COMMERCIAL IN CONFIDENCE

FINAL REPORT

New Vehicle Efficiency Standard impact on Automotive Dealers

Scenario analysis

Prepared for
Australian Automotive Dealers Association

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Summary

The Australian Automotive Dealer Association (AADA) has commissioned the CIE to analyse the impact of the New Vehicle Efficiency Standard Act 2024 (NVES Act) on automotive dealers (AADA's members). [1]

This has consisted of the following tasks:

- Identify how the NVES is likely to impact automotive dealers.
- Develop scenarios which describe the range of possible ways in which the NVES may play out in the market for new cars.
  - These scenarios vary in terms of how regulated entities meet their obligations under the NVES Act.
  - Regulated entities are vehicle manufacturers or original equipment manufacturers (OEMs), or distributors, suppliers or importers (domestic or international) that provide passenger vehicles or light commercial vehicles (up to 4.5 tonnes) to the Australian market.
- Identify a base case which defines what would have happened in the absence of an NVES. This is a hypothetical counterfactual against which the impacts of the NVES scenarios are measured.
- Model new and used car market outcomes under the different scenarios.
- Quantify the likely impacts of the NVES on automotive dealers.

There are several approaches regulated entities can take to meet the NVES…

Regulated entities, which **do not** include automotive dealers, are ultimately responsible for compliance with the NVES. There are three distinct approaches for entities to meet their obligations under the NVES:

- **Adjusting their vehicle mix** to reduce average fleet emissions, such as by importing more EVs in segments where consumers are more likely to switch (e.g., micro/small cars) and fewer higher-emission vehicles (e.g., LCVs, where consumers tend to be less open to EVs).[2]
- **Purchase credits** from regulated entities which exceed the targets
- **Pay the penalty or infringement notice** for not meeting the target.

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1 The AADA has published a fact sheet which summarises the NVES, which is available here: https://www.aada.asn.au/bulletin/new-vehicle-efficiency-standard-factsheet/

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

- In practice paying a penalty will be similar to purchasing credits, as the price for credits is likely to be linked to penalty or infringement rate.

In practice most regulated entities are expected to use a mix of these strategies to meet their NVES obligations.

Further, there is a question of how the costs and benefits[3] of the NVES are shared between stakeholders. Regulated entities could:

- absorb the costs themselves,
- pass this to dealers,
- pass this to customers or some combination of this.

In implementing a response, regulated entities or OEMs, can be expected to seek to minimise the cost to themselves of the NVES. Therefore, costs are likely to at least in part be passed onto dealers and customers.

…which see different prices, vehicles sales and level of carbon abatement

The four modelled scenarios and their key characteristics are outlined in table 1. Not all approaches will see the new vehicle fleet emissions meeting the NVES target, with only scenario 4 seeing the industry as a whole complying with the NVES without necessarily paying penalties (i.e. the obligation could be met only by trading NVES credits).

If the NVES is to see consumers change their purchasing behaviour, prices will need to adjust. Consumers will purchase EVs rather than their preferred conventional fuel vehicle once the vehicle attributes are good enough and/or once the price is low enough.[4] Given the short timer period of the NVES, lower/increase prices for low/high emission vehicles are required to accelerate the fall of fleet emissions.

The availability of zero- and low-emission LCVs remains limited, with more models expected to enter the market in the coming years. To meet the LCV NVES targets would require a significant shift in the vehicle mix, which is considered unlikely to be achievable at this time given consumer preferences. Under scenario 4 the passenger car and SUV mix changes over time to achieve the NVES target for all light-duty vehicles.

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3 Costs arise from purchasing credits or paying penalties to sell high emission vehicles as well as changing the types of vehicles sold. Benefits arise from generating credits from selling low emission vehicles.

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

1 Scenarios compared to the base case

		Scenario 1	Scenario 2	Scenario 3	Scenario 4
		Costs/benefits absorbed by dealers and OEMs	Costs/benefits fully passed onto consumers	Change vehicle mix to meet the passenger and SUV NVES target	Change vehicle mix to meet the NVES target for all light-duty vehicles
EV uptake	All light duty vehicles	- (17% of new car sales by 2029)	↑ (25% of new car sales by 2029)	↑↑ (34% of new car sales by 2029)	↑↑↑ (45% of new car sales by 2029)
Fleet emissions	All light duty vehicles	- (does not meet NVES target)	↓ (does not meet NVES target)	↓↓ (does not meet NVES target)	↓↓↓ (meets NVES target)
Consumer prices	EV	-	↓	↓↓	↓↓↓
	ICE	-	↑	↑↑	↑↑↑
New car sales	All light duty vehicles	-	↓	↓	↑
Dealer Gross sales profit per vehicle	All light duty vehicles	-	-	↑ high emission vehicle ↓ low emission vehicles	↑ high emission vehicle ↓ low emission vehicles
NVES dealer credit/penalty per vehicle	All light duty vehicles	Credit from LEV Penalty from HEV	- (paid for by consumers)	Credit from LEV Penalty from HEV	Credit from LEV Penalty from HEV

Note: HEVs are high emission vehicles whose emissions are above the NVES target in a given year. and LEVs are low emission vehicles, whose emission are below the NVES target in a given year.

Source: CIE

Complying with the NVES is broadly expected to result in higher car prices (at least initially). For the NVES to reduce fleet emissions requires

- Increasing the cost of high emission vehicles
- Decrease the price of low emission vehicles, which tend to be more expensive than high emission vehicles

Because For the NVES to be Under scenarios 2, 3 and 4 prices for internal combustion engine (ICE) vehicles will increase as consumers are pushed towards EVs and other low emission vehicles. Higher prices are expected to result in fewer new car sales but will be offset somewhat by higher used car sales. This is expected to reduce demand for new vehicles and increase demand for used vehicles.

The NVES is expected to impose costs on dealers irrespective of how regulated entities meet their obligations

The magnitude and composition of these costs depends on how regulated entities meet their obligations. This is because different approaches to meet NVES obligations have

different impacts on prices faced by end consumers, the number of new and used vehicles sold, the composition of new vehicles sold and costs for dealerships. The net costs of the NVES which have been modelled include:

- Net cost of NVES penalties and credits which are imposed on dealers – this is generally negative.
- Gross profits from new car sales – this is generally negative.
- Gross profits from used car sales – this is generally positive, but can be negative where the discounting in required to meet the NVES target in scenario 4, see new car prices falling.
- Gross profit from servicing new vehicles –this is generally negative due to lower car sales and the lower servicing requirements for EVs.
- New car holding costs (floorplan financing and space) – in some cases this can be positive (i.e. costs go down) where the additional costs of selling EVs is more than offset by cost savings from fewer new car sales.

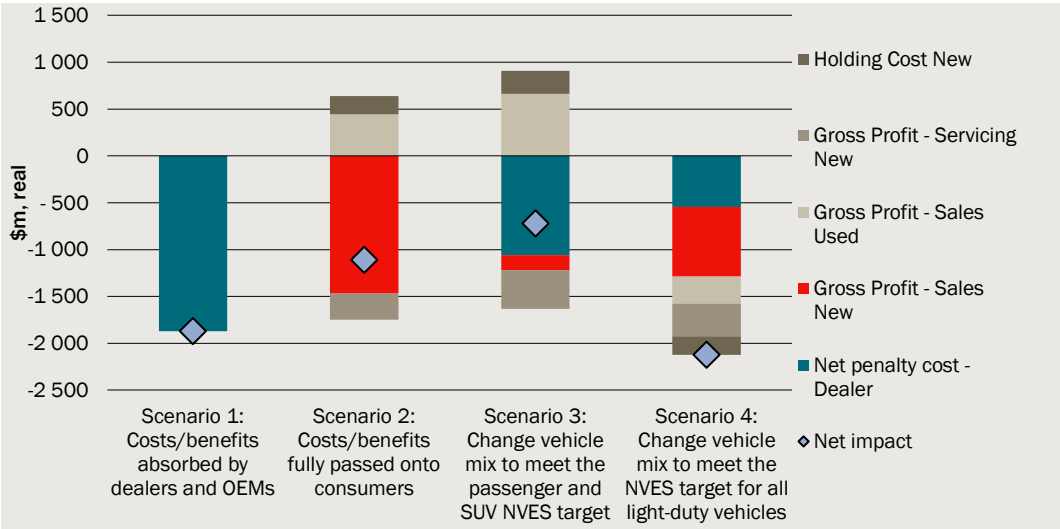
Where no costs are passed onto consumers (scenario 1), there is no change in the mix of new car sales and the only dealership costs relate to NVES penalties (chart 2).

Where NVES credits and penalties are fully passed onto consumers (scenario 2), there is no net penalty cost, but only impacts due the impact that different new vehicle prices have on the level and composition of demand. That is the gross profit per new car sale remains the same with all changes in gross profit due to the fall in the number of cars sold.

Where OEMs seek to move fleet emissions towards the NVES target, the composition of costs changes again, with the precise make up primarily driven by the change in car prices. The overall costs of the NVES are smallest for scenario 3. This is primarily due to the lower gross profit loss, as the fewer new car sales are offset by higher prices and therefore higher gross profits (assuming these rates remain constant). There is still a sizeable cost to dealers as we assume dealers incur 12 per cent (in line with gross profit shares) of the net penalties arising from the NVES. Where more of the net penalty is shared with dealers the greater the cost of the NVES.

Overall, net impacts are highest in Scenario 4 ($2.1 billion) where OEMs meet the NVES target by changing the mix of vehicles sold.

2 Aggregate net impact on all dealers, 2025 to 2029

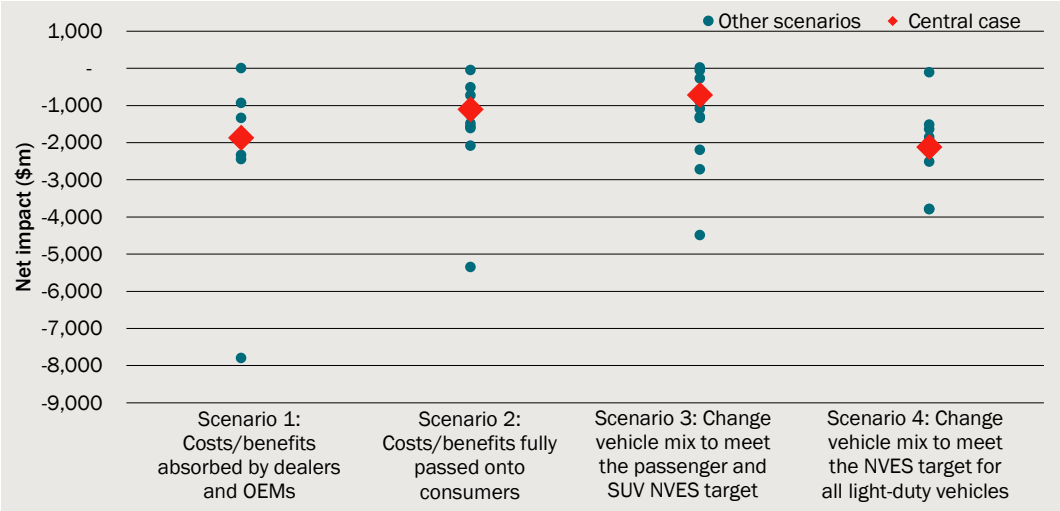


Data source: CIE

We have also undertaken extensive sensitivity testing, recognising that model results are driven by a range of assumptions which are uncertain. Across all these scenarios the NVES imposes net costs on dealerships (chart 3).

