Australian Automobile Association

# AAA Submission on the Australian New Vehicle Efficiency Standard (NVES)

## Introduction

The Australian Automobile Association (AAA) is pleased to provide a submission to the *Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis.* The AAA is the nation's peak motoring body, representing Australia's state-based motoring clubs and their 9.3 million members. Its constituent clubs are the NRMA, RACV, RACQ, RAA, RAC, RACT and the AANT.

The AAA is an apolitical and technology-neutral advocate for federal transport policy that improves safety, equity, and sustainability. The AAA regularly commissions research and develops in-depth analysis of issues affecting transport systems, including affordability, road safety, and vehicle emissions.

As a technology-agnostic advocate, the AAA supports the introduction of a vehicle efficiency standard for new light vehicles. The AAA is firm in its support for an Australian fuel efficiency standard as a mechanism to ensure the supply of latest technology (and lower emission) vehicles to the Australian market. The AAA accepts that there will be costs associated with a standard and believes these need to be credibly assessed and quantified, and balanced against anticipated benefits. The AAA wishes to ensure that any regulatory measure is carefully considered and introduced in a way that minimises costs and maximises choice and benefits for motorists.

The AAA and its members want Australians in the best possible position to adopt new technologies and choose the transport technology options that best suit their lifestyle, household budget, and commuting needs. Owning and operating a car in Australia with its unique driving conditions should remain affordable.

The AAA thanks the Department of Infrastructure, Transport, Regional Development, Communications and the Arts for the opportunity to provide a submission.

**Mailing Address:** GPO Box 1555, Canberra ACT 2601 | **Address:** 103 Northbourne Ave, Canberra ACT 2601 | **P** 02 6247 731 **T** @aaacomms **W** www.aaa.asn.au

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## AAA Feedback

The AAA appreciates the opportunity to provide feedback on the *Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard Consultation Impact Analysis*[1]. Whilst the website states that the document was released for consultation on 4 February 2024, the AAA has noted that the document available on the www.cleanercars.gov.au website has undergone revision at some point during the consultation period, but there is no mention of this on the website and no description of the changes, nor does there appear to be any document revision control marking on the papers. This submission refers to the version available on the website as at 23 February 2024.

The AAA notes that the Government's preferred option for a New Vehicle Efficiency Standard (NVES), identified in the consultation paper, would commence "*in full on 1 January 2025*" and "*seeks to catch up with the US around 2028 and then match the stringency of these standards, while not seeking to go beyond these standards*".

It is important to get the design of the new vehicle efficiency standard right, including the headline targets and timeframes. The design of the standard should incentivise vehicle brands to go beyond business as usual but needs to be achievable. A standard that is too weak will not deliver the benefits of newer technology vehicles and reduced greenhouse gas emissions. Conversely, a standard that is too stringent and unable to be achieved will impose financial penalties on vehicle brands with significant impacts on consumers through restriction of vehicle model choices and/or costs and the anticipated emissions reduction will also not be delivered.

### Support for a New Vehicle Efficiency Standard

The AAA supports the introduction of an Australian new vehicle efficiency standard as a mechanism to ensure the supply of latest technology (and lower emission and latest safety technology) vehicles to the Australian market and continues to advocate for the development of a standard designed for the Australian market.

The AAA also supports the elements of the Government's preferred CO2 standard as appropriate elements to be included in a standard. However, in the absence of the underlying modelling, the AAA is unable to offer a considered view on the timing and headline targets proposed as it is unclear from the Consultation Impact Analysis how catching up with and matching the US standards has been determined, given that:

- the US EPA and NHTSA/CAFE standards include pickup trucks with a gross vehicle weight rating up to 8,500 lb (3.86t), whereas the Government's preferred standard has an upper mass limit of 4.5t for light commercial vehicles and hence would include vehicles in the Australian standard that are not included in the US standard;

[1] https://www.infrastructure.gov.au/sites/default/files/documents/cleaner-cheaper-to-run-cars-the-australian-new-vehicle-efficiency-standard-consultation-impact-analysis-february2024.pdf accessed 23 February 2024.

- the US standard groups larger 4WD SUVs with pickup trucks to apply the limit value curve, whereas the Government's preferred standard groups all SUVs with passenger cars, which are subject to a more stringent headline target;
- the US EPA standard allows pooling, supercredits, off-cycle credits and air conditioning credits making it easier for vehicle manufacturers to meet the specified headline targets, whereas the Government's preferred standard does not allow any of these yet appears to keep the same headline targets;
- the US uses a different laboratory test procedure to determine the CO2 emissions than that used in Australia;
- the US standard uses vehicle footprint as the vehicle attribute, whereas the Government's preferred standard uses mass in running order;
- the US headline targets have been a steady reduction in emissions since 2016, whereas the Government's preferred standard has a much sharper reduction over a short timeframe from 2025 to 2029;
- the US has not locked in its headline targets beyond 2026 and recent media reports suggest that the proposed US targets beyond 2026 are being reconsidered by the Biden administration, whereas the Government's preferred standard has targets out to 2029;
- unlike Australia where no federal funding is envisaged, the US has a significant funding package through the Inflation Reduction Act[2] providing:
    - up to USD$7,500 credit per vehicle for North American assembled plug-in hybrid and electric vehicles;
    - USD$3 billion to the Advanced Technology Vehicle Manufacturing Loan Program for loans to manufacture clean vehicles and their components in the United States;
    - USD$2 billion to the Domestic Manufacturing Conversion Grants, which will fund manufacturers' retooling of production lines for clean vehicles;
    - USD$3 billion for electrifying the United States Postal Service fleet, including vehicles and charging infrastructure;
    - USD$1 billion to states, municipalities, Indian tribes, or non-profit school transportation associations to replace class 6 and 7 heavy-duty vehicles with clean EVs;
    - Commercial Clean Vehicles Credit to defray up to 30 percent of the cost of replacing ICE commercial vehicles with electric vehicles;
    - a new Advanced Manufacturing Production Credit for the domestic production and sale of qualified components for clean energy projects, including batteries and critical minerals;
    - a credit of up to USD$4,000 per vehicle under the Previously-Owned Clean Vehicles Credit to support used vehicle buyers who choose to go electric.
- nineteen US states offer an additional incentive for electric vehicles beyond the federal credit ranging from a $1,000 incentive in Alaska and Delaware to a $7,500 credit in

[2] https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf accessed 23 February 2024.

California, Connecticut, and Maine, whereas Australian states are winding back on vehicle purchase incentives.

It is unclear from the Consultation Impact Analysis how the achievability of the Government's preferred option has been modelled and whether factors such as the extent of emissions reduction and the very short timeframe have been considered. The Consultation Impact Analysis reports fleetwide effects but does not detail whether the Government has undertaken the quantitative analysis required to understand how different vehicle categories, vehicle types and vehicle models are to be affected, or the relative price shifts between technologies that are going to result. This is an important consideration to identify the impact on different consumers and the winners and losers.

Work from The Centre for International Economics (The CIE)[3] commissioned by the AAA indicates that the statement in the Consultation Impact Analysis that "*there are higher BCR outcomes for regional and rural locations*" resulting from greater fuel savings due to greater distances driven does not recognise the potential constraints on vehicle demand for this group. Previous consumer choice modelling undertaken by The CIE found that consumers in regional areas value towing and battery range more highly than other consumers and that consumers in urban areas are likely to switch to EVs before consumers in regional areas, holding all other characteristics constant. Urban consumers have a higher willingness to pay for an EV than regional consumers.

The AAA agrees that it is valuable to learn from other countries that have already implemented new vehicle efficiency standards when developing a standard for Australia. However, caution needs to be exercised when assuming that success of a policy in one jurisdiction will translate into another.

The academic literature[4] notes that the process of transferring policy to one jurisdiction from another jurisdiction may involve:

- **copying**, which involves direct and complete transfer;
- **emulation**, which involves transfer of the ideas behind the policy or program;
- **combinations**, which involve mixtures of several different policies; and
- **inspiration**, where policy in another jurisdiction may inspire a policy change, but where the final outcome does not actually draw upon the original.

The literature[5] also explains possible reasons for policy failure including:

- **uninformed transfer**, where the borrowing jurisdiction may have insufficient information about the policy/institution and how it operates in the jurisdiction from which it is transferred;

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[3] The CIE, *Proposed New Vehicle Efficiency Standard*, March 2024.

[4] Dolowitz, D. P., & Marsh, D. (2000). Learning From Abroad: The Role of Policy Transfer in Contemporary Policy-Making. *Governance: An International Journal of Policy and Administration*, *13*(1), 5-23.

[5] Dolowitz, D. P., & Marsh, D. (2000). Learning From Abroad: The Role of Policy Transfer in Contemporary Policy-Making. *Governance: An International Journal of Policy and Administration*, *13*(1), 5-23. Stone, D. (2017). Understanding the transfer of policy failure: bricolage, experimentalism and translation. *Policy & Politics*, *45*(1), 55-70.

- **incomplete transfer,** where crucial elements that make the policy "successful" are not transferred;
- **inappropriate transfer,** where insufficient attention is paid to the differences between the economic, social, political and ideological contexts in the "transferring" and "borrowing" jurisdictions.

The new vehicle efficiency standard needs to be right for Australia. As noted in the Government's April 2023 consultation paper *The Fuel Efficiency Standard – Cleaner, Cheaper to Run Cars for Australia*[6] *"immediately adopting an annual emissions ceiling from another market would likely disrupt the Australian vehicle market by not providing sufficient time for suppliers to establish a pipeline to Australia of vehicles fitted with more efficient ICE technologies and LZEVs"* (p. 15). It is unclear from the Consultation Impact Analysis how this has been addressed.

The AAA also wishes to understand how the consumer costs of the Government's preferred standard have been modelled. Current vehicle pricing indicates that vehicles fitted with more technology features and newer technology features, come at an increased purchase price. Hybrid and electric drivetrains are more expensive than internal combustion engines. For the headline targets to be met in the short five-year timeframe proposed, consumer purchasing patterns will need to shift significantly to purchase much greater volumes of high technology, low emission vehicles, presumably at greater cost than what they may have otherwise chosen to purchase. This does not align with the statement in the Consultation Impact Analysis that *"Evidence to date consistently finds no purchase price impact, or a negligible purchase price impact, for consumers"* and The CIE also points out that the evidence in the Consultation Impact Analysis to support this statement is not conclusive due to a lack of controls for the reference case with which the prices under the standard are compared.

The Consultation Impact Analysis says that the assumption regarding fuel quality and Euro 6d is *"Dynamic adjustment of fuel efficiency gains with adoption of fuel quality standards and Euro 6d."* (p82). However, it is unclear what this means and whether motorists are expected to be using 95RON premium unleaded petrol or 91RON regular unleaded petrol and the assumptions around the costs and volumes of these fuels in the cost benefit analysis.

**Average age of vehicles**

The AAA would like to see an assessment of the NVES on the average age of light vehicles. The average age of a passenger vehicle in Australia in 2023 is 11 years[7] and has increased from 9.8 years in 2018. The average age of light commercial vehicles in 2023 is 11.3 years.

In 2017 the AAA commissioned Economic Connections (ECON), with Pekol Traffic and Transport and Monash University Accident Research Centre[8] to analyse the road safety and environmental benefits of a one-year reduction in the average age of Australia's light vehicle fleet. This work found that reducing the average age of the Australian light vehicle fleet by one year over a period of four

[6] https://www.infrastructure.gov.au/sites/default/files/documents/consultation_paper_-_australias_fuel_efficiency_standard.pdf accessed 23 February 2024.

[7] https://www.bitre.gov.au/sites/default/files/documents/BITRE-Road-Vehicles-Australia-January-2023.pdf accessed 23 February 2024.

[8] https://www.aaa.asn.au/wp-content/uploads/2018/03/AAA-ECON_Benefits-of-reducing-fleet-age-full-report_Dec-2017.pdf accessed 23 February 2024.

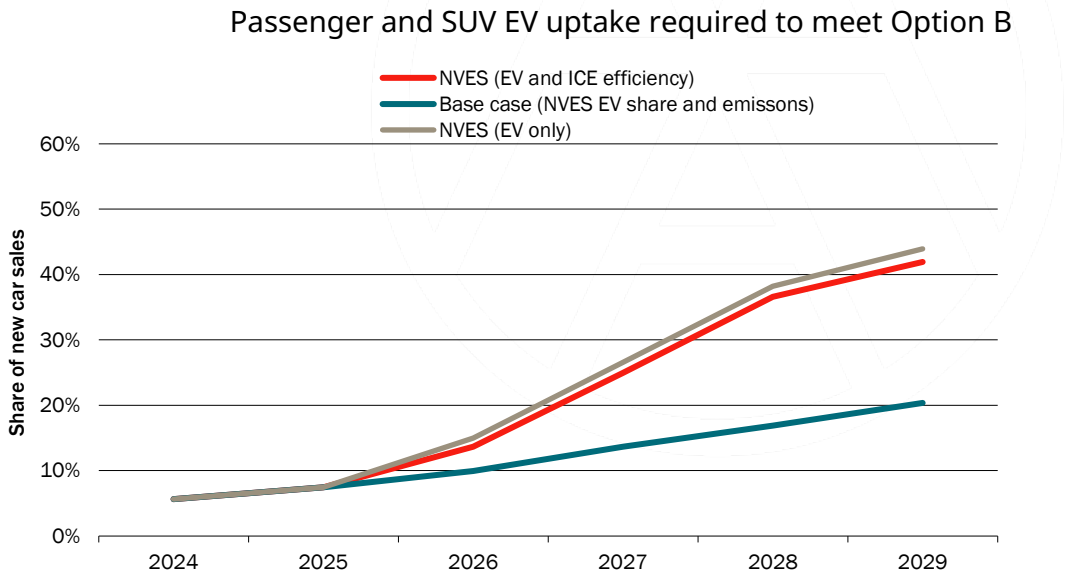
years would deliver $19.7 billion in safety, economic and environmental benefits over the 20 year analysis period.

