miller, "Fuel Efficiency Standards to Decarbonize Australia's Light-Duty Vehicles" (International council on Clean Transportation, 2022), https://theicct.org/publication/pv-australia-co2-standards-dec22/.

16 Australian Government, Department of Infrastructure, Transport, Regional Development, Communications and the Arts, "New Vehicle Efficiency Standard Fact Sheet" (March 2024), https://www.aeva.asn.au/files/3056/.

17 Tanzila Khan and Zifei Yang, "Light-Duty Vehicle Classification for Australia's Fuel Efficiency Standards" (International Council on Clean Transportation, 2023), https://theicct.org/publication/pv-australia-vehicle-classification-apr23/.

18 U.S. Environmental Protection Agency, "The 2023 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975" (2023), https://www.epa.gov/automotive-trends.

19 Vehicle Standard (Australian Design Rule 111/00 – Advanced Emission Control for Light Vehicles) 2024.

20 Tanzila Khan, Jan Dornoff, and Zifei Yang, "ICCT Comments on the Australian New Vehicle Efficiency Standard Consultation Impact Analysis. (ICCT, 2024) https://theicct.org/comments-on-the-australian-new-vehicle-efficiency-standard-consultation-impact-analysis-mar24/.

SUMMARY

The first-ever CO_2 standards regulation for Australia's light vehicles is a historic milestone. Starting in 2025, this will help to put Australia on track toward its 2050 decarbonization goal. It will also complement the national EV strategy and ensure that the latest technology and high-efficiency vehicles are brought to the Australian market. Australian consumers will receive substantial benefits via savings on fuel costs per vehicle. The NVES regulation has many strengths and could still be improved and strengthened in the first review, which is scheduled for 2026.

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