The ultimate impact will depend on features of how the NVES plays out, which at this stage is uncertain. This includes the extent to which dealers and OEMs share costs or benefits, the level of the penalty/cost benefit, how strongly consumers respond to price changes (both in the new and used car markets), and how efficiently ICE vehicles can be made over time.

3 Range of net cost to dealers under the NVES



Data source: CIE

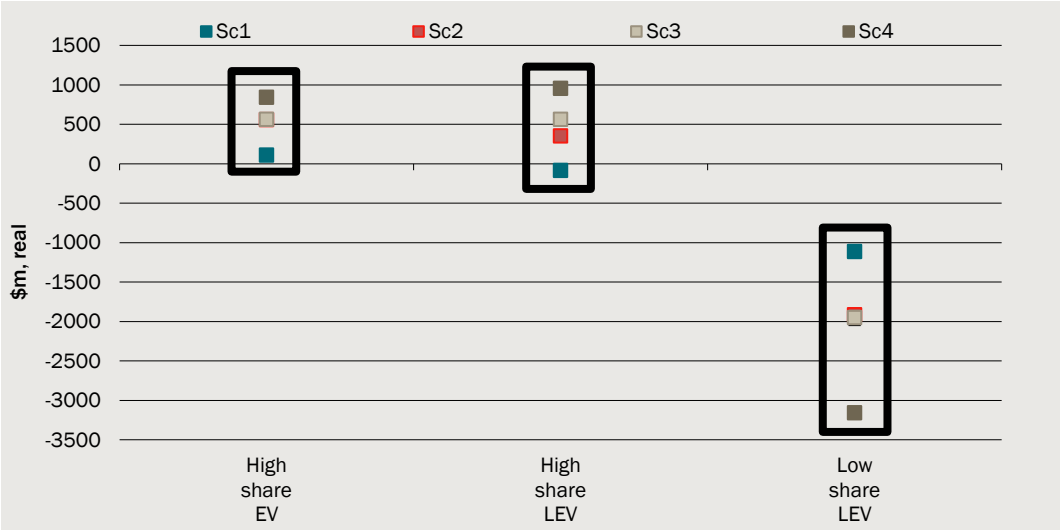
By design, the NVES will divide the industry

For a specific dealership, the impact of the NVES will depend on the types of vehicles they sell. While the overall net impact on the industry is negative, the policy creates clear winners and losers within the industry (chart 4).

- Dealers whose product offering is focused on low emission vehicles, namely EVs, achieve mostly positive or less negative impacts. This is by design as the policy subsidies the sale of these projects by the generation of NVES credits
- ICE-heavy and low EV share dealers face significant costs due to the higher costs of selling higher emission vehicles
- Dealers that sell a mix of hybrids and ICE vehicles will lie somewhere in between.

LCV dealers follow similar trends, with dealers selling a high share of EVs benefiting consistently across scenarios while other dealers face significant losses.

4 Dealer impact by vehicle segment Passenger and SUVs – total, 2025-2029



Data source: CIE

1 Background

The Federal Government has legislated a New Vehicle Efficiency Standard (NVES), which commenced on 1 January 2025 and applies to all new cars sold in Australia. Under this policy the weighted average emission (adjusted for vehicle mass) for each car imported into Australia (and covered by the scheme) is required to be below a specific target, for either passenger and light SUVs or light commercial vehicles (LCVs) and heavy SUVs (table 1.1).

Regulated entities[5], which include original equipment manufacturers (OEMs), or distributors, suppliers or importers, are ultimately responsible for compliance with the NVES. Where average emissions are below the target, credits are generated for a regulated entity, which can be traded. Where average emissions are above the target, regulated entities must either purchase credits from other manufacturers or pay a penalty of $100 per each gCO_2/km the average is above the target for each vehicle sold.

In practice this means:

- OEMs whose weighed average of sales is **below** the target receive a subsidy, in the form of credits that can be traded.
  - This will include EV manufacturers and manufacturers whose sales are dominated by low emission vehicles.
  - EV only manufacturers will receive the largest subsidy.
- OEMs whose weighed average of sales is **above** the target incur an additional cost from either purchasing credits from low emission manufacturers or paying a penalty
  - This will include manufacturers whose sales are dominated by higher emission vehicles.

1.1 Headline NVES emission targets

Scenario	Passenger cars and light SUVs	LCV and heavy SUVs
	gCO_2/km	gCO_2/km
2025 (regulations begin)	141	210
2026	117	180
2027	92	150
2028	68	122
2029	58	110

Source: New Vehicle Efficiency Standard Bill 2024.

Independent of the NVES policy, the car industry is changing. The uptake of EVs is accelerating, new brands are entering the market and there is a continued trend away

5 In this report the terms regulated entities, manufacturers and OEMs are used interchangeably.

from passenger vehicles towards SUVs and LCVs. When quantifying the impact of the NVES, we will need to measure impacts relative to this existing 'baseline' or reference case. There are two options for this comparison:

1 what would have happened in the absence of the NVES – i.e. how are sales and revenues different in 2029 with the NVES, compared to what they would have been in 2029 without an NVES?

2 what would happen in the future compared to today – i.e. how are sales and revenues different in 2029 with the NVES, compared to today without an NVES?

The first of these would give more information (the impact compared to today could also be shown) but requires additional work to define a 'without NVES' scenario. The first would also provide a like for like comparison, accounting for changes to the motor vehicle industry which will occur regardless of a NVES.

1.2 Summary of key issues

Issue	Description and approach
How will the mix of car imports change?	Understanding the types of cars which will be imported and sold with and without an NVES is critical to understand the impact on dealers. ▪ At one extreme the NVES targets could be met by changing only changing the types of cars sold in Australia – NVES met by trading credits only. ▪ At the other, there could be no change in the mix of vehicles. types of vehicles could remain unchanged – NVES met by trading credits and paying penalties How the NVES is met will affect how dealers are impacted as it will change the types of vehicles which are sold.
To what extent will prices faced by consumers change in response to NVES policy?	For the NVES policy to have an impact on vehicle choices, prices will need to change. Understanding how large the price changes need to be to meet the NVES targets will inform: ▪ Changes in revenue for dealers, through changes in prices, and volume of vehicle sold ▪ Changes in the types of vehicles sold. This may include: – Consumers changing their choice of new car due to the policy – Choosing to purchase a used vehicle instead of new (or vice versa) – Choosing to defer or forego purchasing a new vehicle
How do dealer margins vary across different types of vehicles and to what extent will they change due to an NVES?	Dealer margins dictate how revenue translates to profits. It seems possible that margins are likely to vary across different vehicle types and that they could change in response to the NVES.

How will changes in the type and quantity of cars sold impact on the servicing part of dealerships?	Servicing is an important part of car dealerships. As the type of vehicles sold change, revenue from servicing may also change as some vehicle types (namely EVs) cost less to service. Similarly a fall in new car sales may see a drop in new car servicing income for dealerships.

Source: CIE

This study

The Australian Automotive Dealer Association (AADA) has commissioned the CIE to undertake analysis to understand the impact of the NVES on automotive dealers (AADA's members). This has consisted of the following tasks:

- Identify the impact pathways associated with the NVES (**chapter 2** of this report).
  - This involves exploring the ways in which the NVES may impact on automotive dealers and related stakeholders, namely customers and original equipment manufacturers (OEMs).
- Develop scenarios which describe the range of possible ways in which the NVES may play out in the market for new cars, plus a without NVES base case (**chapter 3** of this report).
  - A range of scenarios were developed to reflect the uncertainty around how the costs and benefits of an NVES may be shared between OEMs, dealers and consumers.
  - The base case, without the NVES, is used as a reference case. Impacts from the NVES are compared relative to the base case.
- Quantify the impacts of the NVES (**chapter 4** of this report).

Further information on data, modelling assumptions and approaches are provided in the appendices.

Limitations of this study

There are several limitations and unknowns which affect the results of this study, which are noted below:

- Uncertainty around how the NVES will impact new car markets. We have sought to account for this by modelling a range of plausible scenarios, however there is some uncertainty around which scenario actual outcomes will settle.

  As the NVES is introduced, we would expect OEMs to experiment with different approaches to comply with their obligations while maximising profits. This may mean that:
  - the impact may change overtime
  - this uncertainty may be resolved over time as OEMs become familiar with the NVES and how best to meet the targets given consumer preferences and other factors.

- Impacts will vary considerably by brand. For example, some brands may seek to meet their obligations by changing the mix of vehicles they sell while others may be happy to pay the penalty (or buy credits). We have modelled impacts at the aggregate market level and mapped this back to individual brands based on the current product mix, and does not reflect the potential for varied responses.
- Independent of changes related to the NVES, the car industry in Australia and globally is undergoing an unprecedented change with the shift from ICE vehicles to EVs or other low emission vehicles. This has and is expected to continue to be characterised by:
  - new brands and models entering the market
    - for example, there are a large number of Chinese EV brands expected to enter the market over the coming years
  - associated changes in the competitive dynamics due to new brands and models, which affect prices
  - changes in the technical characteristics and costs of EVs due to continued product and supply chain innovation.