Thus, the impact of a new vehicle efficiency standard on the average age of Australia's light vehicle fleet is an important consideration and may deliver increased or reduced economic benefits that have not been quantified as part of the Consultation Impact Analysis.

**Impacts on Different Segments in the New Vehicle Market**

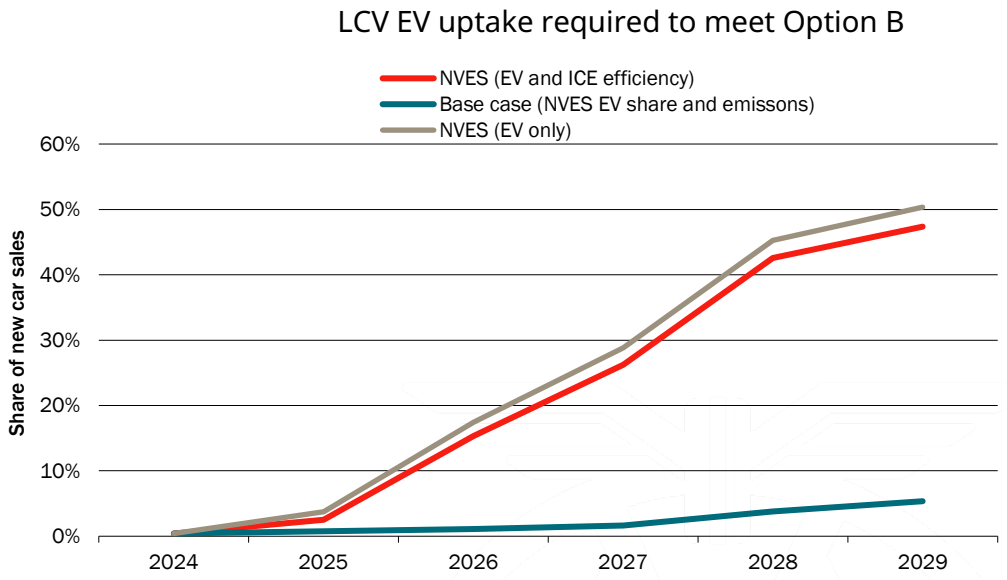
The Consultation Impact Analysis does not outline how the new vehicle market is expected to be distorted and the anticipated impact on different types of vehicles in the market. The AAA expects that the introduction of the NVES will impact different segments of the market differently and therefore create "winners" and "losers". This is not evident in the paper.

Modelling from The CIE commissioned by the AAA shows that the Government's preferred new vehicle efficiency standard would require more than 40 per cent of new passenger vehicles and around 50 per cent of new light commercial vehicles to be electric vehicles in 2029. As shown in the charts below, The CIE modelled the base case, a scenario where electric vehicle uptake increased to achieve the emissions target, and a scenario that assumed ICE vehicles had twice the efficiency improvement assumed in the Consultation Impact Analysis and electric vehicle uptake increased to achieve the emissions target.




Source: The CIE

The AAA notes that all SUVs, including larger 4WD SUVs, are included in the passenger vehicle category for the Government's preferred standard. The extent to which other passenger vehicles can offset the emissions from off-road 4WD SUVs, or the ability for off-road 4WD SUVs to change to electric vehicles remains unclear from the Consultation Impact Analysis.




Source: The CIE

The AAA notes that vehicle manufacturers are already producing electric pick-up trucks such as the Ford F-150 Lightning, LDV eT60 and Tesla Cybertruck. Changing buyer behaviour to purchase such vehicles in greater volumes will be critical. The Consultation Impact Analysis is focussed on supply side measures and the only reference to buyers in the document is to point out the reduced fuel costs and savings that an average new car buyer can expect.

The LDV eT60 is currently the only electric ute available in Australia and 15 of these vehicles were sold in the fourth quarter of 2023.

In the US in 2023, Ford USA sold 1,995,912 vehicles[9] of which 1,789,561 were internal combustion engine vehicles, 133,743 were hybrid and 72,608 were electric. In 2023, the Ford F-Series was America's best-selling vehicle for the 42nd year in a row and 750,789 F-series pickup trucks were sold, of which 24,165 were the electric F-150 Lightning. According to the US EPA[10], in 2021, 507,000 Ford pickup trucks were subject to the EPA's light duty vehicle greenhouse gas standard, whereas Ford sold 834,017 pickup trucks in the same year[11]. The Gross Vehicle Weight Rating of some of the Ford pickup trucks means that they are not subject to the US standard and 40 per cent of all Ford pickups and 45 per cent of Ford F-series pickups are not subject to the US standard.

US deliveries of the Tesla Cybertruck commenced on 30 November 2023 and there is little information on sales volumes or trends at this time.

Ford Australia has a plug-in hybrid Ranger ute coming to the Australian market in 2025[12]. Official fuel consumption figures are not yet available, but the electric range is stated as "over 45km".

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[9] https://media.ford.com/content/dam/fordmedia/North%20America/US/2024/01/04/Q4%202023%20Sales%20Final.pdf accessed on 23 February 2024.

[10] https://www.epa.gov/automotive-trends/explore-automotive-trends-data#DetailedData accessed 23 February 2024.

[11] https://media.ford.com/content/dam/fordmedia/North%20America/US/2023/01/05/December%202022%20Sales%20Release%20Final.pdf accessed 23 February 2024.

[12] https://www.ford.com.au/showroom/electric/phev/ranger/ accessed on 23 February 2024.

Transport and Environment[13] and The International Council on Clean Transportation[14] have both cautioned that plug-in hybrid vehicles may not deliver the emissions reduction anticipated by the laboratory results when driven in battery, engine or battery charging mode and that, in-service, these vehicles may drive fewer kilometres on electricity than anticipated. This may impact the cumulative abatement estimated to be achieved by a new vehicle efficiency standard.

**Required shifts in vehicle pricing to drive necessary changes in buyer behaviour**

As part of the work commissioned by the AAA, The CIE has used previously-undertaken consumer choice modelling[15] (that quantified how consumers value different vehicle attributes and their respective willingness to pay for different technologies and attributes) and used this to calculate the change in vehicle pricing that would be required to incentivise consumers to purchase the mix of vehicles necessary to comply with the Government's preferred standard.

The CIE assumed that under the base case, price parity between electric and internal combustion engine vehicles would be achieved by 2029 but the consumer choice modelling indicates that the value consumers ascribe other vehicle attributes means greater price adjustments will be required to shift consumer vehicle buying behaviour to achieve compliance with Option B.

| Prices required to achieve targets under different emission standard scenarios – 2029 | | Base case | Option B |
|---|---|---|---|
| | | $ '000 | $ '000 |
| Passenger | ICE | 33.7 | 58.6 |
| | EV | 33.7 | 27.9 |
| SUV | ICE | 46.9 | 80.8 |
| | EV | 46.9 | 33.6 |
| LCV | ICE | 50.2 | 157.8 |
| | EV | 50.2 | 15.5 |

Source: The CIE

The CIE's modelling suggests that prices of electric vehicles will need to be reduced to incentivise more buyers to purchase them, whereas ICE vehicles will need to be disincentivised through increased prices. Internal cross-subsidisation of products within a vehicle brand may be used to achieve these outcomes and the extent of these price distortions is relative to the stringency of the headline targets. In 2029, to reach market shares required to comply with the headline targets, relative prices would need to adjust dramatically or EV technology would need to improve significantly.

It is important to note that the CIE's work is **not a prediction of price changes** that will flow from the Government's preferred approach. Rather, it is analysis that shows the relative price changes for different technologies required to make the Government's preferred targets achievable.

The analysis suggests the targets will be unlikely to be met without additional consumer and/or producer subsidies, as well as significant enhancements to Australia's EV recharging network.

[13] https://www.transportenvironment.org/discover/plug-hybrids-new-emissions-scandal-tests-show-higher-pollution-claimed/ accessed 23 February 2024.

[14] https://theicct.org/wp-content/uploads/2021/06/PHEV-FS-EN-sept2020-0.pdf accessed 23 February 2024.

[15] https://www.thecie.com.au/publications-archive/demand-for-electric-vehicles accessed 1 March 2024.

The Consultation Impact Analysis states on page 18: *"Evidence to date consistently finds no purchase price impact, or a negligible purchase price impact, for consumers. The experience in the US and the EU, which have long standing fuel efficiency regulations, and New Zealand, which implemented an ambitious fuel efficiency standard in 2023, doesn't show a vehicle purchase price increase".*

However, the Consultation Impact Analysis is silent on financial incentives provided to consumers and other economic factors in those jurisdictions that support the reduction in emissions targeted by their vehicle efficiency standards. For example, in Europe high fuel taxes and high fuel prices encourage consumers to purchase low fuel consumption vehicles and a wide variety of state-based subsidies and incentives are available[16]. The US has its Inflation Reduction Act as outlined earlier.

The Consultation Impact Analysis is also silent on the rate of reduction of headline targets in the other jurisdictions and whether the much greater rate of reduction in the Government's preferred standard may impact the applicability of the overseas experience to the Australian scenario.

**Timeline/commencement date**

The AAA understands to enable light vehicle emissions to be reduced as quickly as possible there is an urgency for the introduction of the NVES and supports the introduction of a standard at the earliest feasible opportunity, minimising the impact on the market.

The introduction date of 1 January 2025 appears rather ambitious and there are a number of factors that may threaten the viability of the planned start date. Certainty for industry will be important in providing certainty for consumers in the new vehicle market.

As stated in *The Fuel Efficiency Standard – Cleaner, Cheaper to Run Cars for Australia*, *"Government best practice requires a period of time for business to implement new policies and for government to undertake any targeted education on how to comply with new legislation. A compliance system needs to be in place, along with a way of effectively regulating a new FES. Importantly, we need to ensure that any new costs to suppliers are not simply passed on to consumers, nullifying the objective of providing affordable LZEVs to the market"* (p. 25).

Advice from the Department of Infrastructure, Transport, Regional Development, Communications and the Arts indicates that the Register of Approved Vehicles (RAV) has been under consideration as the tool for counting the number of vehicles supplied to the market by a vehicle brand. The AAA understands that the RAV is legislated as part of the Road Vehicle Standards Act 2018 and its suitability to support the regulator for a new vehicle efficiency standard is unclear. The RAV does not currently collect information on the mass in running order or CO2 emissions of a vehicle and regulatory change may be required to effect this. Furthermore, using the RAV to count supply to the market may give an incorrect picture, as vehicles listed on the RAV may not be sold and may be sitting with dealerships for extended periods of time. This could have a perverse outcome of vehicle brands complying with the standard but dealerships holding stock of vehicles that have been counted but not sold.

These issues will require consideration and resolution prior to the commencement date.

[16] https://www.acea.auto/files/Electric_cars-Tax_benefits__purchase_incentives_2023.pdf accessed 23 February 2024.

**Issues related to the New Vehicle Efficiency Standard**

The AAA notes that, as a result of the NVES accelerating the deployment of electric vehicles, there will be a need for more urgent consideration and action regarding:

- the rollout of sufficient charging infrastructure to support the increased uptake in electric vehicles and planning and management of the electricity grid;
- planning and support for a trained and skilled workforce capable of servicing, repairing and maintaining the fleet of electric vehicles;
- the reform of motoring taxes that will be required as a consequence of increased uptake of electric vehicles.

These are all issues of keen interest to consumers.

The first two relate directly to the user experience in operating an electric vehicle and the ability to recharge the battery and maintain the vehicle in a roadworthy condition. Failure to support these necessary activities will leave consumers stranded and the AAA foresees a role for the Australian Government in coordinating, planning and funding initiatives to help resolve these.

The need for reform of motoring taxation will become more acute as the number of electric vehicles continues to increase. Current federal budget projections show an increase in net fuel excise in the forward estimates as excise rates increase through indexation relative to the Consumer Price Index and the total number of vehicle kilometres travelled increases in proportion to Australia's transport task. However, the increased fuel excise revenue will be contributed by a diminishing proportion of vehicle drivers as the proportion of electric vehicles increases. The inequity of this situation is exacerbated by the fact that those who can afford to buy an electric vehicle will not pay excise, whereas those who cannot afford to buy an electric vehicle, or those for whom an electric vehicle is not suited to their needs, will continue to pay excise.

Developing technologies such as e-fuels (synthetic fuels produced using zero emission electricity) should be monitored for commercial viability and cost effectiveness as these have the potential to provide existing and future ICE vehicles with the possibility to operate with net zero emissions. Should these become commercially viable, this should be incorporated into the regular reviews of the NVES headline targets.

## Conclusion

The AAA is committed to reducing the environmental impact of transport and supports a standard designed specifically for the Australian light vehicle fleet, introduced over a reasonable timeframe without unduly restricting choice or increasing costs to consumers.

A well-designed NVES will increase supply of new technology vehicles to Australia and provide consumers with greater choice and improve road safety. But a poorly designed NVES will not achieve theses outcomes.

The AAA congratulates the Government on committing to the development of a NVES and encourages the Government to be more transparent with its modelling and its quantification of the impacts of its preferred option on different vehicle categories, vehicle types and vehicle models. Before a NVES is legislated, the AAA would like different vehicle buyers to be able to fully understand the positive and negative impacts of the standard on their future vehicle choices.

The AAA continues to advocate for MC category passenger vehicles to be grouped with light commercial vehicles when segmenting vehicles for the two headline targets and believes that this is a more appropriate option for the Government to consider.

The AAA is very concerned by the apparent lack of Government analysis regarding the achievability of its preferred targets, particularly those relating to the light commercial fleet. Given the global lack of affordable and ready alternatives for existing popular vehicles, it is incumbent on the Government to provide robust analysis showing how it sees its headline targets for light commercial vehicles being met. As proposed, the NVES will drive significant change to Australia's vehicle fleet over the coming years, and consumers deserve to know how the Government understands or expects this policy will influence the vehicles that will (and will not) be available, and their future prices.

The AAA also encourages the Government to take a more active leadership role in addressing issues relating to the acceleration of EV uptake, including charging infrastructure, grid readiness, availability of a skilled and trained workforce to service and maintain EVs, and reform of motoring taxation.

REPORT

# Proposed New Vehicle Efficiency Standard

Impacts on consumers, vehicle markets, emissions and fuel excise

*Prepared for*
*Australian Automobile Association*

*4 March 2024*

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**CANBERRA**
Centre for International Economics
Ground Floor, 11 Lancaster Place
Canberra Airport ACT 2609

Telephone +61 2 6245 7800
Facsimile +61 2 6245 7888
Email cie@TheCIE.com.au
Website www.TheCIE.com.au

**SYDNEY**
Centre for International Economics
Level 7, 8 Spring Street
Sydney NSW 2000

Telephone +61 2 9250 0800
Email ciesyd@TheCIE.com.au
Website www.TheCIE.com.au

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# *Summary*

The Department of Infrastructure, Transport, Regional Development, Communications and Arts (the Department) Commonwealth Government has published a Consultation Impact Analysis, which presents three options for a new vehicle emission standard (NVES).[1]

The NVES is intended to improve the supply and variety of battery electric vehicles (EVs) coming into the Australian market, to help reduce vehicle emissions and fuel costs for Australian Motorists.[2]

This report seeks to identify and quantify the different impacts of an emission standard, with a focus on the impact on consumers, emissions, fuel consumption and fuel excise. The analysis in this report builds on modelling previously undertaken by the CIE for the Australian Automobile Association (AAA).[3] We also provide a discussion around key assumptions driving results in the Department's modelling.

## *This report*

In this report project we model the preferred option (Option B) from the Consultation Impact Assessment.

The modelling undertaken by ACIL-Allen for the Department has not been released in its entirety. We have therefore used our model previously developed for AAA to understand the conclusions of the Department's modelling and key assumptions.

To do this we have:

- calibrated our model to match the base case used in the Department's modelling
- modelled Option B, against this base case. Which has included:
  - Defining the fleet mix required to meet the NVES target under Option B
  - Estimating the price impacts required to change consumer choices, assuming preferences remain unchanged
  - Estimating consumer impacts of these changes
  - Mapping out the impact of achieving Option B on emissions and fuel excise

1 Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February.

2 Department of Climate Change, Energy, the Environment and Water 2023, The National Electric Vehicle Strategy.

3 The CIE 2023, Vehicle emission standards: Impacts on consumers, vehicle markets, emissions and fuel excise, prepared for AAA.

- making observations around key modelling assumptions taken in the Department's analysis.

The remainder of the report is structured as follows:

- Chapter 1 outlines the NVES scenarios modelled by the Department with a focus on the base case and Option B. This includes consideration of how the base case varies from analysis previously undertaken by the CIE for the AAA, and the mix of new vehicle sales required to meet the emissions under Option B.
- Chapter 2 presents modeling results for Option B in terms of impact on:
  - Households, or consumers
  - Emissions
  - Fuel consumption and excise
  - Car markets
- Chapter 3 concludes with observations on modelling assumptions taken by the Department and provides recommendations.

# 1 NVES scenarios modelled

In the following section we outline the base case and the options presented in the Consultation Impact Analysis.

In analysing the proposed policy, we have sought to:

- replicate the base case used in the Department's analysis
- characterise Option B, which is the preferred option from the Consultation Impact Analysis
- determine the EV uptake which would be required to meet the headline target of Option B.

This analysis is limited by the information which was provided in the consultation paper. Where information was not available, we have sought to understand the likely differences.

## The base case

The base case — from the perspective of modelling a NVES — defines what emissions from new vehicle sales would be in the absence of the NVES. This is the extent to which emissions are expected to fall overtime, independent of any additional Government intervention.

This is driven by:

- EV uptake rates
- The assumed emissions from each vehicle type
- The total number of vehicles sales

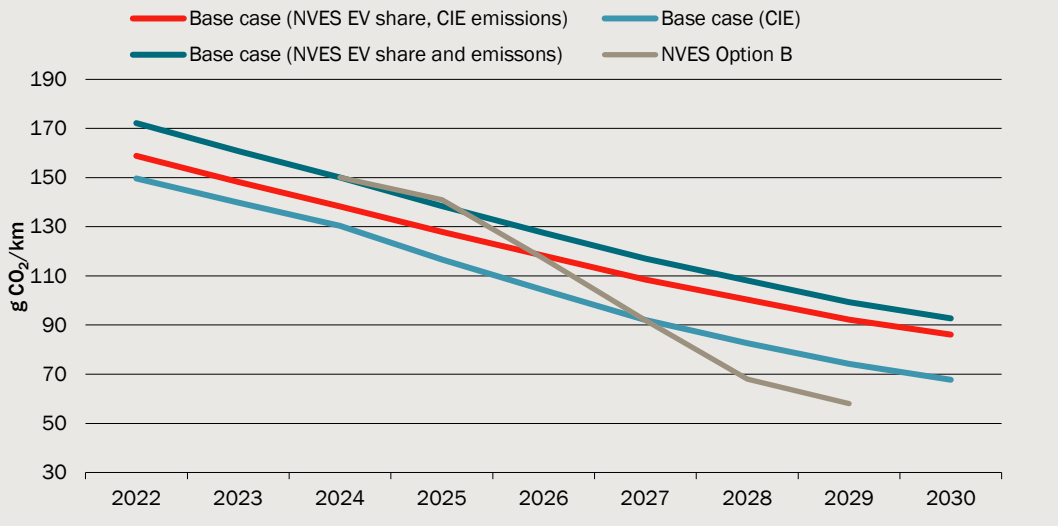
The results presented by the Department provide an incomplete picture of the base case, as the modelling undertaken by ACIL-Allen for the Department has not been published in full.

To account for this, we have calibrated the base case in our model previously developed for AAA to match that of the Consultation Impact Analysis. Where information is not available, i.e., around EV uptake across different vehicle types, we have used our original base case with scaled parameters to match the overall emissions from the Consultation Impact Analysis.

Overall, the NVES base case emissions profile for *passenger vehicles* is more pessimistic (that is, higher emissions intensity) compared to our original base case (chart 1.1). This is driven equally by two factors:

- More rapid uptake of EVs in the FCAI sales projections we used compared to the Department's projections
- Lower emissions per vehicle in our analysis compared with the Department.
  - The Department estimates emissions based on unpublished BITRE data
  - We estimate emissions based on average NTC emissions by vehicle type and model how the composition of vehicle sales impacts on emissions (we back out emission for different vehicle propulsion types using sales data)

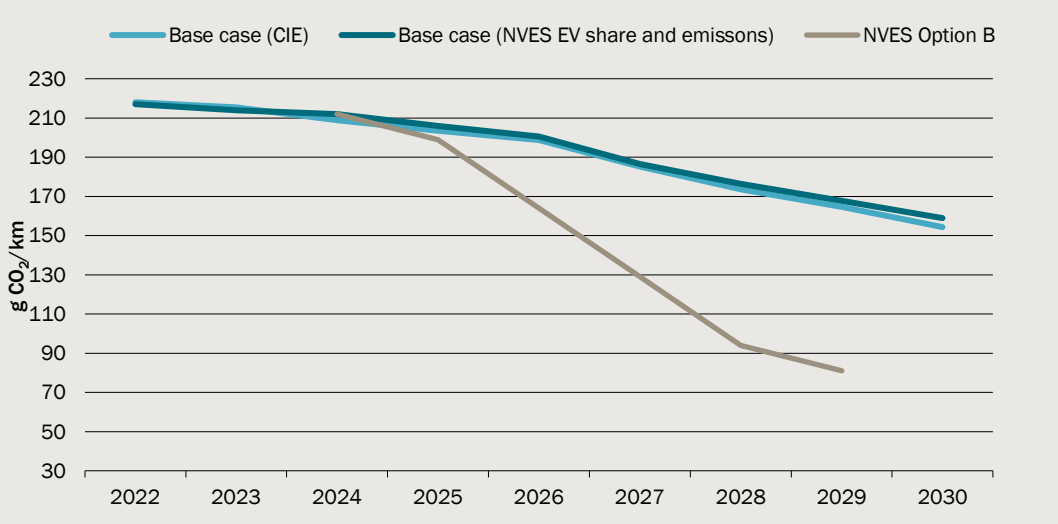
### 1.1 Base case – passenger and SUV




*Data source:* CIE

In contrast, our base case for LCVs is essentially the same as for the Departments base case.

### 1.2 Base case - LCV




*Data source:* CIE

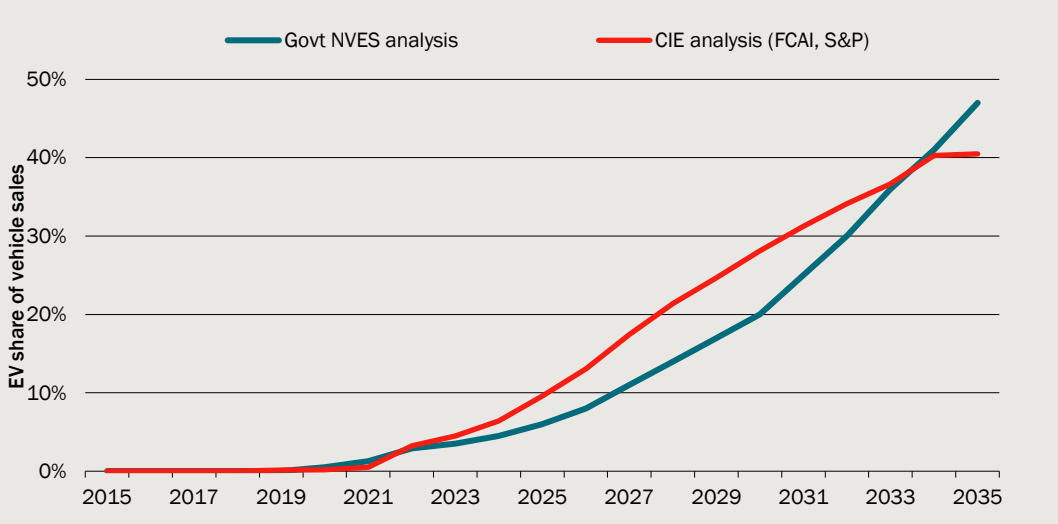
### *EV uptake*

Aggregate EV uptake (across passenger, and SUV and LCVs) is reported in the Consultation Impact Analysis.

There are substantial differences between the baseline EV uptake used by the Department's modelling and the uptake used in the CIE model. The CIE model used projected EV uptake provided by the FCAI, which was prepared by S&P Global Mobility (chart 1.3). The Government's NVES analysis assumes slower initial uptake of EVs compared to the FCAI numbers until 2026, before accelerating and eventually overtaking the FCAI EV sales share by 2034.

FCAI projections are provided to 2035, while the NVES analysis reports uptake to 2050. In the NVES analysis, uptake increase linearly by around 5 percentage points each year between 2031 and 2045, before reaching 100 per cent of the market by 2047.[4]

**1.3 Base case EV uptake – Passenger, SUV and LCV**

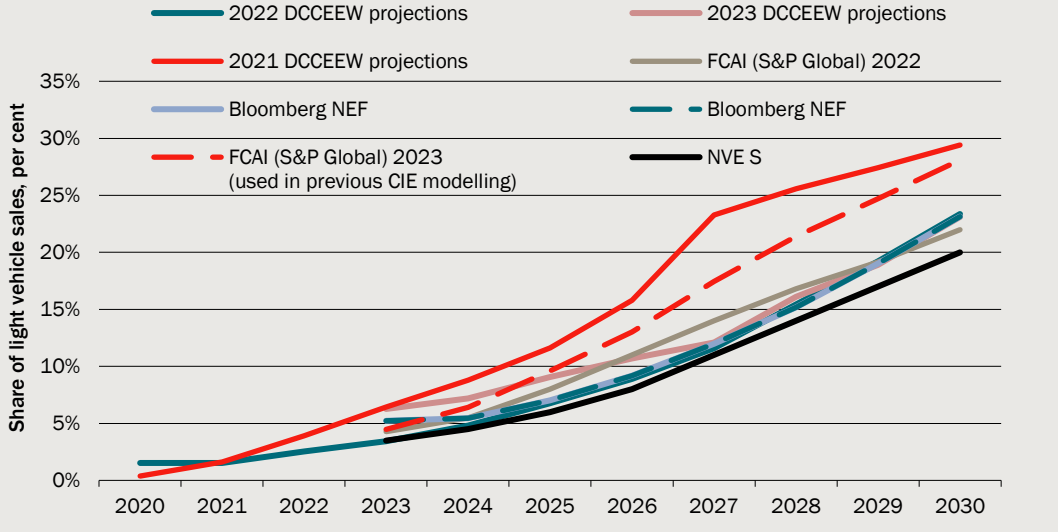



*Data source:* CIE based on FCAI and S&P Global Mobility data; Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February, p. 30.