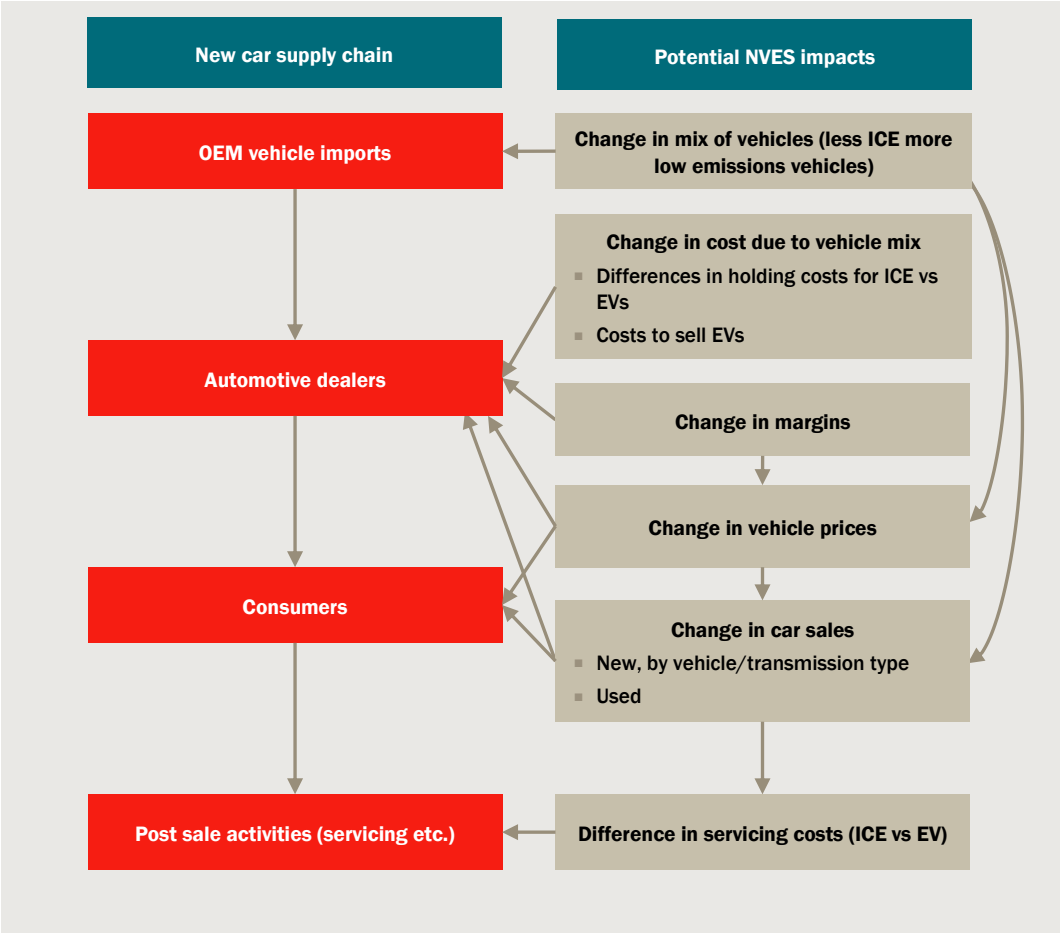
  Higher quality or lower cost EVs could reduce the costs of meeting the NVES.

  The changes in the car industry may impose costs and benefits on dealerships. In the modelling we account for the entry of new car brands as part of new car sales projections but do not account for other changes (i.e. increased competition leading to lower prices).
- The trajectory of technological improvement in the base case, will influence the impact of the NVES. For example, rapid innovation around battery technology, could see a more rapid uptake of EVs which in turn would affect weighted average emissions of new vehicles and therefore the impact of the NVES.
- Uptake of EVs is also limited by physical charging infrastructure. An accelerated rollout of this infrastructure could bring forward EV uptake which in turn would reduce weighted average emissions of new vehicles and therefore the impact of the NVES.
- We have modelled consumer preferences as being fixed over the evaluation period. If these change, for example due to greater familiarity with EVs this would affect the modelled results.

2 NVES Impact pathway

The NVES is likely to have several impacts on the market for new vehicles and therefore for automotive dealers (chart 2.1). These impacts are discussed in detail in following sections.

2.1 Illustrative new vehicle supply chain



Data source: CIE.

Vehicle imports

The NVES may affect the types of vehicle manufacturers choose to import to Australia. Namely, this could see lower emissions vehicles coming to the market. How manufacturers, who ultimately decide which cars to market in Australia, react to the NVES is uncertain. For example, the types of cars sold could remain unchanged, with

the costs of the NVES either being absorbed by the manufacturer or passed onto dealers and or customers.

- Insofar as the types of vehicles change, this may change the number of sales depending on the prices, characteristics and consumer preferences. Low emission vehicles currently tend to be more expensive than comparable higher emission vehicles and provide different characteristics in terms of range, operating costs, and performance.
- This may affect profits for dealers depending on the number of sales and margins of these vehicles (and the extent to which margins differ from vehicles they currently sell).

Automotive dealers

Any changes in the mix of vehicles will result in:

- Changes in prices to:
  - accommodate a different desired sales mix (i.e. more EVs and fewer ICE vehicles)
  - pass on the costs and benefits of penalties and subsidies to customers, which in turn will affect the mix of vehicles sold for a given OEM
- Changes in margins. Where the revenue or costs of selling a given vehicle change for an OEM, these may be reflected in wholesale prices and the margins faced by dealers.
- Changes in the number of vehicles sold, as changes in prices impact consumer decisions. Where prices of new vehicles increase, consumers may choose to:
  - purchase the vehicle they would have purchased in the absence of an emission standard and incur the additional cost
  - switch to a lower cost car, which could be an EV whose price may now be lower due to the NVES
  - not purchase a vehicle and retain their existing vehicle or use other forms of transport, or
  - purchase a used vehicle. Further information on the impact on used car markets is provided in box 2.2.

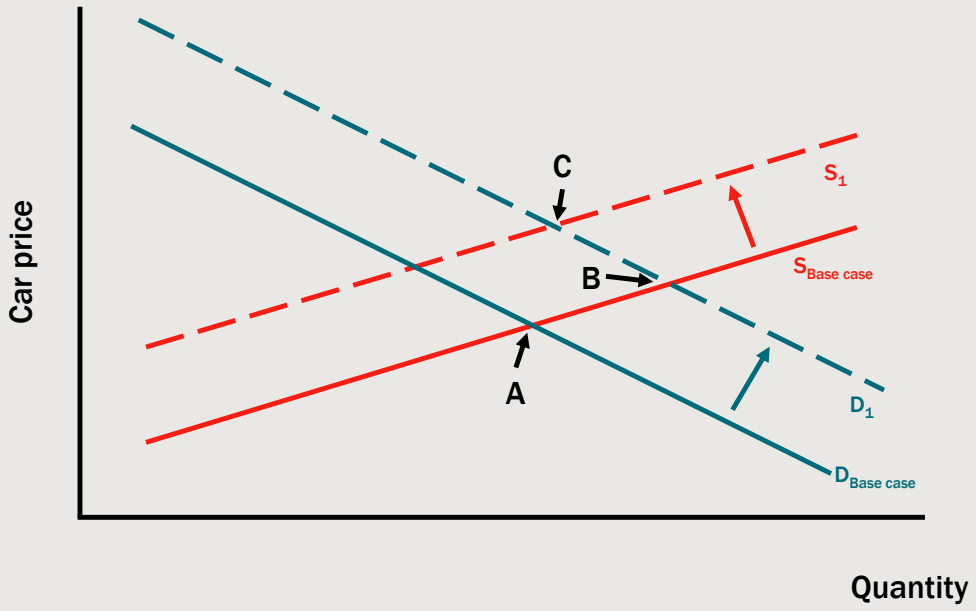
2.2 NVES impact on used car markets

Used car markets are directly related to the new car market, as new and used cars are substitutes and new car sales create use car supply. NVES impacts are expected to include:

- Changing the composition of used markets overtime with higher uptake of EVs
- Price changes in the used market due to price changes in the new market. The chain of effects at market level is illustrated in a simplified supply and demand illustration for new and used cars (chart 2.3)
  - Prior to introduction of an emission standard, the used car market starts at point A

- An increase in price in new car markets is expected to result in an increase in demand for used cars (as consumers substitute from new to used cars), seeing demand shift to D_1 and the equilibrium moves to point B
  - The amount of new- and used-car demand curves shift is determined by the elasticity of substitution between new and used cars.
- Overtime another response to higher new car prices may be consumers holding onto their cars for longer, reducing supply to the used car market. This reduced turnover may result in an upward shift in the supply curve to S_1 and the market reaching a new equilibrium at point C.
- At point C, prices will be higher, with the overall impact on turnover (the number of used car sales) uncertain.

2.3 NVES impact on used car market



Source: CIE

The incidence of the additional cost for higher emission vehicles is uncertain. Although manufacturers are likely to find the lowest costs means by which to meet standards (i.e. by importing new lower emission vehicles) there is still likely to be a cost. We would expect that the price of higher emission vehicles will increase, and the number of vehicles sold will fall.

- Costs of selling higher emission vehicles are likely to be shared between sellers (manufacturers and dealers) and consumers.
- How the cost impacts are shared between manufacturers and dealers will depend on how and if margins were to change, which will depend on relative elasticities of demand and supply and the competitive structure of the industry.

For lower emitting vehicles, the NVES will effectively be a subsidy. In 2025, this subsidy will be worth $14 100 per EV sold (assuming NVES credits are traded at the penalty

value). This has the opposite effect as an implied tax and will see the supply curve shift down. The incidence of the subsidy will again depend on the relative elasticity. How this is shared between dealers and manufacturers will depend on how and if margins change, which are determined by the relative elasticities of demand and supply, as well as the competitive structure of the industry.

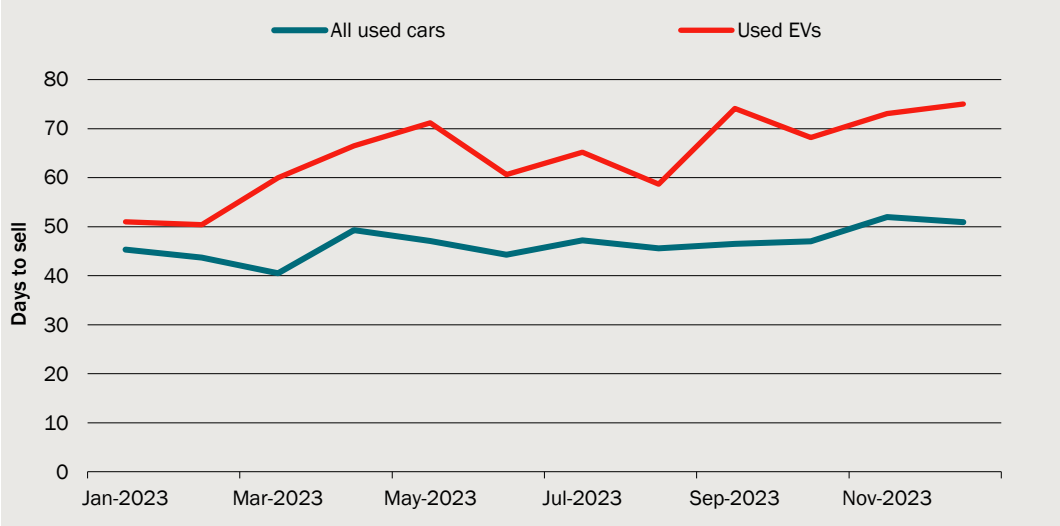
Price impacts in the new car market will flow onto the used car market. To some extent new and used cars will be substitutes. This means that an increase (or fall) in price in one market will generally result in an increase (or fall in the other). Overall, we would expect new car prices to increase as low emission vehicles (EVs and hybrids) currently tend to be more expensive than higher emission (ICE) vehicles.