The EV uptake used by the Department is more conservative than a wide range of previous projections reported publicly, including a range of previous Government estimates (chart 1.4)

4 Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February, p. 30.

### 1.4 Projected share of EVs in light vehicle sales by year




*Data source:* CIE, FCAI, S&P Global Mobility and Department of Climate Change, Energy and Environment and Water 2023, Australia's emissions projections 2022, p. 41; Department of Climate Change, Energy and Environment and Water 2023, Australia's emissions projections 2023, p. 55; Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February, p. 30.

An implication of a pessimistic (low uptake) base case is that given a particular target, lower base case emissions will appear to reduce the costs of achieving an emission target. That is, the cost of achieving an emission standard would be greater if the DCCEEW 2022 projections were to eventuate, as opposed to those from the NVES Consultation Impact Analysis.

#### *Emissions by vehicle type*

Analysis by the Department is based on unpublished data from BITRE combined with assumptions about improvement in efficiency overtime:

- for passenger vehicles, efficiency improvements are approximately 2 $gCO_2$/km year-on-year in 2025, falling to improvements of 0.8 $gCO_2$/km year-on-year by 2035, where it remains constant to 2050).
- For LCV, efficiency improvements are 3 $gCO_2$/km year-on-year in 2025, falling to improvements of 1.6 $gCO_2$/km year-on-year by 2035 (where it remains constant to 2050).

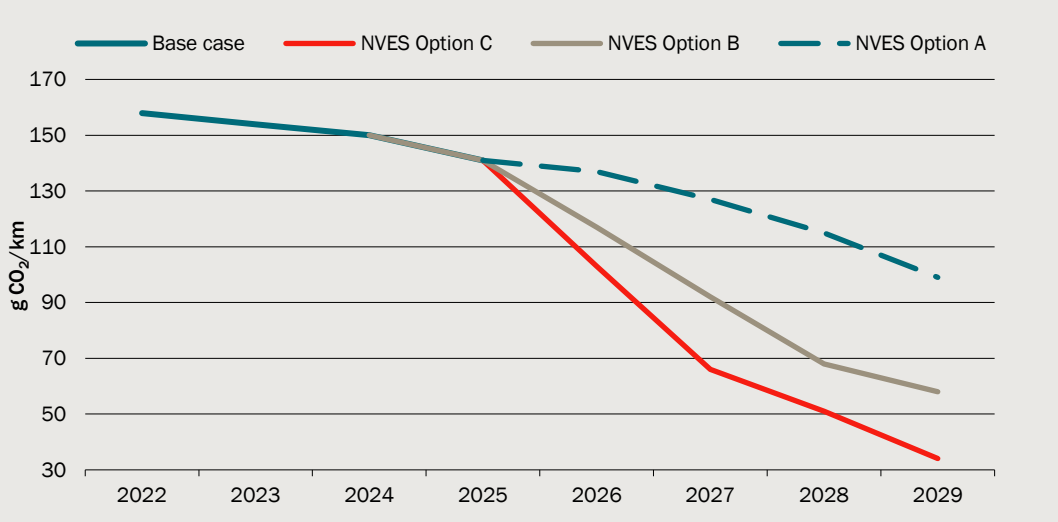
These improvements in efficiency are similar to the assumptions used by the CIE in previous modelling for AAA, the main difference being the level of emissions for passenger and SUV vehicles. Without further information, on the BITRE data, it is not possible to assess this further.

We have calibrated the model to have the same starting point as the NVES Consultation Impact Analysis.

## *Government's proposed NVES Options*

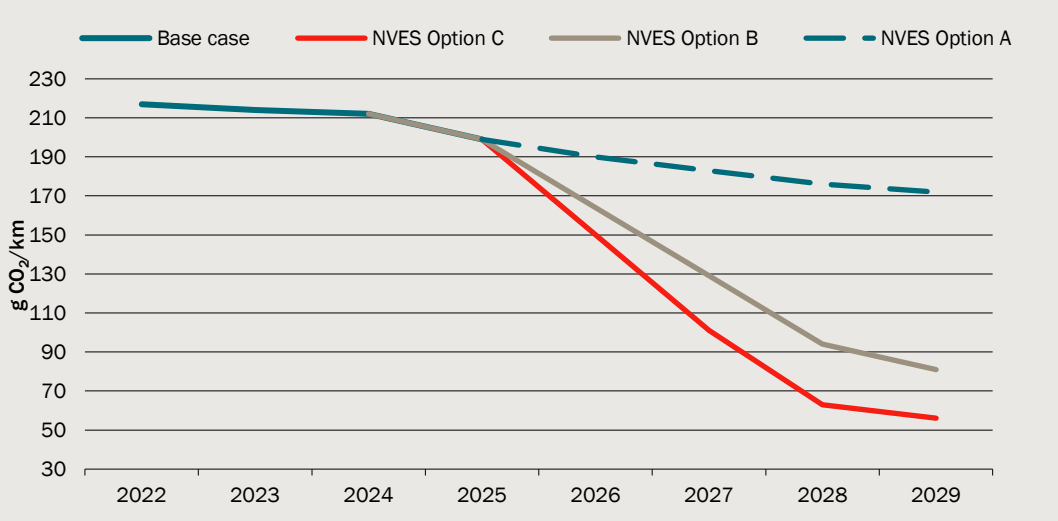
Three options have been proposed in the Consultation Impact Analysis, which are primarily defined by the headline emission target (charts 1.5 and 1.6)

### 1.5 Passenger and SUV NVES options




*Data source:* Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February.

### 1.6 LCV NVES options




*Data source:* Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February.

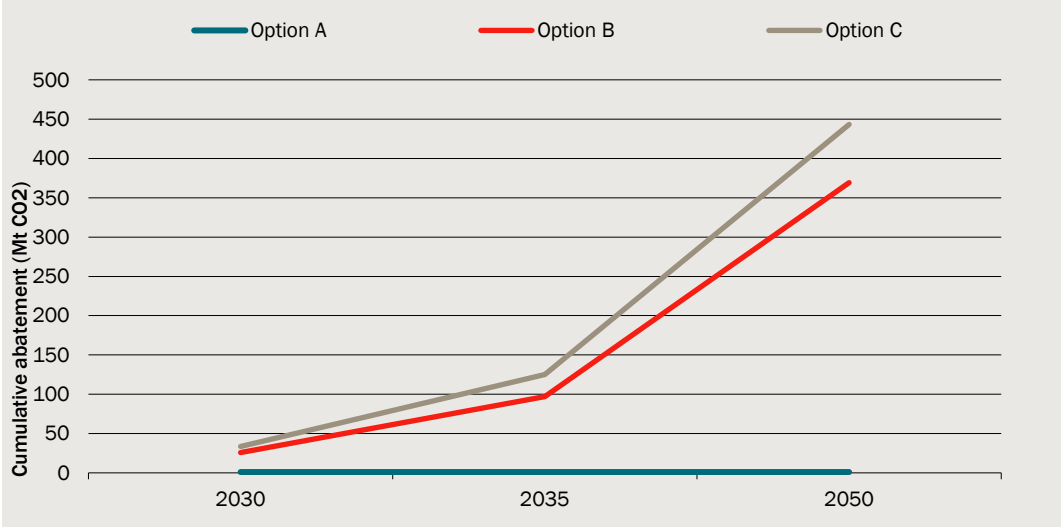
The options are bookended by:

- Option A, which is the least ambitious option and is likely to see emissions reductions close to base line reductions (i.e. it would be expected to have little to no impact on emissions). This would see a 34 and 14 per cent reduction in average emissions of new passenger (including passenger and SUVs) and LCVs respectively sold in 2029 compared to 2024.

- Option C, which is the most ambitious option. This would see a 77 and 74 per cent reduction in average emissions of new passenger (including passenger and SUVs) and LCVs respectively sold in 2029 compared to 2024.

Option B, which is the preferred option in the Consultation Impact Assessment, is closer to Option C than Option A in terms of the headline reduction. In terms of emissions reductions, Options B and C are very close together, while Option A projects almost no emissions savings compared to the base case (chart 1.7).

### 1.7 Cumulative emission reductions by option




*Data source:* Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February, p. 35.

Care should be taken in comparing these, as options not only differ in terms of headline target, but also the design of the scheme. For example, Option A categorises vehicles differently compared to Options B and C, and also allows super credits, off-cycle credits and air conditioning credits. This means the headline targets are not directly comparable:

- Excluding technology credits would increase the stringency of the headline target.
- Moving larger SUVs, four-wheel drives from "passenger" to LCV makes the passenger target much easier to meet. The impact on the LCV target is uncertain.
- If the headline target were adjusted for both these, Option A would be even less ambitious.

In addition to the headline emission targets, the options differ in terms of:

- fleet limit curves
- vehicles categories
- credit banking, pooling and trading
- technology credits
- penalties

These specifications are discussed in further detail for option B below.

## *Option B*

Option B is defined by:[5]

- Two sets of headline standards applying to (table 1.8):
  - Passenger vehicles (passenger vehicles, light and heavier SUVs and 4WDs (MA, MB and MC categories))
  - LCVs (utes and vans GVM up to 4.5 tonnes (NA and NB1 vehicles with some exceptions)).
- Fleet limit curves which reduce the disadvantage of heavier or larger vehicles (subject to upper and lower breakpoints)
- Trading and some banking of credits allowed
- No super credits of technology credits
- Penalties of $100 per g/$CO_2$ per vehicle above target

### 1.8 Headline emission targets – Option B

| Scenario | Passenger cars and SUV | LCV |
|---|---|---|
| | $gCO_2$/km | $gCO_2$/km |
| 2024 | 150 | 212 |
| 2025 (regulations begin) | 141 | 199 |
| 2026 | 117 | 164 |
| 2027 | 92 | 129 |
| 2028 | 68 | 94 |
| 2029 | 58 | 81 |
| Annual average change (per cent) | -17.3% | -17.5% |
| Absolute change (2024-2029) $gCO_2$/km | -92 | -131 |

*Source:* CIE; Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February.

## *EV uptake required to meet emissions target*

The Consultation Impact Analysis does not report EV uptake required to meet each of the modelled options. Meeting the target could be achieved in the following ways:

- More rapid uptake of low emission vehicles (EVs, PHEVs and HEVs)
- More rapid uptake of lower emission vehicles plus improved ICE efficiency[6]
- Through the payment of penalties (i.e. not reaching the headline target).

---

5 Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February, table 4 – Options for NVES policy setting.

6 Noting that the reductions in emissions under option B would not be possible with ICE efficiency improvements alone.

To inform modelling of Option B, we have modelled the required vehicle mix under versions of the first two of these scenarios:

- **EV driven** – EV uptake increases until the fleet meets the emission target, replacing ICE and MHEV vehicles. The PHEV market share is assumed to increase proportionately to EVs and HEV market share is assumed to be unchanged.
- **EV and ICE efficiency driven** – same as EV driven, but with double the annual fuel efficiency improvements for ICE engines compared with the baseline (includes ICE component of HEVs, PHEVs and MHEVs). The Consultation Impact Analysis assumes base case efficiency emission reductions of:
  - 2 $gCO_2$/km year-on-year in 2025, falling to reductions of 0.8 $gCO_2$/km year-on-year by 2035 (where it remains constant to 2050) for passenger vehicles
  - 3 $gCO_2$/km year-on-year in 2025, falling to reductions of 1.6 $gCO_2$/km year-on-year by 2035 (where it remains constant to 2050).

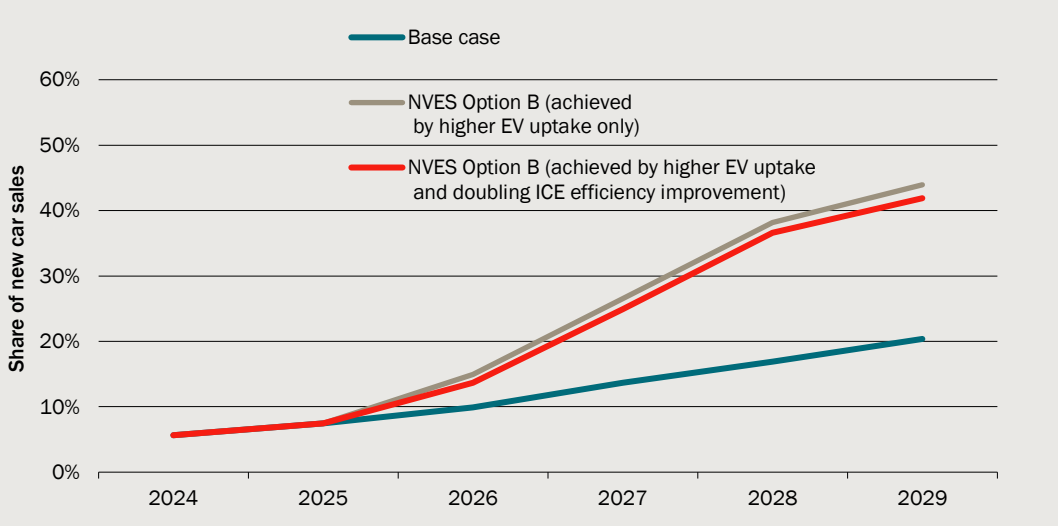
  Under this scenario we assume these year-on-year emission reductions are doubled under Option B.