Insofar as prices change, the types of cars people buy may also change (i.e. consumers may switch from purchasing an SUV to a passenger car).

In addition to changes in the market for new cars, the NVES may change the costs imposed on dealerships. Two key impacts are expected to be:

- Costs associated with selling EVs compared to ICE vehicles. Historically there has been a difference in the time taken to sell used EVs compared to all used vehicles (chart 2.4). Although the same data is not available, if a similar pattern were replicated for new cars, selling additional EVs would impose additional costs associated with:
  - Floorplan financing (i.e. the cost of capital associated with holding stock for longer)
  - The cost of additional space taken up by additional stock holdings
- Cost of selling EVs where this was previously not the case. If the NVES results in OEMs, which do not currently sell EVs, to now sell EVs these dealers may incur costs to allow them to sell and service EVs. These costs may include:
  - tooling,
  - vehicle storage,
  - battery storage,
  - charging infrastructure, and
  - hiring and or training of specialist technicians to service EVs.

2.4 Days to sell used vehicles –EVs vs all vehicle types



Data source: AADA and Autograb (2024), 2023 Automotive Insights Report

Post sale activities

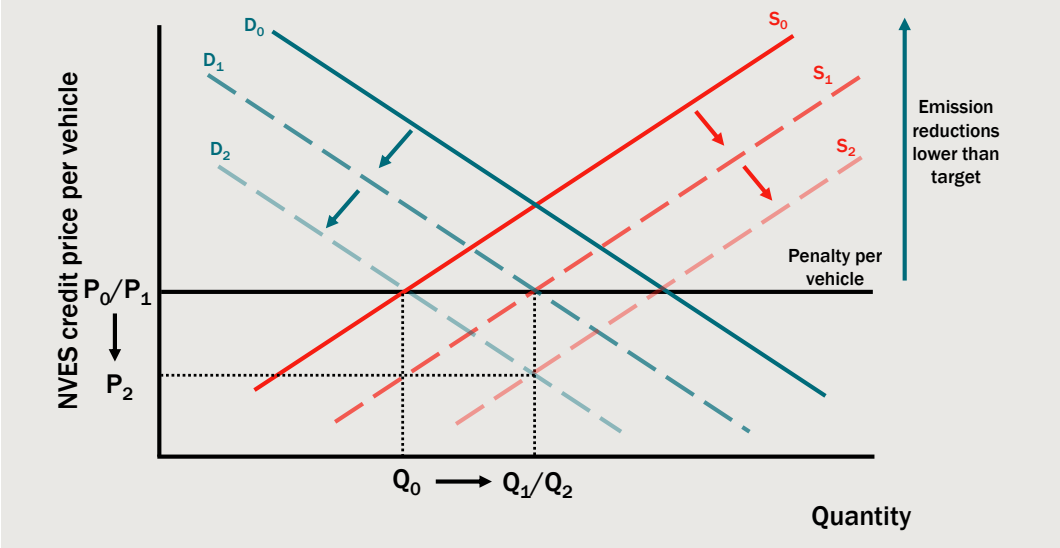
Changes in the volume of new and the type of new vehicle sales (i.e. ICE vs EV) may also affect servicing parts for dealer's businesses. Fewer new car sales may affect the volume of servicing, while EVs are likely to have different servicing needs and costs affecting revenues.

Market for NVES credits

The NVES allows for trading of emissions credits. This effectively creates a market where brands who outperform the NVES target each year (i.e. have emissions below the NVES target) are able to sell their credits to other brands who do not meet the NVES target for weighted average emissions. The outcome of this market will determine the costs and benefits of the policy.

- If demand for credits is greater than or equal to the supply for credits, the value of credits will be anchored by the NVES penalty rate ($100 per gCO_2/km for weighted average of emission above the NVES cap)
  - For example, where the average NVES target is 100 gCO2/km, credits generated from selling an EV would be worth $10,000 per EV ($100 times 100 gCO_2/km)
  - For brands who sell higher emitting vehicles, the penalty is the shadow price of meeting the target (they could incur a penalty instead of changing sales mix).
  - Where a penalty is paid, the full benefits of the NVES are not realised (e.g. the emission reductions associated with the target).
- If demand for credits is lower than the supply for credits, the value of credits will be less than the NVES penalty rate. This means that, the whole car industry is currently meeting the NVES target, while the price of credits – being set by the market – could be lower than the penalty.

2.5 Market for NVES credits



Data source: CIE

Key determinants of the NVES market outcomes are the aspects of the legislation that determine how the scheme functions. In particular:

- The penalty of not meeting the NVES standard is set at \$100 per gCO_2/km above the target.
  - Note that the penalty is uncertain. Although the act sets out a penalty of \$100 per gCO_2/km, the Secretary could alternatively issue an infringement notice penalty of which would be \$50 for each gCO_2/km.[6] We use \$100 per gCO_2/km, in our central estimates as only this is set out in the act, but test the impact of \$50 per gCO_2/km as part of sensitivity testing.
- If brands do not meet the NVES standard, they have an additional two years to purchase credits.
  - For example, for 2025, brands will have until 1 February 2028 to purchase credits. This would allow credits generated in 2025 and 2026 to be used.[7]
  - Note we understand that credits for a given year are created as soon as possible after the following 1 February.[8] As a result we do not believe that credit generated for 2027 could be used to meet 2025 obligations.
- Banking of credits is allowed, with credits generated being valid for three years after which they are extinguished if not used.[9]
  - For example, units generated for 2025 (on 1 February 2026), will be extinguished on 1 February 2029 if they are not used. This means that credits generated for 2025 can be used to meet obligations for 2025, 2026 and 2027.

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6 Gibson, E. 'New Vehicle Efficiency Standard Bill 2024 [and] New Vehicle Efficiency Standard (Consequential Amendments) Bill 2024', BILLS DIGEST NO. 63, 2023–24, 2024.

7 *New Vehicle Efficiency Standard Bill 2024* (Cth) pt 2 div 3 sub-div A s 17.

8 *New Vehicle Efficiency Standard Bill 2024* (Cth) pt 3 div 2 s 39(1).

9 *New Vehicle Efficiency Standard Bill 2024* (Cth) pt 3 div 3 sub-div 3 s 44.

- Credits only have value insofar as they can be traded. Brands who outperform the NVES can only realise their value by trading credits with brands that need them.
- Demand and supply for credits are influenced by the NVES emissions target

Combining these key aspects together, we have mapped the years in which credits are generated to the years for which they may be applied to NVES obligations (table 2.6). For example, a brand who does not meet the NVES target in 2028, would be able to use credits generated in either 2026, 2027,2028 and 2029, and would be required to meet that obligation by 1 February 2031.

2.6 NVES obligations and credits by year

Year of obligation	Years credits which can be used to meet obligation
2025 [a]	2025 and 2026
2026	2025, 2026 and 2027
2027	2025, 2026, 2027 and 2028
2028	2026, 2027, 2028 and 2029
2029	2027, 2028, 2029 and 2030

[a] The NVES will commence on 1 January 2025 but manufacturers will not begin earning credits or penalties until 1 July 2025. We interpret this as meaning the 2025 obligations and credits will be generated based on new case sales for the second half of 2025.

Note: The NVES only has targets to 2030, however we expect that the scheme would be renewed in future years.

Source: CIE based on *New Vehicle Efficiency Standard Bill 2024* (Cth).

This creates complicated intertemporal market, as the prices of credits generated in any given year, or purchased to meet an obligation in a given year are linked to other years. This means that prices across years will be linked and jointly determined. This is because credits generated in several years can be used to meet obligations in a given year; for example credit generated in 2026, 2027, 2028 and 2029 are substitutes to meet any NVES obligation generated in 2028. This means that under certainty (i.e. if OEMs know what vehicles will be sold in future periods) they must have the same price.

We would expect the cost of these credits to be anchored by the penalty rate of \$100 per gCO_2/km, where there is a shortage of credits (i.e. the car market is not currently meeting the NVES across the regulatory period). This is because OEMs not meeting the target will always be able to choose the penalty; if prices for credits rise above the penalty, these OEMs will maximise profits by paying the penalty. Similarly, if prices are below the penalty, sellers of credits will also be incentivised to increase prices to the penalty where buyers are indifferent between credits and the penalty.

Where this outcome becomes less certain is when:

- There is a surplus of credits, or the NVES is not binding. If the NVES emission target is set above what emissions would have been anyway, the policy will have a limited effect on car markets (beyond passing the cost of the penalty onto customers). In this case prices will be determined by the balance of the demand (OEMs who individually do not meet the target) and supply of credits.

Overseas, where emissions standards already operate, there is some evidence of a surplus of credits with credits trading at a discount to penalties (noting comparisons are often difficult as credit price information is generally not published):

- In the EU emission penalties are typically less than the amount of the potential penalty.[10]
- In New Zealand credits are currently trading around $15-$20 (NZD)[11], which is below the penalty rates of between $54 - 67.50 NZD per gCO_2/km (new cars) and $27 – 33.75 NZD per gCO_2/km (used cars).[12]

- OEMs have a specific preference for either paying the penalty or purchasing credits (avoiding penalties).
  - OEMs may try to avoid paying penalties where this has some other costs (such as for reputational reasons)[13]. In this case credits may trade above the value of the penalty.
  - There is mixed anecdotal evidence of willingness to pay penalties:
    - In the EU it is reported that vehicle manufacturers prefer to enter pooling arrangements as opposed to paying fines to the European Commission for reputational reasons.[14]
    - Historically the payment of fines in the US was limited to luxury car manufactures (presumably whose consumers were willing to trade off price for vehicle performance), however more recently large manufacturers in the US have chosen to pay penalties instead of complying with CAFE Standards.[15]
- The market for credits is not efficient. This may occur for a range of reasons and could see credits trading at various prices. Factors which could cause this include:
  - Imperfect information around market prices
  - Uncertainty around future sales of vehicles and credits required to meet obligation (relevant where OEMs sell ICE and low emission vehicles, but the future mix of sales is uncertain)
  - Lack of market participation
  - Market power, if a few large OEMs dominate the market, they may manipulate prices

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10 L Freeman, 'The new European vehicle CO2 emissions targets and opportunities for manufacturers to trade CO2 emissions credits', in *Bird & Bird*, September 2024, https://www.twobirds.com/en/insights/2024/belgium/the-new-european-vehicle-co2emissions-targets,

11 https://co2x.nz/buy-credits/

12 https://www.nzta.govt.nz/vehicles/clean-car-programme/clean-car-standard/information-for-importers-how-the-ccs-works/credits-charges-and-payments/#charges-and-payments

13 https://www.twobirds.com/-/media/pdfs/article-new-european-rules-for-vehicle-co2-emissions-june-2019.pdf?la=en&hash=FAA484183E54151C44449839B88515055198DC47

14 https://www.twobirds.com/en/insights/2024/belgium/the-new-european-vehicle-co2emissions-targets

15 https://blog.ucsusa.org/dave-cooke/automakers-opt-out-of-cleaning-up-their-vehiclesbut-at-what-cost/

3 Scenarios

In the following section we outline the base case and the scenarios which have been used to model the impact of the NVES on vehicle dealerships.

This consists of developing a base case and four scenarios:

- **Base case,** which describes what is expected to occur in the absence of an NVES. The impact of the NVES on dealerships is measured relative to the base case.
- **Scenario 1: No change in vehicle sales (costs/benefits absorbed by dealers/OEMs)**. Under this scenario we assume that the types of vehicles sold do not change, which in turn assumes that vehicle prices faced by consumers are unaffected by the NVES. In this case, the costs and benefits of meeting the NVES are shared by dealers and OEMs.
- **Scenario 2: Change in vehicle mix due to full passthrough of costs/benefits.** Under this scenario we determine changes in vehicle prices based on the costs and benefits of the NVES being fully passed onto customers. We determine the market shares across transmission types which are consistent with these prices.
- **Scenario 3: Change in vehicle mix that meets the passenger and SUV NVES target.** Under this scenario we determine how vehicle prices would need to change to meet the NVES target. Hereby, we only model the passenger cars/SUVs NVES target, as it is unlikely that the LCV NVES target can be achieved on its own.
- **Scenario 4: Change in vehicle mix to meet 'all light duty vehicles' NVES target.** Under this scenario we determine how vehicle prices would need to change to meet the NVES target across all light duty vehicles.

This analysis is limited by the information available – in particular the base case has been developed using publicly available information.

Base case

The base case, or business-as-usual (BAU) scenario, describes the expected emissions from new vehicle sales in the absence of the NVES. It represents how emissions are anticipated to evolve over time, driven by market and consumer trends, independent of additional government intervention. Key drivers of emissions under the base case include:

- EV and other low emissions vehicle uptake rates – primarily influenced by consumer preferences, available vehicle choices, and supply chain dynamics
- Assumed emissions from each vehicle and fuel type – reflecting improvements in vehicle technology over time

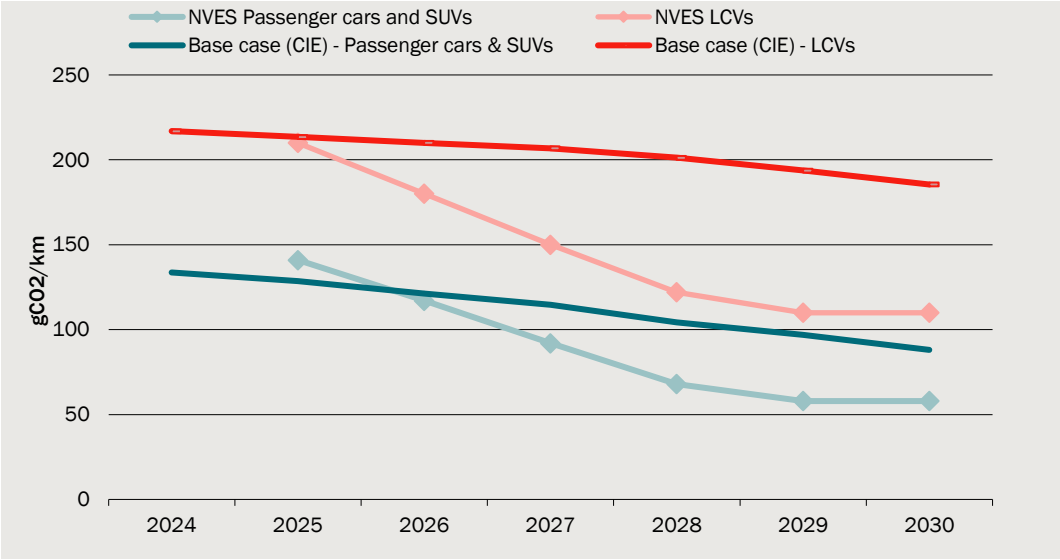
- Total vehicle sales and preferences – including shifts toward larger vehicles, such as SUVs.

Understanding the BAU scenario is essential to evaluating the incremental impact of the NVES. The base case estimates are derived from the projected technology mix for new light-duty vehicle sales, as prepared by the Commonwealth in 2023.[16] The total number of vehicle sales was provided by the Australian Automotive Dealer Association (AADA) based on analysis undertaken by Blueflag. The technology mix projections, initially from 2023, have been updated by the CIE using publicly available data.[17]

The chart 3.1 below illustrates our estimates for combined passenger cars and SUVs, as well as light commercial vehicles (LCVs), along with the NVES targets:

- Over time, overall emissions are expected to decline as the uptake of low- and zero-emission vehicles increases.
- The NVES targets become binding in 2026 for passenger cars and SUVs, and in 2025 for LCVs, i.e., the industry as a whole does not meet the defined targets.
  - This implies that, even with credit trading, some companies will face penalties—particularly in the LCV market. To meet the NVES targets, OEMs would therefore need to move away from the base case (without NVES) mix of vehicles sold.

3.1 Base case – Passenger cars & SUV and LCV



Data source: CIE

16 DCCEEW 2023, *Methodology for Australia's 2023 emissions projections,* Department of Climate Change, Energy, the Environment and Water, Canberra, November. This publication is available at https://www.dcceew.gov.au/climate-change/publications/australias-emissions-projections-2023.

17 Australian Automobile Association's (AAA) Electric Vehicle (EV) Index, https://www.aaa.asn.au/research-data/electric-vehicle/

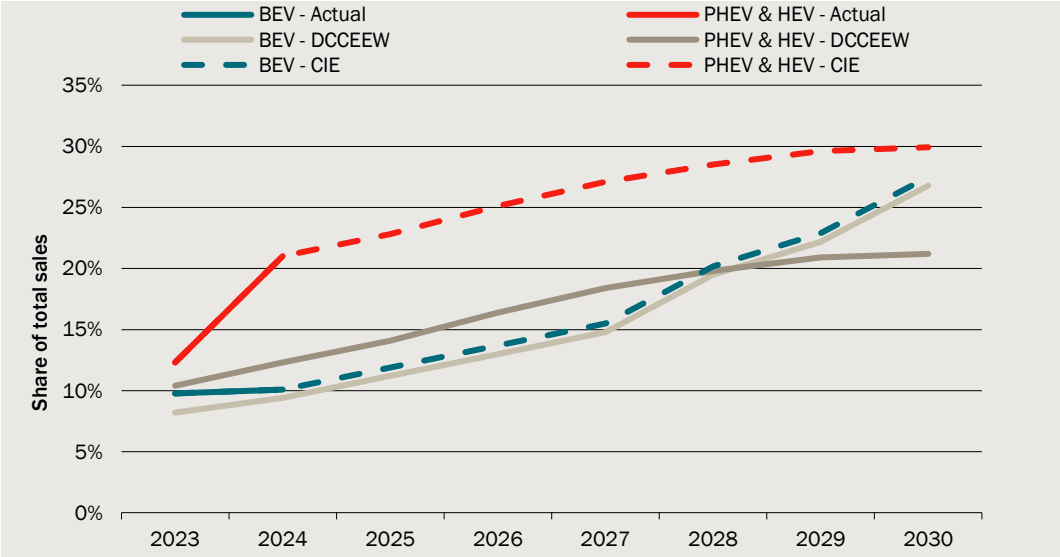
Zero and low-emissions vehicle uptake

The technology uptake for zero- and low-emission vehicles is based on DCCEEW's 2023 projections. These projections incorporate historical registration data from BITRE (2023) and sales data from VFACTS to calibrate the model to the 2023 financial year. These projections account for trends in drive train adoption, analysed individually for each vehicle type, and incorporate ratios such as shifts between petrol and diesel or PHEV and EV adoption. The modelling also uses a technology adoption function influenced by factors like projected model availability and first-year return on investment.

We have updated DCCEEW's projections using actual sales data for 2023 and extrapolated data for 2024 (based on Q1 to Q3 sales in 2024):

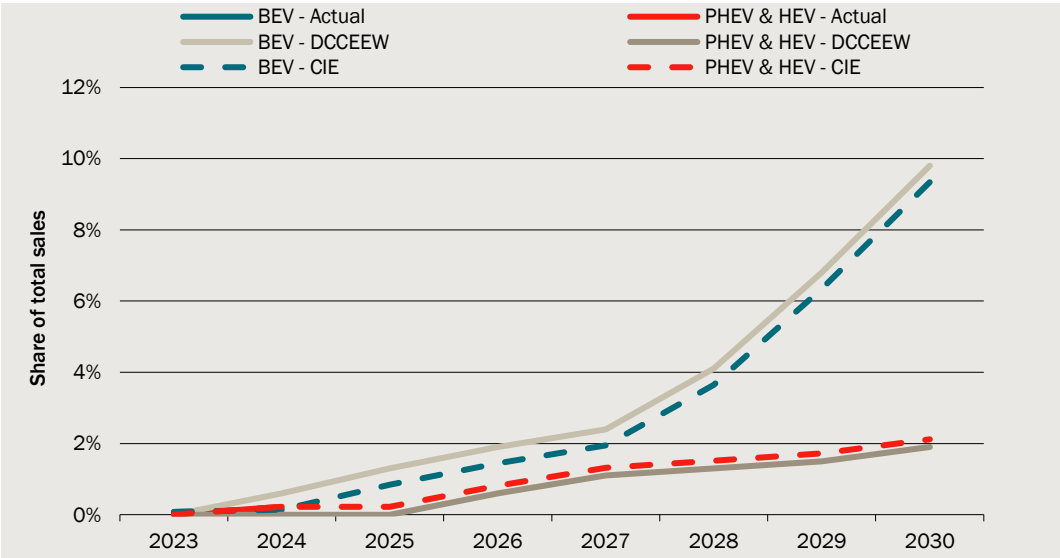
- Passenger cars and SUVs (chart 3.2) – the actual share of hybrid electric vehicles (HEVs) and plug-in hybrid electric vehicles (PHEVs) was significantly higher than projected by DCCEEW for 2024, reaching 21.0 per cent compared to the projected 12.3 per cent.
- LCVs (chart 3.3) – while DCCEEW's projections were more optimistic regarding EV uptake, the actual share of HEVs and PHEVs was slightly higher than anticipated. However, the availability of zero- and low-emission LCVs remains limited, with more models expected to enter the market in the coming years.