Option B requires a sharp increase in EV uptake by 2029 to meet the proposed target, to above 40 per cent for Passenger and SUV (from around 20 per cent in the base case), and to around 50 per cent for LCVs (from 5 per cent in the base case) (charts 1.9 and 1.10).

The larger increase for LCVs is due to the larger absolute reduction in emissions from 2024 to 2029 (see table 1.8). Absent a very large change in ICE efficiency, lower emissions will need to be driven by higher EV uptake as doubling annual ICE efficiency improvements (from 3 $gCO_2$/km year-on-year in 2025 under the base case to 6 $gCO_2$/km year-on-year in 2025) has a modest impact on the share of EVs required to meet the proposed target (reducing the share of LCV EV sales required in 2029 by around 3 per centage points).[7]

7 We also undertook sensitivity testing for a 3 times increase in the rate of efficiency reduction (9 $gCO_2$/km year-on-year reduction in 2025 for LCVs). This sees the required share of LCV EV sales in 2029 fall to 44 per cent compared to 47 per cent for a doubling of ICE efficiency.

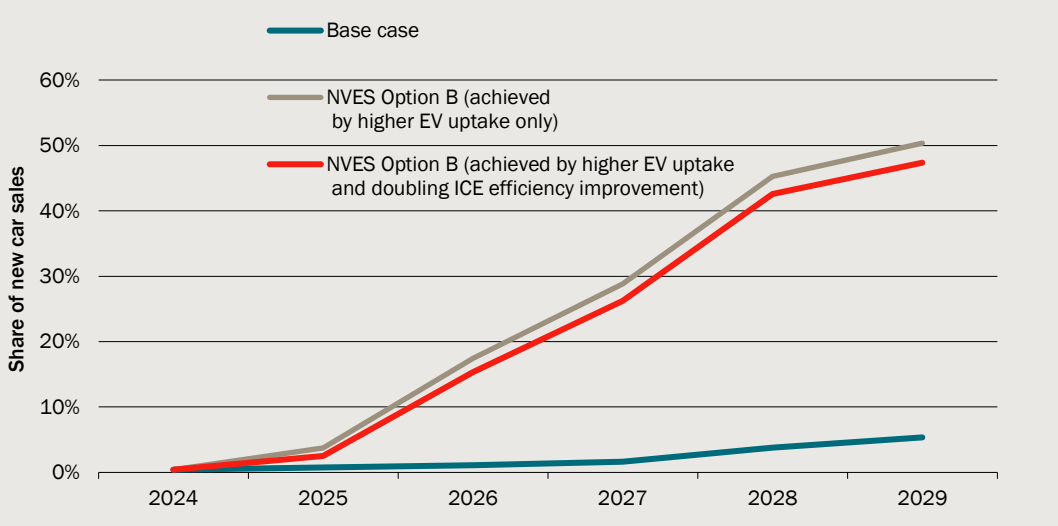
### 1.9 Passenger and SUV EV uptake required to meet Option B




*Note:* The base case has been calibrated to match that presented in the Consultation Impact Analysis.

*Data source:* CIE

### 1.10 LCV EV uptake to meet Option B



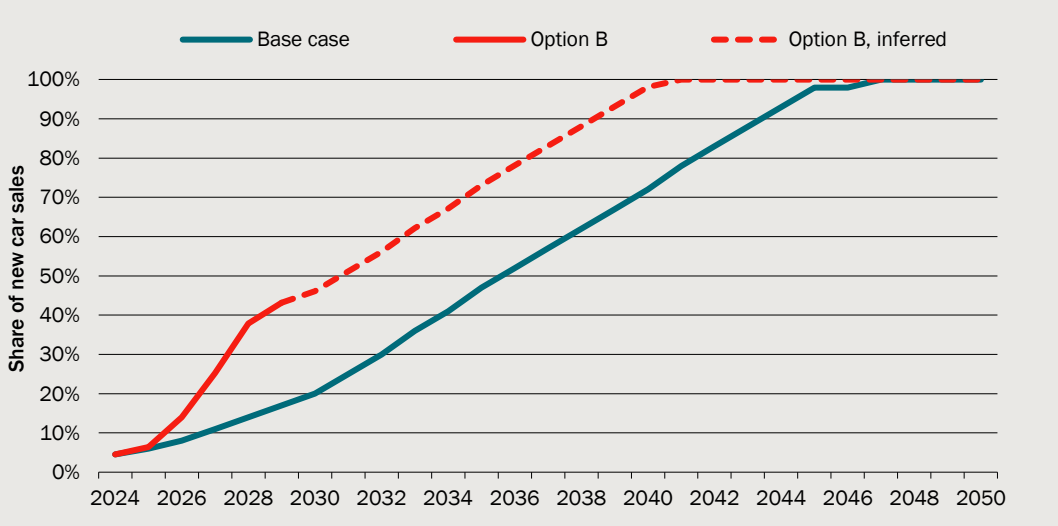

*Note:* The base case has been calibrated to match that presented in the Consultation Impact Analysis.

*Data source:* CIE

Chart 1.11 shows the implied overall EV uptake against the base case presented in the Consultation Impact Analysis. Following 2029, we infer future headline limits and therefore EV uptake based on the assumption from the Consultation Impact Analysis that it tracks parallel to the base case.[8] This shows that this policy will bring forward full adoption of EV across new vehicle sales by around 6 years from 2047 in the base case to 2041 under Option B. Note that subsequent NVES determinations could bring this forward by even more.

8 Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February, p. 76.

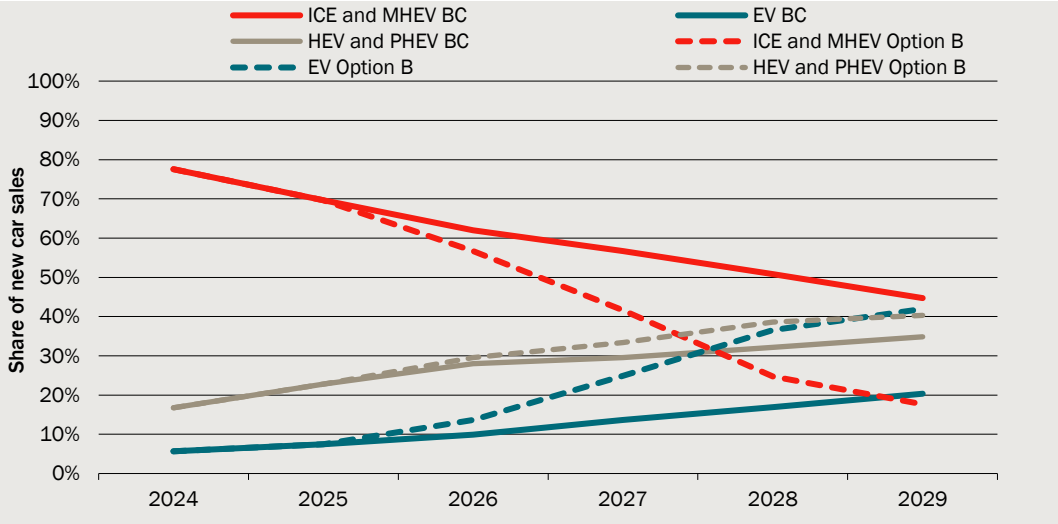
### 1.11 EV uptake required to meet Option B




*Data source:* CIE

Charts 1.12 and 1.13 show vehicle shares under Option B (based on the EV and ICE driven shares) against the base case calibrated to the Consultation Impact Analysis EV uptake. Under Option B, ICE vehicles would be largely phased out by the early 2030s.[9] Of the ICE vehicles remaining in the market in 2029, most are expected to be MHEVs. Again, this shows LCVs emissions reductions will need to be driven in large part by EVs, given the low share of PHEVs and HEVs in the base case and under the option. If PHEV and HEV market shares were to increase, the number of EVs required would be lower.

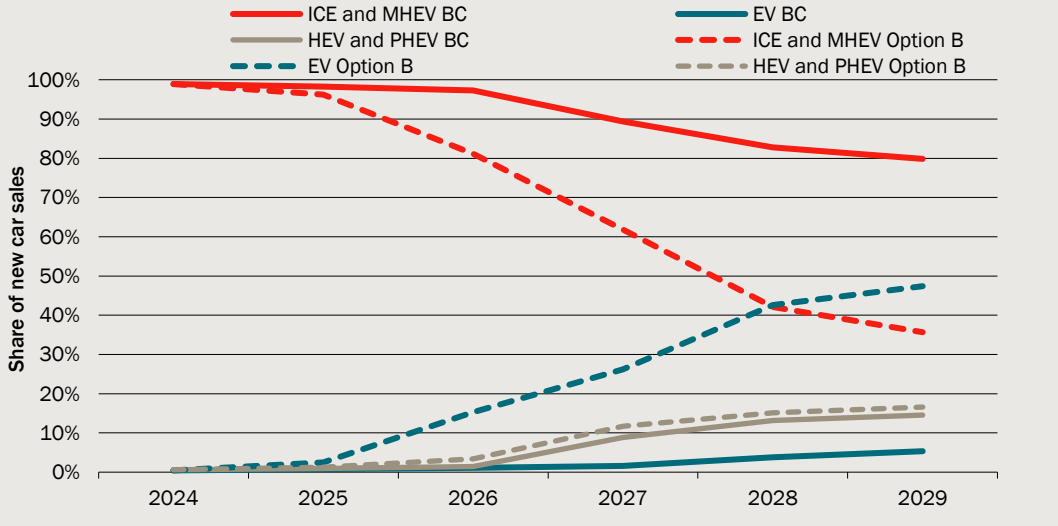
### 1.12 Passenger and SUV vehicle mix to meet Option B – EV and ICE efficiency




*Data source:* CIE

9 Mild hybrids (MHEVs) would remain in the market.

## 1.13 LCV vehicle mix to meet Option B – EV and ICE efficiency




*Data source:* CIE

# 2 Impact of Option B

In this chapter we present our analysis of Option B, estimating the impact of emission standards on:

- households
- emissions
- fuel consumption and excise
- car markets.

## Households

### Social welfare impact

Following previous analysis undertaken by the CIE for AAA[10] we have estimated social welfare impacts in two parts:

1 higher prices on the purchase of new high emission vehicles (which has the same impact as a tax)

2 the implicit subsidy on the purchase of new low emission vehicles.

This is estimated using consumer preferences previously estimated by the CIE for the AAA.[11] These describe the willingness to pay (WTP) for different attributes across vehicle type powertrains. We use this to estimate by how much prices would need to change to induce consumers to switch to lower emission vehicles, which allows us to estimate the change in price required to deliver the vehicle mix to achieve Option B.

The issue of whether prices are likely to change in response to the NVES is discussed separately in chapter 3.

Table 2.1 reports the price difference between EV and ICE vehicles which is required to achieve the EV for Option B in 2029. We have not presented results for 2025, as in this year there is essentially no deviation from the base case EV uptake. Under the base case we assume there is no difference in price between ICE vehicles and EV, in line with the

10 The CIE 2023, Vehicle emission standards: Impacts on consumers, vehicle markets, emissions and fuel excise, prepared for AAA. Note some changes have been made to this model, namely assuming EV and ICE price parity by 2029.

11 CIE 2019, Demand for electric vehicles: A discrete choice survey, prepared for Australian Automobile Association.

Consultation Impact Analysis which assumes price parity by 2030.[12] This means that to encourage consumers to trade off the characteristics of an ICE vehicle for an EV, would require EVs to be discounted relative to ICE vehicles (would require a larger price difference).

The difference required is larger for:

- SUVs compared to passenger cars
- LCV compared to SUVs

The further away from base case uptake, which reflects price parity, the larger the price difference required. This is largest for LCVs, due to LCVs requiring the largest increase in EV uptake and LCV consumers placing greater value on ICE vehicle characteristics.

For example, consumers purchasing an LCV may place a greater value on range and towing performance or LCVs are purchased by households in regional and remote areas where there may be limited charging infrastructure. This means they need to be compensated by a large price discount to induce shifting from ICE vehicles to EVs.

### 2.1 Required difference in price to meet emission standard scenario market shares – EV and ICE 2029

| Vehicle type | Passenger | SUV | LCV |
|---|---|---|---|
| | $ '000 | $ '000 | $ '000 |
| Option B | 30.8 | 47.2 | 142.3 |

*Source:* CIE.

Table 2.2 shows the prices for ICE and EVs under Option B which are required to:

- meet the required difference in prices in table 2.1
- ensure that enough additional revenue is collected from high emission vehicles to offset the implicit subsidy paid to the purchase of high emission vehicles.