3.2 Zero and low-emissions vehicle uptake – passenger cars and SUVs



Data source: CIE, DCCEEW (2023)

3.3 Zero and low-emissions vehicle uptake – LCVs



Data source: CIE, DCCEEW (2023)

Emissions by vehicle type

Analysis is based on light vehicle fleet emissions data published by the National Transport Commission (NTC)[18] with assumptions about improvement in efficiency overtime:

- for petrol passenger vehicles and SUVs, efficiency improvements are approximately 1.4 gCO2/km and 2.7 gCO2/km year-on-year in 2025 until 2030, based on the previous 5-year linear trend
- for petrol LCV, efficiency improvements are 1.6 gCO2/km year-on-year in 2025 until 2030
- All other fuel types are assessed based on their previously observed relative emissions in comparison to petrol vehicles.

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.

We have calibrated the model to have the same starting point as the Blueflag data provided by AADA.

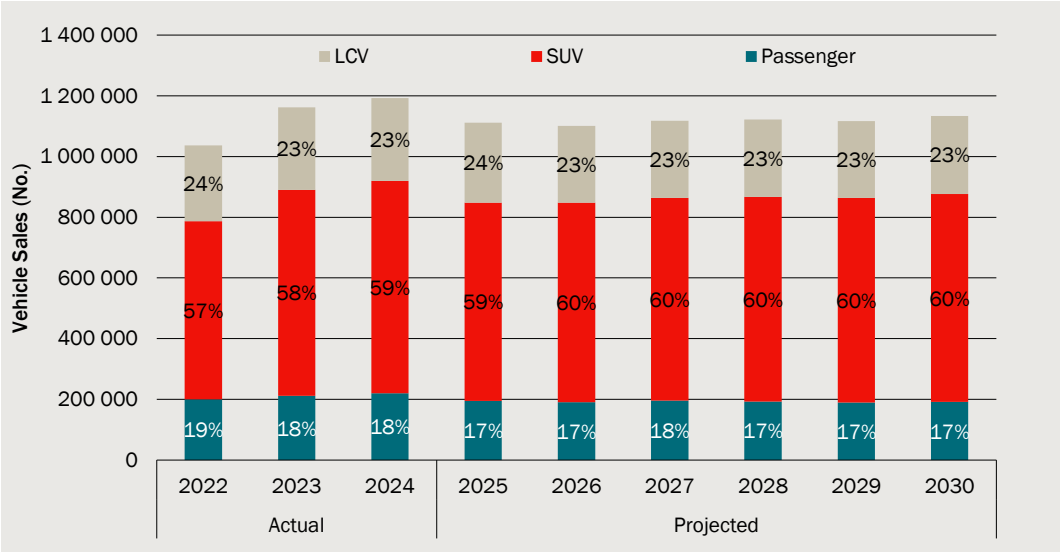
Sales by vehicle types

Different vehicle types have varying sticker emissions, and the mix of vehicle types sold significantly influences the overall fleet emissions of the industry. Data on actual sales are sourced from AAA reports, while future sales projections are based on conservative estimates provided by AADA (*Blueflag*).

18 Recent reporting is available here: Recent reporting is available here: https://www.ntc.gov.au/light-vehicle-emissions-intensityaustralia.

Over the forecasting period, the composition of vehicle types and the total number of vehicles sold are projected to remain relatively stable (chart 3.4).

3.4 Vehicles sales by vehicle type



Data source: CIE, Blueflag conservative projection, AAA (2024) https://www.aaa.asn.au/research-data/electric-vehicle/

Scenarios

The scenarios have been designed to assess the impact of a range of potential outcomes of the NVES and can be grouped into two distinct *approaches* which OEMs may take in response to the NVES:

- **Market Response Scenarios (Scenarios 1 and 2)**: These scenarios explore the market dynamics under two contrasting conditions: a full absorption of costs and benefits by OEMs and dealers, or a complete passthrough of costs and benefits to customers.
  - **Scenario 1**: No change compared to the base case.
  - **Scenario 2**: We model how price changes influence the vehicle mix sold. The price changes depend on the level of costs (penalties) and benefits (credits) by vehicle and fuel type.
    - For example:
      - For EVs, value of credits generated by selling a passenger or SUV EV ranges from $14,100 in 2025 to $5,800 in 2029, assuming credits can be sold at the same price as the penalty.
      - For ICE vehicles, the penalty depends on the vehicle type and fuel type (petrol versus diesel). SUVs and LCVs generally have higher emissions, leading to a higher implied penalty on average. Overall, the penalties range from approximately $1,000 in 2025 to $12,000 in 2029.
    - Given that NVES targets change over time, but credits can be traded, and penalties can be settled across most of the period, we calculate a *weighted average price* change for each vehicle and fuel type.

    - For EVs, the effective subsidy is around $9,000 for passenger cars and SUVs and $13,000 for LCVs.
    - For ICE vehicles, the effective additional cost is around $5,000 for petrol passenger cars and SUVs, higher for diesel cars, and approximately $6,000 for LCVs.

- **Compliance Scenarios (Scenarios 3 and 4)**: These scenarios are designed to evaluate the adjustments needed to achieve either the passenger car and SUV NVES target or the broader target for all light-duty vehicles. We model the necessary changes in the vehicle mix to meet the targets and assess the resulting impacts on consumer prices.
  - **Scenario 3**: The passenger car and SUV mix changes over time to achieve the NVES target. However, as LCVs do not meet their own target, the overall NVES target is not achieved. We model the price changes needed to incentivise enough consumers to switch to EVs. For LCVs, we use the same price changes as modelled under Scenario 2.
    - This reflects the current lack of available electric LCVs and the significant shift in the vehicle mix that would otherwise be required, which is considered unlikely to be achievable at this time.
  - **Scenario 4**: The passenger car and SUV mix changes over time to achieve the NVES target for all light-duty vehicles. Like Scenario 3, we apply the same price changes for LCVs as in Scenario 2. As a result, an even greater number of passenger car and SUV EVs must be sold to compensate for LCVs not meeting their target.
    - Our central case focuses on achieving the NVES targets by increasing the share of EVs sold. We also test sensitivities where the targets are achieved through a considerably higher share and mix of zero- and low-emission vehicles.

Table 3.5 summarises the impacts of each scenario on the uptake of EVs, the industry-wide fleet emissions, and the consumer prices by vehicle type and in aggregate.

3.5 Scenarios compared to the base case

		Scenario 1	Scenario 2	Scenario 3	Scenario 4
		No change in vehicle sales (costs/benefits absorbed by dealers/OEMS)	Change in vehicle mix due to full passthrough of costs/benefits	Change in vehicle mix to meet passenger & SUV NVES target	Change in vehicle mix to meet all light duty vehicle NVES target
EV uptake	Passenger & SUV	-	↑	↑↑	↑↑↑
	LCV	-	↑	↑	↑
Fleet emissions	Passenger & SUV	-	↓ (does not meet NVES target)	↓↓ (meets NVES target)	↓↓↓ (exceeds NVES target)
	LCV	-	↓ (does not meet NVES target)	↓ (does not meet NVES target)	↓ (does not meet NVES target)
	All light duty vehicles	-	Does not meet NVES target	Does not meet NVES target	Meets NVES target
Consumer prices	Passenger & SUV - EV	-	↓	↓↓	↓↓↓
	Passenger & SUV - ICE	-	↑	↑↑	↑↑↑
	LCV - EV	-	↓	↓	↓
	LCV - ICE	-	↑	↑	↑
Consumer prices aggregated market	Passenger & SUV	-	↑	↑	↓
	LCV	-	↑	↑	↑
New car sales	All light duty vehicles	-	↓	↑	↑

Source: CIE

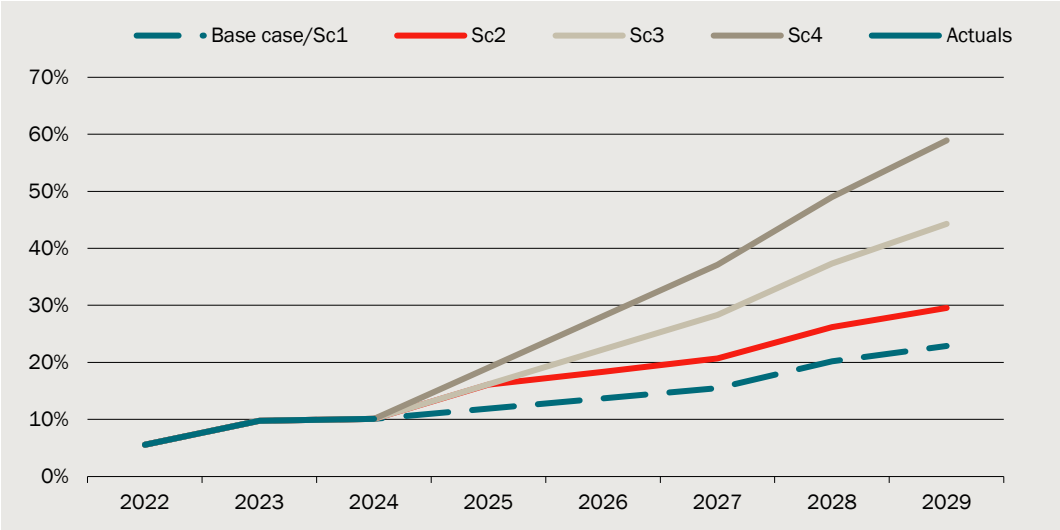
EV uptake and fleet emissions

The charts below illustrate how the modelled changes in EV uptake vary across all vehicle types:

- Passing through the costs and benefits of the NVES to consumers (scenario 2) leads to an increase in overall EV uptake. As a result, the average annual growth rate rises to 24 per cent, compared to 18 per cent under the base case.
- Achieving the passenger car and SUV NVES target (scenario 3) requires a significantly accelerated EV uptake growth rate of 34 per cent per year, or almost twice as many EV sales by 2029 compared to the base case.
- Meeting the broader NVES target for all light-duty vehicles (scenario 4) demands an even higher annual growth rate of 42 per cent, which equates to more than 2.5 times the EV sales by 2029 relative to the base case.

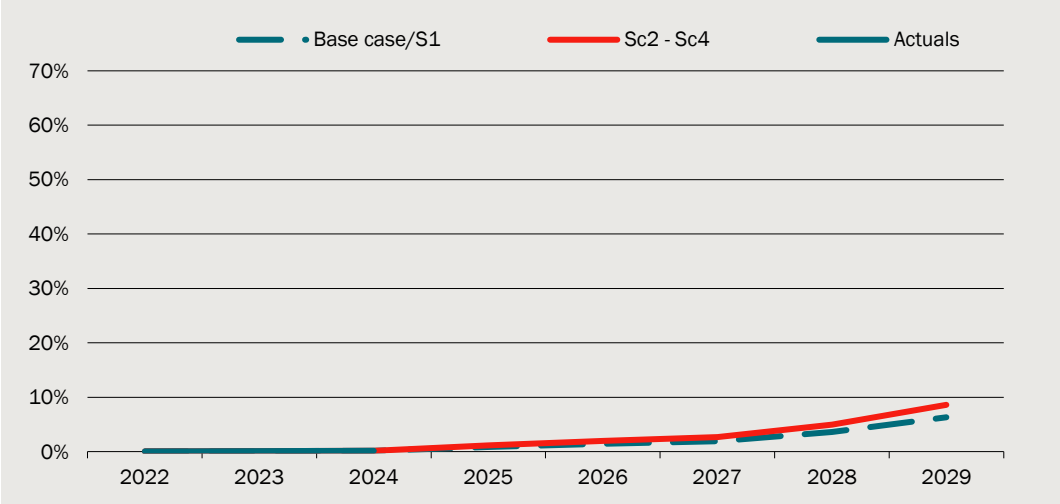
- As noted above, due to the current lack of available electric LCVs and the significant shift in the vehicle mix that would otherwise be required, we have only modelled a pass-through of costs and benefits to consumers (Scenario 2) and applied the same assumption for Scenarios 3 and 4.
  - In the base case, the number of electric LCVs sold grows at an average annual rate of 113 per cent, while under Scenario 2, this increases to 127 per cent per annum.

3.6 Passenger and SUV electric vehicle uptake by scenario



Data source: CIE

3.7 LCV electric vehicle uptake by scenario



Data source: CIE

These estimated or modelled changes compared to the base case affect the weighted average fleet emissions. Under the base case, the weighted average deviation is 18 gCO_2/km for passenger cars and SUVs, and 50 gCO_2/km for LCVs over the 2025 to 2029 period. This means that on an industry-wide level, each vehicle sold between 2025 and 2029 leads to a net penalty of $2,600 under scenario 1, where the vehicle mix remains the same as in the base case.

Under Scenario 2, where the costs are passed through to consumers, EV uptake accelerates, leading to a considerable reduction in overall fleet-weighted emissions for passenger cars and SUVs. However, the broader NVES target is not met, highlighting that the policy will most likely fail to achieve its intended outcome at this penalty level. The industry-wide net penalty cost under scenario 2 is reduced to $1,500 per vehicle sold.

In scenario 3, we specifically model the passenger car and SUV NVES target being achieved, which results in a further reduction in the overall net penalty for the industry, while under Scenario 4, the industry as a whole achieves compliance. This outcome, however, can only be achieved if the weighted emissions from passenger cars and SUVs fall below their respective targets.

3.8 Emissions deviation from the NVES target and average net cost (2025-2029)

	BC Base case	Scenario 1 No change in vehicle sales (costs/benefits absorbed by dealers/OEMS)	Scenario 2 Change in vehicle mix due to full passthrough of costs/benefits	Scenario 3 Change in vehicle mix to meet passenger & SUV NVES target	Scenario 4 Change in vehicle mix to meet all light duty vehicle NVES target
	gCO_2/km	gCO_2/km	gCO_2/km	gCO_2/km	gCO_2/km
Passenger & SUV	18	18	5	0	-12
LCV	50	50	48	48	48
All light duty vehicles	26	26	15	11	0
	$/vehicle	$/vehicle	$/vehicle	$/vehicle	$/vehicle
All light duty vehicles	**2 600**	**2 600**	**1 500**	**1 100**	**0**

Source: CIE

4 Impacts of the NVES

In this chapter we present our 'analysis' results estimating the impact of emission standards on:

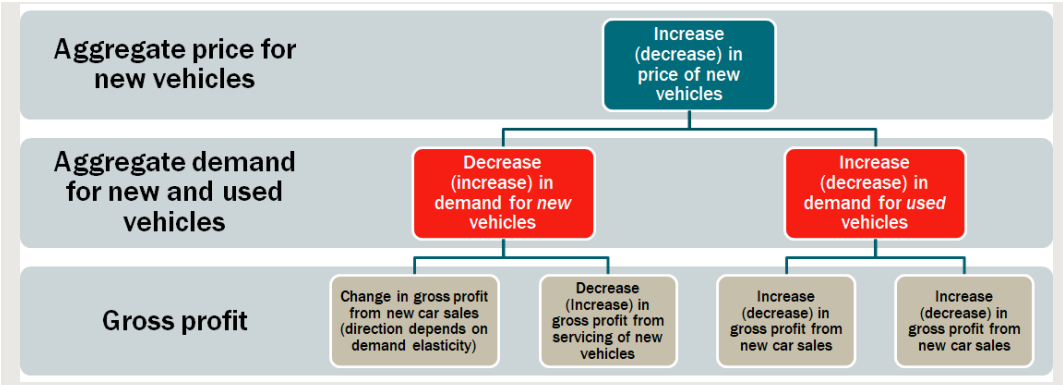
- car market
- dealers
- emissions.

At the end of this chapter, we also undertake a sensitivity analysis to consider the impact of key uncertainties on the conclusions of the analysis that aims to identify and quantify the different impacts on dealers and emissions.

We measure the impact of the NVES through price changes in the new car market, which translate into changes in the quantity of new and used cars sold (as discussed in chapter 3). This, in turn, affects the gross profits of dealers from both vehicle sales of new and used cars and the associated servicing (chart 4.1).

Further details on the modelling assumptions and specific parameters can be found in appendices B and C.

4.1 Impact pathway of price changes in the car market



Data source: CIE

Impacts on car markets

The NVES directly impacts the car market when it leads to changes in prices. Under our scenarios, these price changes range from a full pass-through of implicit costs and benefits to consumers to hypothetical price changes required to change consumer choices to meet the targets.

These incentives (or penalties) on EVs (ICE vehicles) can exceed the actual implicit costs and benefits under scenarios 3 and 4 determined by the penalty set in the NVES (i.e. the price changes in these scenarios can exceed $100 per gCO_2/km). These are hypothetical scenarios designed to demonstrate the changes required if the industry were to achieve the targets by adjusting the vehicle mix sold. In practice, it may be more realistic for price changes to be anchored by the penalty value in the NVES legislation.

Using our choice modelling, we find that price changes can be substantial under the different scenarios. Table 4.2 shows how average consumer prices change relative to the base case for passenger cars and SUVs combined and light commercial vehicles (LCVs) over the 2025 to 2029 period.

For passenger cars and SUVs:

- EV prices are 17 per cent lower when the full benefit is passed on to consumers, while ICE vehicle prices increase by over 12 per cent, reflecting the penalty (scenario 2).
- In order to meet the NVES target for passenger cars and SUVs (scenario 3), EV prices must decrease beyond the subsidy implied by the NVES penalty of $100 per gCO_2/km, and ICE vehicle prices must increase more than the penalty would imply. This indicates that, under current price and preference assumptions, the penalty value set out in the NVES legislation is not high enough to meet the NVES target (even larger price changes are required to induce consumers to switch in sufficient numbers).
- To meet the broader NVES target for all light-duty vehicles, the required price decreases for EVs are substantial, with prices needing to almost halve to meet the target (scenario 4). Price changes are particularly high for SUVs, as they represent the largest vehicle segment.
- This change in prices results in an increase in overall prices of vehicles sold. At an aggregate car market level, price changes are very modest under scenario 2 and 3. Notably, under scenario 4, the overall aggregate market price decreases by 7 per cent due to the significant price reductions required in the EV segment.

For Light commercial vehicles:

- Price changes have been kept constant across all scenarios by design and aligned with the implicit cost and benefit pass-through (scenario 2) described in the previous chapter.
- Given the large share of ICE vehicles and the high penalties for LCVs, the aggregate market price increases by over 9 per cent.

4.2 Weighted consumer price changes relative to base case, 2025 to 2029

	Base case Base case	Scenario 1 No change in vehicle sales (costs/benefits absorbed by dealers/OEMS)	Scenario 2 Change in vehicle mix due to full passthrough of costs/benefits	Scenario 3 Change in vehicle mix to meet passenger & SUV NVES target	Scenario 4 Change in vehicle mix to meet all light duty vehicle NVES target
	Per cent	Per cent	Per cent	Per cent	Per cent
Market segments					
Passenger & SUV-EV	0	0	-17	-26	-43
Passenger & SUV-ICE	0	0	+12	+23	+35
LCV-EV	0	0	-18	-18	-18
LCV-ICE	0	0	+11	+11	+11
Aggregated market					
Passenger & SUV	0	0	+2	+4	-7
LCV	0	0	+9	+9	+9

Note: Price changes were weighted by base case sales.
Source: CIE

Changes to the overall price level in the car market are expected to lead to changes in the demand for new and used cars. As prices for new cars increase (decrease), demand decreases (increases).