This change in prices results in an increase in overall prices of vehicles sold. This could result in an increase in the average age of the vehicle fleet as owners keep their existing cars longer (see section on impacts on car markets later in this chapter for further discussion).

12 Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February, table 4 – Options for NVES policy setting.

## 2.2 Prices under different emission standard scenarios – 2029

| | | Base case | Option B |
|---|---|---|---|
| | | $ '000 | $ '000 |
| Passenger | ICE | 33.7 | 58.6 |
| | EV | 33.7 | 27.9 |
| SUV | ICE | 46.9 | 80.8 |
| | EV | 46.9 | 33.6 |
| LCV | ICE | 50.2 | 157.8 |
| | EV | 50.2 | 15.5 |

*Source:* CIE.

From the price change we calculated the 'dead-weight loss' (DWL) of the subsidy and implicit tax (Table 2.3). The results suggest that Option B would result in a $5.4 billion welfare loss in 2029. This estimate is broadly in line with the estimate of this impact in the Consultation Impact Analysis, which included this impact as a sensitivity.[13]

There is considerable uncertainty around this estimate as:

- a subsidy and tax could be efficient where it moves the market equilibrium closer to the socially optimal outcome
- assumptions around how supply responds to changes in prices is conservative.

DWL per customer switching from an ICE to an EV is shown in Table 2.3. The largest welfare cost is associated with changing LCV purchasing behaviour, with a cost of around $36 500 per customer switching from ICE to EV.[14] The costs for passenger vehicles are the smaller gap in vehicle capabilities. Customer requirements mean that changes in EV uptake can be achieved with smaller changes in prices and therefore less social welfare costs.

Note that these estimates are likely to overestimate the loss to the buyer, because the buyer has choices other than buying a different new vehicle, they could choose a different vehicle (i.e. substitute an LCV for a passenger vehicle) or decide not to buy a new vehicle at all.

13 Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February, p. 50. Present value of consumer welfare costs are converted to an annual benefit stream using the profile of EV uptake under option B.

14 Note this a conservative estimate, which assumes price are only changed for enough vehicles to meet the NVES target.

### 2.3 Dead weight loss for NVES – 2029

| | Total DWL | DWL per switching customer |
|---|---|---|
| | $ million | $ per switching customer |
| Passenger | 488 | 9 598 |
| SUV | 1 518 | 10 304 |
| LCV | 3 387 | 36 443 |
| **Total 2029** | 5 393 | 18 527 |

*Source:* CIE.

## *Change in costs of ownership*

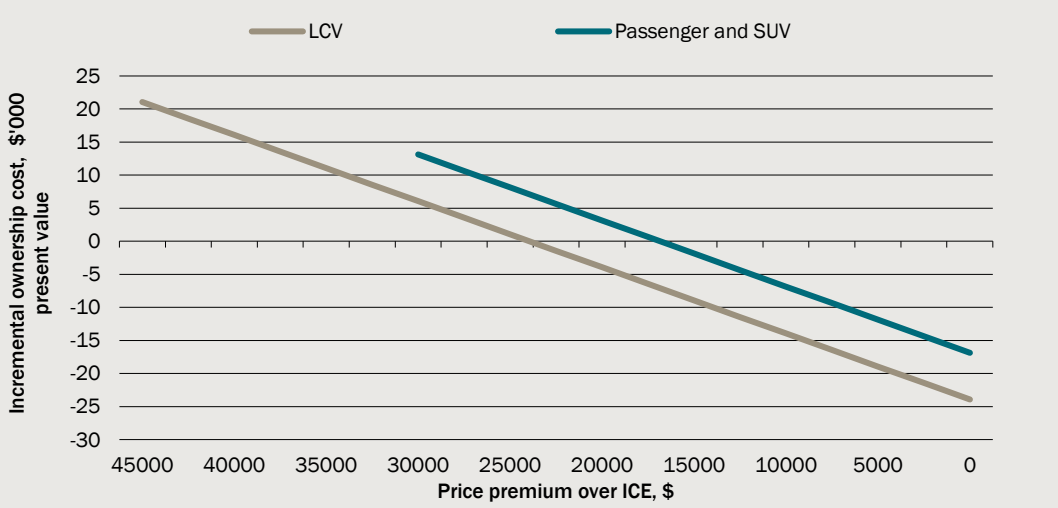
The financial cost of owning a vehicle consists of:

- upfront costs (i.e. the purchase price)
- operating costs, including fuel, maintenance and insurance and registration, which recur each year over the life of the car.

By comparing these costs across different powertrains, we can measure the potential financial impact of changing new car choices on households. This change in financial costs in turn can be used to measure the marginal abatement cost to a household seeking to reduce their own emissions.

Chart 2.4 shows the incremental ownership costs compared to ICE vehicles for EVs. Along the y-axis, positive values imply higher ownership costs compared to ICE vehicles. Note these are financial costs and do not take into account the transfers (i.e. the cross subsidies) associated with an emission standard, nor the social welfare costs associated with these transfers.

### 2.4 Incremental present value ownership costs – EVs




*Note:* Ownership costs are incremental to the ownership costs of ICE vehicles.

*Data source:* CIE.

For EVs, the price premium is the key determinant of incremental ownership costs. EVs are expected to result in a fuel cost saving of around $11,000, $15,000 and $22,500 for

passenger, SUVs and LCVs respectively – larger cost savings reflect higher fuel consumption by ICE vehicles of that type. In addition to fuel cost savings, there are modest maintenance savings and negligible difference in insurance costs, while we assume all other costs (registration and tyres, etc.) are the same. When price premiums are greater than these savings, owning an EV is a net cost for households. The break-even threshold is higher for LCVs and SUVs due to the higher fuel consumption of these ICE vehicles.

Over time as prices for EVs approach those of ICE vehicles, EV uptake will increase. This is likely to be one of the main drivers of EV uptake in the base case.

Based on the observed price premiums for EVs, assuming a premium of around $25,000 for passenger and SUVs and around $43,000 for LCVs in 2023, purchasing an EV would result in higher costs to consumers.

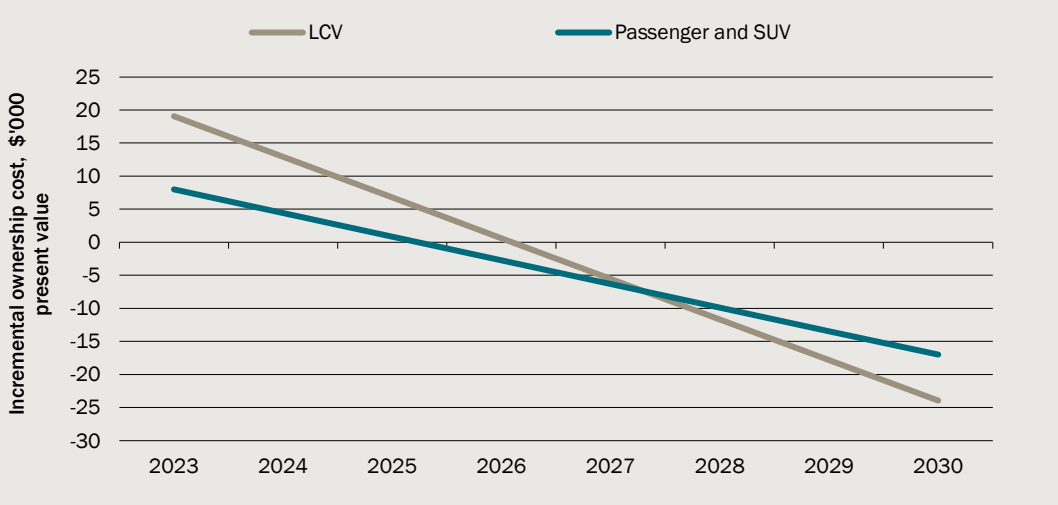
In present value terms over 20 years compared to an ICE vehicle, EVs would cost:

- $14 000 more for passenger cars
- $9 600 more for SUVs
- $19 500 more for LCVs.

The cost when the NVES scheme begins will depend on the rate at which EV prices converge with ICE vehicles. Modelling in the Consultation Impact Analysis for the NVES assumes linear progression to price parity by 2030.[15] This assumption, this would see EVs reaching price parity for passenger and SUVs by 2026 and for LCVs by 2027 (chart 2.5). In this case, the financial cost of higher EV uptake will be minimised when the NVES is operating – however this trajectory is uncertain, and price parity may be reached at different times for different parts of the market (i.e. passenger vehicles may reach parity sooner than LCVs).

15 Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February, p. 79.

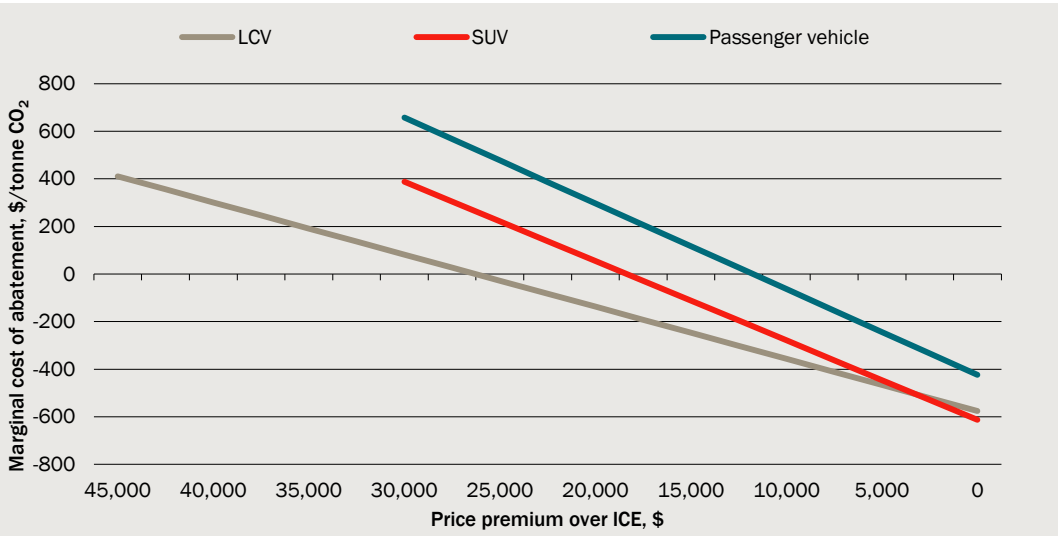
### 2.5 Incremental present value ownership costs over time – EVs




*Data source:* CIE

Using these cost differences and information on emissions we calculated the marginal financial abatement cost for a household seeking to manage their own $CO_2$ emissions. This is the cost of reducing one unit of emissions, which in this case is one tonne of $CO_2$ (Chart 2.6).

### 2.6 Marginal financial abatement costs – EVs




*Data source:* CIE.

For passenger and SUV EVs, at a price premium based on similar vehicle models, we find a marginal abatement cost of around $500 and $250 per tonne $CO_2$. For LCVs this is around $400 per tonne $CO_2$ (based on an EV price premium of around $43,000). This is higher than the cost of carbon used by NSW Government economic assessments[16], and implies that currently there may be lower cost approaches to reduce emissions.

16 NSW Treasury 2023, Technical note to NSW Government Guide to Cost-Benefit Analysis TPG23-08 Carbon value in cost-benefit analysis.

To have a marginal cost of abatement equal to the NSW Government cost of carbon ($123 per tonne $CO_2$ in 2023) would require EV ownership costs (equivalent of upfront costs) to be:

- $10,500 lower for passenger vehicles
- $6,000 lower for SUVs
- $16,400 lower for LCVs.

For context, the present cost value of carbon from an ICE vehicle sold in 2023 is around $4,500 for passenger vehicles, $4,800 for SUVs and $9,700 for LCVs over 20 years (also based on projected distance travelled by each vehicle type).[17] However as noted before, this is likely to be an upper bound estimate. Some EVs currently have smaller price premiums compared to ICE vehicles, and these price premiums are expected to continue to fall.

### *Marginal cost of abatement*

Bringing together the possible range of social welfare costs and the change in the cost of ownership of EVs, we can estimate the total marginal cost of abatement. This represents the total cost to society of using an emission standard (in this case we present Option B) to reduce emissions. Given uncertainties in measures of the cost of abatement we present results as a range. This reflects uncertainties around the extent to which:

- vehicle operating costs and potential cost savings from choosing an EV over an ICE vehicle are internalised in decision making:
  - where cost savings are fully internalised in decision making, there is no cost saving from shifting a car purchase from an ICE vehicle to an EV. In this case the marginal cost of abatement would not include the change in ownership costs from switching from an ICE vehicle to an EV
- an emission standard is correcting existing distortions in the market for new cars:
  - if an emission standard moves the market equilibrium close to the socially optimum point, the DWL of an emission standard would be smaller than the estimate presented in this study.

Results are shown for passenger, SUV and LCV in Charts 2.7, 2.8 and 2.9 respectively. At high EV price premiums over ICE vehicles, the range of the potential marginal cost abatement is very large:

- the upper bound reflects financial costs not being internalised in decision making and the full DWL
- the lower bound reflects financial costs being fully internalised in decision making, and there being no DWL.

Around the point where ownership costs are equal for EVs and ICE vehicles, the range of the potential marginal costs of abatement narrows, as at this point only the DWL loss is relevant:

- the upper bound reflects the full DWL

17 This corresponds to a cost of around $0.28 per litre of petrol.

- the lower bound reflects there being no DWL.

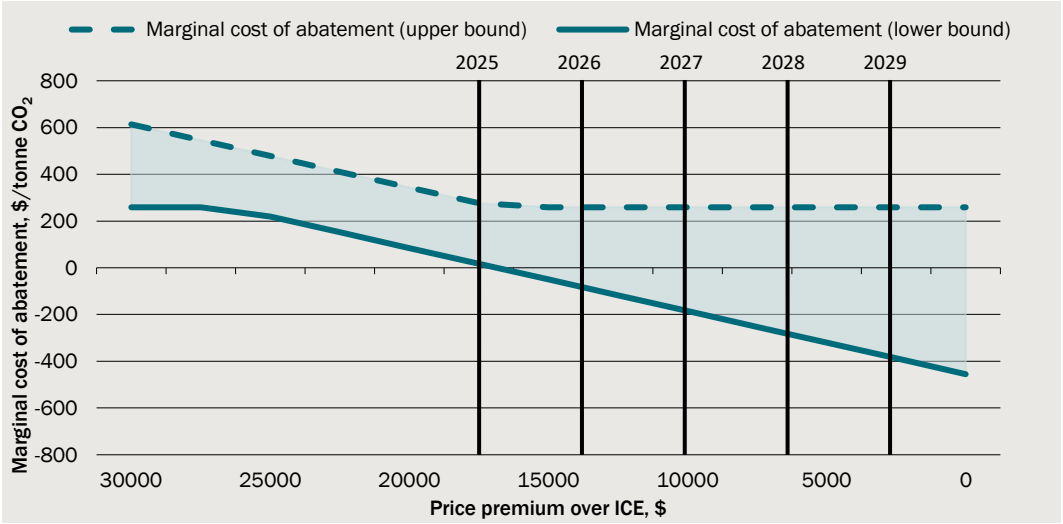
At lower EV price premiums, the range of the potential marginal costs of abatement widens:

- the lower bound reflects financial costs not being internalised in decision making and there being no DWL
- the upper bound reflects financial costs being fully internalised in decision making and the full DWL.

It is unlikely that the marginal cost of abatement would be at either extreme; in practice we would expect it to be somewhere in the middle.

In these charts we also show where the path to price parity assumed in the Consultation Impact Analysis would sit of the graph for each year of the NVES.

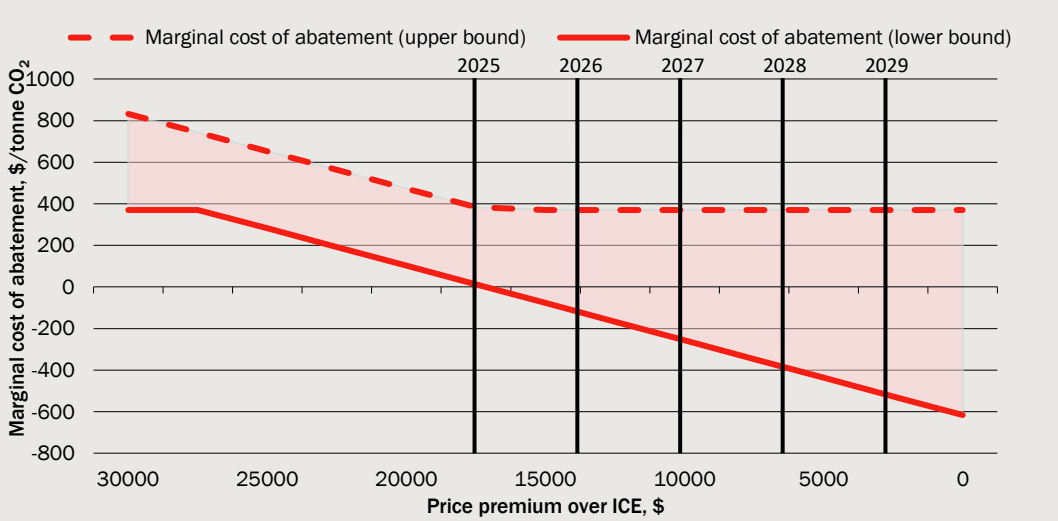
### 2.7 Marginal cost of abatement to society– passenger vehicle EVs, present value




*Note:* The upper bound is based on the Option B scenario.

*Data source:* CIE.

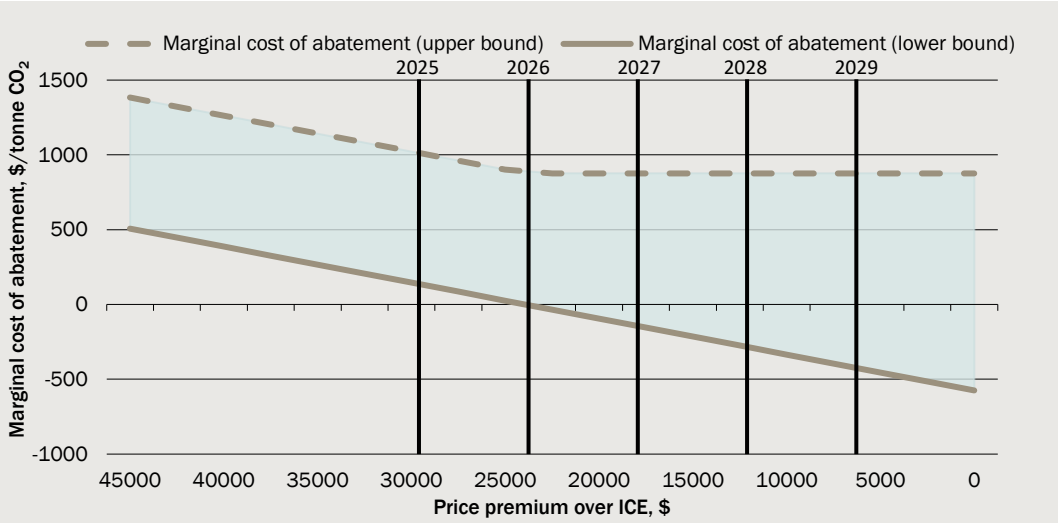
## 2.8 Marginal cost of abatement to society – SUV EVs, present value




*Note:* The upper bound is based on the Option B scenario.

*Data source:* CIE.

## 2.9 Marginal cost of abatement to society – LCV EVs, present value




`*Note:* The upper bound is based on the Option B scenario.

*Data source:* CIE.

The key implications of the results in these charts are:

- emission standards are likely to become less costly forms of abatement as EV price premiums fall
- the marginal costs of abatement are likely largest for LCVs, then SUVs and then passenger vehicles. This reflects the higher DWL required to induce LCV consumers to switch from ICE vehicles to EVs
- the range of the marginal cost of abatement includes some particularly high values, which are greater than recommended costs of carbon (the NSW Government recommends a cost of carbon of $123 per tonne, in its economic appraisals and the

Consultation Impact Analysis used a $60 per tonne $CO_2$ in 2025). This implies that an emission standard may currently be a relatively expensive form of abatement:

- Note this is broadly consistent with findings from the Productivity Commission that finds high marginal costs of abatement for existing demand side policies.[18] For example:
  - marginal cost of abatement for the FBT exemption for EVs between $987 and $20 084 per tonne $CO_2$
  - marginal cost of abatement for the NSW $3 000 EV subsidy and stamp duty exemption between $271 and $4 914 per tonne $CO_2$.

## *Fuel consumption and fuel excise*

Fuel consumption is directly linked to vehicle emissions, such that the pattern of fuel consumption is the same as emissions (Table 2.10). Like emissions, the fall in fuel consumption is relatively modest across emission standard scenarios, due to the 20-year asset life of vehicles, although the fall is persistent.

**2.10 Total fuel consumption by emission standard scenario**

| Year | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|---|---|---|---|---|---|---|
| | Mega litres | Mega litres | Mega litres | Mega litres | Mega litres | Mega litres |
| Base case | 27 386 | 27 331 | 27 257 | 27 149 | 27 007 | 26 843 |
| Option B | 0.0% | 0.0% | -0.3% | -0.8% | -1.6% | -2.4% |
| Difference from Base case | | | | | | |
| | Per cent | Per cent | Per cent | Per cent | Per cent | Per cent |
| Option B | -0.3% | -0.8% | -1.3% | -1.8% | -2.4% | -2.9% |

*Source:* CIE.

Although fuel consumption is expected to fall, fuel excise revenue is expected to increase, due to its indexation (Table 2.11 and Chart 2.12). Compared to BAU, an emission standard will result in lower fuel excise revenue across scenarios. By 2029, fuel excise is expected to be 2.4 per cent lower under Option B than under the base case. Lower fuel excise revenue will need to be accompanied by:

- spending reductions by government, resulting in lower investment in land transport infrastructure or reduced spending elsewhere
- increasing other taxes. For example, the lost fuel excise under Option B could be recovered with:[19]
  - a road user charge of $0.001 per km travelled levied on all vehicles

18 Productivity Commission 2023, Updated Submission to National Electric Vehicle Strategy Consultation, Canberra.

19 Note this is the road user charge to make up for lost revenue from increased uptake of low emission vehicles due to an emission standard (i.e. the deviation from BAU). It does not make up for revenue lost due to BAU low emission vehicle uptake. Making up lost revenue under BAU would require a higher road user charge.

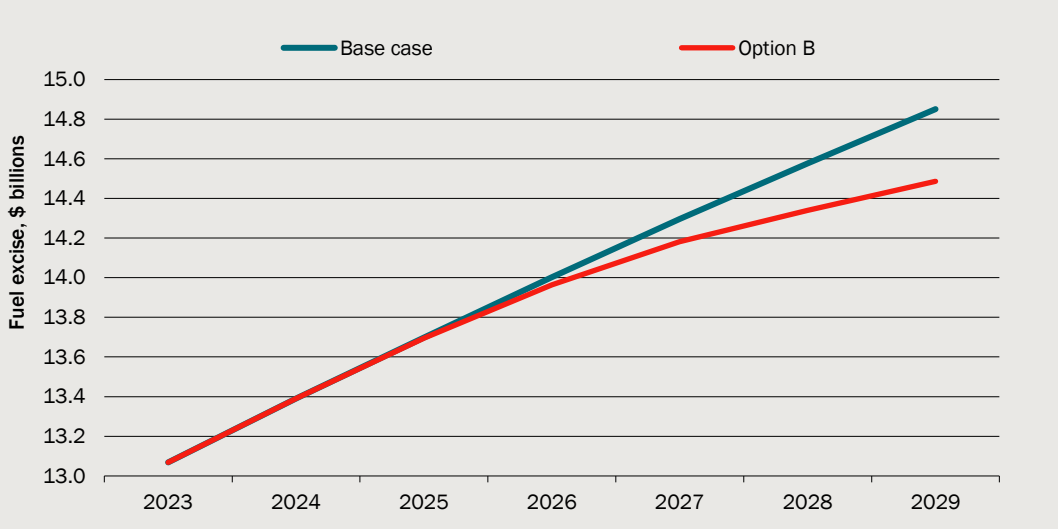
– a road user charge of $0.05 per km travelled levied on all additional EVs which are purchased due to the NVES[20], noting
  … in addition to making up a funding shortfall, road user charging may also help offset the external impacts of car use, including congestion and environmental impacts.

### 2.11 Fuel excise revenue by scenario

| Year | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|---|---|---|---|---|---|---|
| | $ million | $ million | $ million | $ million | $ million | $ million |
| Base case | 13 390 | 13 698 | 14 002 | 14 296 | 14 576 | 14 850 |
| Option B | 13 390 | 13 695 | 13 964 | 14 181 | 14 339 | 14 487 |
| Difference from base case | | | | | | |
| | Per cent | Per cent | Per cent | Per cent | Per cent | Per cent |
| Option B | 0.0% | 0.0% | -0.3% | -0.8% | -1.6% | -2.4% |
| Annual revenue gap from base case | | | | | | |
| | $ million | $ million | $ million | $ million | $ million | $ million |
| Option B | 0 | -3 | -39 | -114 | -236 | -363 |

*Source:* CIE.

### 2.12 Fuel excise revenue by scenario




*Data source:* CIE.

20 Note this takes the change in revenue for option B compared to the base case, and divides it by the additional EVs purchased due to option B.

# 3 Assumptions driving Government modelling results

## No trade off associated with an emission standard

The results of the Departments CBA do not include any trade offs associated with a more stringent emission standard and imply that the benefits arising from a stricter emissions standard increase at a faster rate than costs. This occurs by design as:

- the operating costs of EVs are lower than ICE vehicles
- price parity is assumed to occur by 2030, such that the operating cost savings dominate any EV price premium
- the CBA does not measure consumer welfare costs (noting that a sensitivity test is undertaken for only Option B) – this introduces a trade off in consumer preferences
- The CBA implicitly assumes that the market failure being addressed by the NVES is a lack of supply of low emission vehicles:
  - there is large unmet demand for EVs and low emission vehicles more generally (i.e. consumers want to purchase these vehicles but can't)
  - these vehicles are not brought to Australia because it is more profitable to sell these vehicles into other markets in the absence of a NVES.

  This assumption allows for the user benefits of EVs (i.e. the full operating cost savings associated with fuels cost savings net of electricity costs and maintenance savings net of battery replacement costs) to be measured in the CBA. The assumption is that although consumers may internalise these benefits into their vehicle choice, because of capacity constraints they are unable to choose their preferred vehicle.

This reasoning makes sense:

- where supply is capacity constrained, and
- for relatively small incremental changes in EV uptake compared to the base case.

Careful consideration should be given to the extent to which demand is truly constrained. The Consultation Impact Analysis states that:

> EV uptake under BAU is constrained by the limited supply of these vehicles to Australia and the fact that suppliers have strong incentives to divert any supply of EVs and ZEVs into markets with NVESs.[21]

However, the Consultation Impact Analysis does not appear to quantify the size of this unmet demand. We also note that the size of unmet demand and supply into Australia

21 Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February, p. 49.

may change rapidly in response to weakness of demand in more mature EV markets.[22] As EV prices are discounted overseas, the commercial proposition of importing EVs to a supply constrained Australian market become more favorable even under the base case (without an NVES). It is not clear how these factors are incorporated into the base case.

Establishing the size of unmet demand, or the problem being addressed by the NVES is critical to justify Government intervention and the assumption underpinning the CBA.

Further, documenting the size of unmet demand will help determine whether EV uptake is moving to its unconstrained level, reflective of consumer preferences, or it is going beyond this. Even if there is unmet demand, a very strict NVES target may result in consumer welfare costs where it forces the market to accept an EV market share higher than unconstrained demand.

## *Higher BCR outcomes for regional areas*

The Consultation Impact Analysis finds:

> …that for all options there are higher BCR outcomes for regional and rural locations. In other words, rural, regional and remote areas have a better return on each dollar spent. This is driven by larger fuel cost savings expected for people in areas that drive greater distances and higher rates of vehicle ownership.[23]

This is consistent with the observation that people in regional areas drive further, but does not recognise the potential constraints on demand for this group. By not having demand constraints, it does not consider the heterogeneity of consumer preferences across different types of consumers.

The CIE previously undertook a choice modelling study of the determinants of demand for electric vehicles (EVs) in Australia, the barriers that may be limiting the take-up of EVs in Australia, and how demand is likely to change as the relative price and performance of these vehicles improves in the near future.[24] This found:

- Consumers in regional areas value towing and battery range more highly than other consumers
- Consumers in urban areas are likely to switch to EVs before consumers in regional areas, holding all other characteristics constant. Their willingness to pay (WTP) for an EV with the worst attributes used in the survey is around $8 500 higher than regional consumers' WTP, on average. This difference narrows as the battery range of EVs improves.

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22 See for example Campbell, P. 2023, November 14., EV makers slash prices worldwide as demand goes flat, The Australian Financial Review. https://www.afr.com/world/europe/ev-makers-slash-prices-worldwide-as-demand-goes-flat-20231114-p5ejxw.

23 Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February, p. 48.

24 CIE 2019, Demand for electric vehicles: A discrete choice survey, prepared for Australian Automobile Association.

- Of the other factors that affected the choices, some of the main concerns were over driving long distances in regional and rural areas and finding charging and service facilities over these long distances.

With a NVES, demand for EVs is unlikely to be uniform. To some extent this will depend on the characteristics and innovation related to EVs (i.e. providing improved range, and towing capacity at lower costs), but will also depend on policies around supporting infrastructure such as ensuring adequate coverage of fast chargers to enable EV adoption across regional areas.

If the NVES increases supply of EVs, supporting polices may still be required to ensure there is sufficient demand to meet the NVES targets.

## *No new vehicle price impacts*

The Consultation Impact Analysis states that:

> Evidence to date consistently finds no purchase price impact, or a negligible purchase price impact, for consumers.[25]

In discussing purchase price increases it is important to differentiate between average prices paid for new cars and prices for specific vehicles which control for changes in characteristics overtime.

Average prices paid for new cars are likely to increase in the initial years of the NVES. This is due to:

- the price premium for EVs which is expected to persist until 2030, and
- the NVES increases the share of EVs which are purchased which means weighted average prices across all new vehicles will increase for vehicles purchased before price parity is achieved.

Note this may also be offset somewhat by consumers choosing, or manufacturers offering, vehicles with lower quality trim to reduce price for either EV or ICE vehicles (that is, a change in quality).

The statement in the Consultation Impact Analysis appears to be referring to price changes for quality-controlled vehicles. The report refers to a range of sources, which suggest there are no price impacts, however we do not believe the evidence is conclusive:

- Regulatory Impact Analyses of US emissions standards, prepared by the US EPA have in the past assumed that technology costs associated with the emission standard are passed onto consumers.[26] They note that vehicle manufacturers are expected to

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25 Department of Infrastructure, Transport, Regional Development, Communications and Arts 2024, Cleaner, Cheaper to Run Cars: The Australian New Vehicle Efficiency Standard: Consultation Impact Analysis, February, p. 19.

26 United State Environmental Protection Agency 2023, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles: Draft Regulatory Impact Assessment, p. 4-24, and United State Environmental Protection Agency 2023, Regulatory

strategically price vehicles, subsidising lower prices for some with higher prices for others, but this will result in higher average purchase prices.[27]

- Consumer Reports published a study which they claim shows "After adjusting for inflation, vehicle prices didn't increase during the time period studied – model years 2003 through to 2021 – even as average fuel economy increased 30% and proven lifesaving technologies became common." It is not clear how the analysis identifies changes in price due to the emission standard (i.e. the causal relationship between emission standards and price), as opposed to the correlation between the two. Without proper identification, the analysis may not be measuring the counterfactual of what prices changes would have been in the absence of emission standards (for example, prices could have been even lower in the absence of emission standards).
- Other studies referred to indicate that the costs of implementing lower emission technologies have been lower than originally anticipated, however do not provide quantitative evidence to show how this translated to prices.[28]
- As noted in the Consultation Impact Analysis, an EU review of actual performance noted the difficulty in assessing price impacts of emissions standards. The report shows that average prices increased, but not by as much as anticipated ex-ante with some prices falling.[29] This report also did not have any information available to assess how prices for LCVs had changed.

To compare costs of car ownership, in particular the upfront purchase prices, across powertrains we need to compare like with like. This is difficult because of:

- differences in vehicle characteristics between ICE and EV vehicles and brands – even where different vehicles have similar specifications, there may be differences which are not immediately observable or quantifiable (such as brand value, which would need to be estimated) that affect the value placed on different vehicles
- strategic pricing by car brands – where brands offer similar vehicles with different powertrains (i.e. the same model is offered with both an ICE and EV, or different models which target the same market segment), they may strategically set prices to avoid their EV products competing with their own ICE products and cannibalising their ICE sales. This may overstate the actual difference in prices of comparable vehicles, in particular when comparing ICE prices to EVs from electric only brands
- limited availability of EV vehicles in some market segments:

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Impact Analysis: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, p. 8-1

27 United State Environmental Protection Agency 2023, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles: Draft Regulatory Impact Assessment, p. 4-24

28 ICCT 2017, Addressing misconceptions surrounding light-vehicle fuel efficiency standards, and Lutsey, N. 2016, Are automakers beating the U.S. vehicle fuel economy standards? Yep, bigly, retrieved from http://www.theicct.org/blogs/staff/automakers-beating-US-vehicle-fuel-economystandards-bigly , accessed 29 February 2024.

29 European Commission, Directorate-General for Climate Action, Kollamthodi, S., Bonifazi, E., Kirsch, F. et al. 2015, Evaluation of Regulation 443/2009 and 510/2011 on the reduction of $CO_2$ emissions from light-duty vehicles – Final report, p. 109.

  - in some cases, there may not be a comparator within the single vehicle category which does not allow a meaningful comparison
  - limited availability will limit competition and may result in inflated prices. In this case, it is not possible to assume thar price equivalency will be replicated across market segments
  - in some segments, EVs may already be at or close to price parity with HEV and ICE vehicles
- differences in costs depending on manufacturing approaches – purpose built EV vehicles are likely to have lower price premiums compared to EVs which are based on an ICE vehicle platform, as accommodating an electric drive train in a chassis design for an ICE vehicle may increase manufacturing costs
- price premiums are likely to change over time, such that premiums based on current (2023) retail prices will overstate future price premiums which over time will fall due to:
  - increased competition with more EVs brands and models entering the market
  - reduced manufacturing costs from technological improvements and economies of scale. To account for this uncertainty, we estimated the cost of ownership across a continuum of price premiums. Incremental ownership costs, compared to ICE vehicles, are estimated over the life of the vehicle asset (assumed to be 20 years), with future costs discounted and expressed in present value terms based on an annual discount rate of seven per cent.[30]

Given these challenges and the information gaps around price impacts, price monitoring should form part of the program monitoring and evaluation to ensure the interests of consumers are protected and the NVES does not have unintended consequences on prices.

Further recognising there are likely to be technology costs, it is not clear why vehicle manufacturers would not pass these costs onto customers. While the evidence suggests manufacturers find the lowest costs means by which to meet standards, there is no evidence to suggest they will absorb these costs. The more elastic is demand, and the less elastic is supply, the smaller the extent of pass-through all else being equal. This does not appear to have been examined in the Consultation Impact Analysis.

## *The role of penalties in determining the cost of the NVES*

The fine for exceeding the emissions standard can be thought of as the upper bound of the cost of the scheme. It will also be a key determinant of whether the scheme realises the emissions reductions consistent with the NVES. Despite the importance of this, there is little analysis presented in the Consultation Impact Analysis considering how the penalty will affect the NVES.

30 The data underlying these results are shown in Tables B.10, B.11 and B.12, in Appendix B.

Take for example an LCV with emissions of 200g $CO_2$/km and vehicle mass equal to the average (meaning there is no adjustment along the limit curve for this individual vehicle) purchased in 2025.

Under the NVES, this exceeds the target of 141 $CO_2$ g/km. In terms of the NVES, this could have the following impacts:

- If the manufacturer only sold this type of LCV, they could:
  - Pay the penalty of $100 per g/km above the target. For this example, this would be $5 900 per vehicle
  - Purchase credits from another manufacturer with excess credits. In equilibrium, we would expect this to be at or close to $5 900 where the NVES is binding (i.e. it actually reduces emissions compared to the base case)
- For brands with a mix of vehicles, the penalty is the 'shadow price' (that is the implicit price) of meeting the target. Brands could choose to incur a penalty instead of changing sales mix.

Where a penalty is paid, the full benefits of the NVES will not be realised (e.g. the emission reductions associated with the target will not actually occur). The penalty needs to be high enough to incentivise a change in vehicle mix, and this will anchor the cost of the scheme.

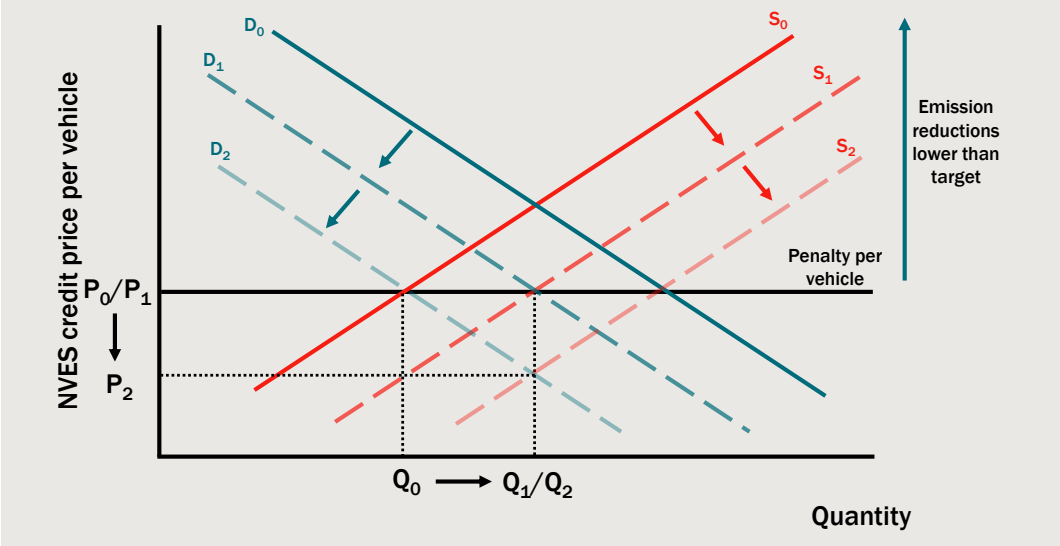
Consider the market for NVES credits (chart 3.1).

Where the target is binding (i.e. requiring an increase in EV uptake compared to the base case), the penalties act as a price ceiling for NVES credits. Over time, we would

- initially expect the market equilibrium for credit prices to be above the penalty per vehicle, with the penalty acting as a price ceiling with manufacturers meeting requirements through a combination of credits and penalty payments.
- expect that if the NVES works as intended, and the penalty is large enough to change behaviour (as consumers are shifted from higher to lower emission vehicles if the price is large enough to shift consumer behaviour), the supply and demand for EVs will increase and in turn increase the supply of and reduce demand for credits.
- expect that as EV uptake continues to increase, demand for credits will fall and supply will increase. Once the price for credits is lower than the penalty, obligations will be met only using credits.

During the initial phase, the cost of the scheme will be determined by the penalty. If this is high the cost of the scheme to manufacturers and ultimately consumers will be high. Given the importance of the penalty this may warrant further analysis before implementing the NVES and should be incorporated into program monitoring and evaluation.

## 3.1 Market for NVES credits




Data source: CIE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