To estimate the change in demand for new cars for a given price change, we use the price elasticity of demand, which specifies the percentage change in demand for a 1 per cent change in price. We assume an average price elasticity of -0.79, meaning that if new car prices *increase* (decrease) by 1 per cent, demand for new cars *decreases* (increases) by 0.79 per cent. Across all scenarios, we observe price increases, except for passenger cars and SUVs under scenario 4 (table 4.3):

- Scenario 2: Demand decreases by 3 per cent, reducing vehicle sales by over 173,000 from 2025 to 2029.
- Scenario 3: We estimate a slightly higher demand reduction of 4 per cent, or approximately 240,000 vehicles from 2025 to 2029.
- Scenario 4: We estimate that more passenger cars and SUVs are sold, while fewer LCVs are sold relative to the base case. Overall, demand increases by 2 per cent, or approximately 131,000 vehicles.

4.3 Demand for new vehicles, 2025 to 2029

	Base case	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	Base case	No change in vehicle sales (costs/benefits absorbed by dealers/OEMS)	Change in vehicle mix due to full passthrough of costs/benefits	Change in vehicle mix to meet passenger & SUV NVES target	Change in vehicle mix to meet all light duty vehicle NVES target
	No.	No.	No.	No.	No.
Total sales					
Passenger & SUV	4 291 348	4 291 348	4 212 648	4 146 198	4 516 311
LCV	1 279 396	1 279 396	1 184 302	1 184 302	1 185 889
All light duty vehicle	5 570 744	5 570 744	5 396 950	5 330 500	5 702 200
Relative to base case					
	No.	No.	No.	No.	No.
Passenger & SUV	0	0	-78 700	-145 150	224 963
LCV	0	0	-95 094	-95 094	-93 507
All light duty vehicle	0	0	-173 794	-240 244	131 456
	Per cent	Per cent	Per cent	Per cent	Per cent
Passenger & SUV	0	0	-1.8	-3.4	5.2
LCV	0	0	-7.4	-7.4	-7.3
All light duty vehicle	0	0	-3.1	-4.3	2.4

Note: Price changes were weighted by base case sales.
Source: CIE

Price changes in the new car market lead to changes in demand for used cars as they represent substitutes. We estimate the size of the retail used car market serviced by dealers using a 'used retail/new retail ratio' of 0.4.[19] This means that for every new car sold, 0.4 used retail cars are sold. As a result, the overall size of the used retail car market is approximately 445,000 vehicles per year, or 2.2 million vehicles over the 2025 to 2029 period.

The effect of a price change in the new car market on the used car market can be estimated by the cross-price elasticity of demand. This specifies the change in demand for used cars for a given price change for new cars. We assume an average cross-price elasticity of 0.7[20], meaning that if new car prices increase (decrease) by 1 per cent, demand for used cars increases (decreases) by 0.7 per cent.

Overall, we estimate an increase in the used retail car market of 62,000 vehicles under scenario 2 and 86,000 vehicles under scenario 3, while under scenario 4, we estimate a decrease of 47,000 vehicles.

19 AADA (2024), Dealernomics Automotive Statistics 2024, p. 11 https://www.aada.asn.au/dealernomics-automotive-statistics-2024/

20 J Murray & N Sarantis, 'Quality, user cost, forward-looking behavior, and the demand for cars in the UK', in *Journal of Economics and Business*, vol. 51, 1999, 237–258

4.4 Demand for used vehicles, 2025 to 2029

	Base case	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	Base case	No change in vehicle sales (costs/benefits absorbed by dealers/OEMS)	Change in vehicle mix due to full passthrough of costs/benefits	Change in vehicle mix to meet passenger & SUV NVES target	Change in vehicle mix to meet all light duty vehicle NVES target
	No.	No.	No.	No.	No.
Total sales					
Passenger & SUV	1 716 539	1 716 539	1 744 611	1 768 312	1 636 298
LCV	511 758	511 758	545 677	545 677	545 111
All light duty vehicle	2 228 298	2 228 298	2 290 288	2 313 990	2 181 409
Relative to base case					
	No.	No.	No.	No.	No.
Passenger & SUV	0	0	28 071	51 773	-80 242
LCV	0	0	33 919	33 919	33 353
All light duty vehicle	0	0	61 990	85 692	-46 889
	Per cent	Per cent	Per cent	Per cent	Per cent
Passenger & SUV	0	0	1.6	3.0	-4.7
LCV	0	0	6.6	6.6	6.5
All light duty vehicle	0	0	2.8	3.8	-2.1

Note: Price changes were weighted by base case sales.

Source: CIE

Impacts on dealers

There are broadly three different sales models in the current car market:

- Dealer Model (Franchised Dealer): Vehicles are sold through franchised dealers who manage inventory, pricing, and customer sales (i.e., Toyota, Ford, Volkswagen, or BYD).
- Agency Model (Agent Facilitation): Dealers act as agents to facilitate sales, while the OEM retains control over pricing and inventory (i.e., Honda, Mercedes-Benz, or Cupra)
- Direct – Factory Model: Vehicles are sold directly to consumers by the manufacturer, either online or via shop fronts, bypassing traditional dealers (i.e., Polestar, Tesla, or Genesis)

For the purpose of this section, we only focus on the dealer model and excluded brands which have a different sales model such as Tesla, Cupra, or Honda.

We assess the impact of the policy by estimating changes in gross profit across the main revenue sources relative to the base case:

- New car sales

- Used car sales
- Servicing of new cars
- Gross profit margins and assumptions regarding servicing costs and retention are summarised in Appendix B. The overall impact is estimated by applying gross profit benchmarks to total sales and servicing revenue.

In addition, we calculate the additional costs/benefits that dealers might incur:

- The share of the total penalty/credit for failing/exceeding to meet NVES targets that dealers are assumed to absorb. The penalty/credit is shared between OEMs and dealers in proportion to their gross profit margin arrangement. This assumption is reflected in the change in gross profit from new car sales.

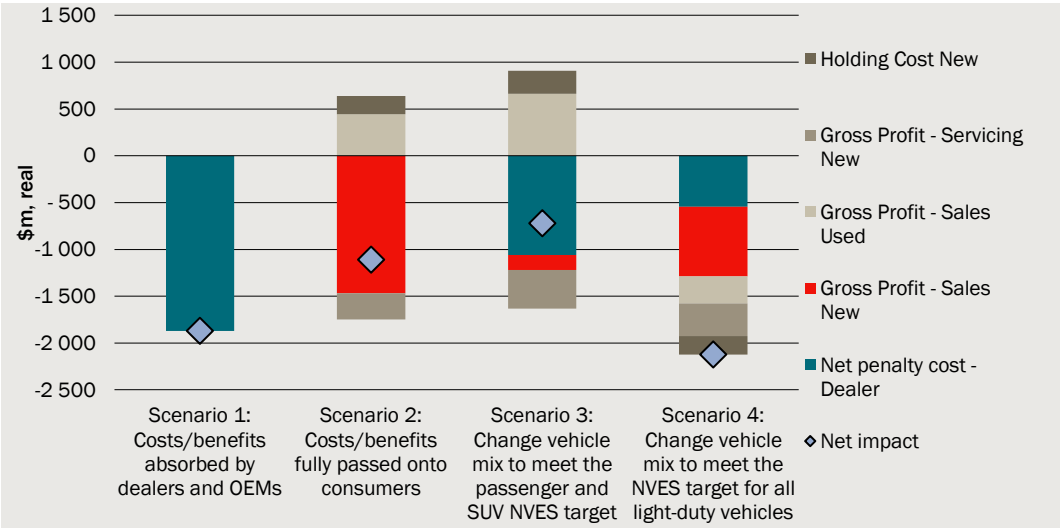
Aggregate impact

Chart 4.5 shows the overall impact on gross profit and penalty for dealers of each option:

- The results highlight that meeting the NVES target as an entire industry has the largest impact (scenario 4). However, note that under scenarios 3 and 4, the price changes required to meet the passenger car and SUV, or the broader NVES target are substantial and most likely unrealistic.
- Gross profits from new car sales are lower than the base case across all scenarios. For scenarios 1 to 3 this is driven by the penalty/credit sharing between dealers and OEMs, while under scenario 4 the overall price decrease leads to a reduction in gross profits.
- Gross profits from used retail sales are higher under scenarios 2 and 3 given the overall price increase in the new car market leading to higher demand in the used car market. Under scenario 4, prices decrease in the new market leading to lower demand in the used car market.
- Gross profit from servicing new cars are decreasing across scenarios 2 to 4 relative to the base case due to overall lower servicing costs of EVs.
- The overall net impact for dealers is highest under scenario 4 at $2.1 billion, followed by scenario 1 at $1.9 billion over the next five years. Under scenarios 2 and 3, the net impacts are considerably lower, at $1.1 billion and $0.7 billion, respectively.
  - Scenarios 2 and 3 perform better than the other scenarios as some of the reduction in overall sales of new cars can be compensated by a higher demand for used cars.

Note including agency or direct sales would reduce the overall net impact of the NVES. This is because the share of EV sales is disproportionately high in the non-dealer segment, particularly driven by Tesla and Polestar.

4.5 Impact on the aggregate industry – only dealers, 2025 to 2029



Data source: CIE

Impact on dealers by vehicle segment

While the overall impact on dealers as a whole industry is mostly negative, the distributional effects within the industry vary widely. The policy also creates winners, particularly among brands that focus exclusively on selling EVs, while brands with a strong focus on ICE vehicles and/or LCVs are more adversely impacted.

In this section we present results disaggregated by the mix of vehicles that brands sell in terms of emissions:

- Passenger cars and SUVs
  - **High share EV**: brands that only or mostly sell EVs with weighted average emissions of 58 gCO_2/km (2025 to 2029), i.e., meeting the lowest NVES target in the base case. Examples include BYD or Lotus
  - **High share of LEV**: brands that sell a high share of EVs and hybrids, and a smaller share of ICE vehicles with weighted average emissions of less than 100 gCO_2/km by 2029. Examples include Toyota, or Volvo.
  - **Low share LEV**: brands that sell a low share of EVs and hybrids, and a high share of ICE vehicles with weighted average emissions of more than 100 gCO_2/km by 2029. Examples include Volkswagen, BMW, or Hyundai.
- LCVs
  - we apply the same categories as the above, however, the cut-off is 200 gCO_2/km by 2029.

In summary, the NVES policy has varying effects on dealers, depending on their vehicle mix and the scenario:

- Dealers specialising in high EV shares generally fare better, with positive or less negative impacts, as the policy favours low-emission vehicles.
- Conversely, those focusing on ICE or a low share of low-emission vehicle (LEV) sales experience significant declines in profitability.

Charts 4.6 and 4.7 summarise the total impact on dealers for different types of dealers relative to the base case, while tables 4.8 and 4.9 show the impact for each sold vehicles ($/vehicle):

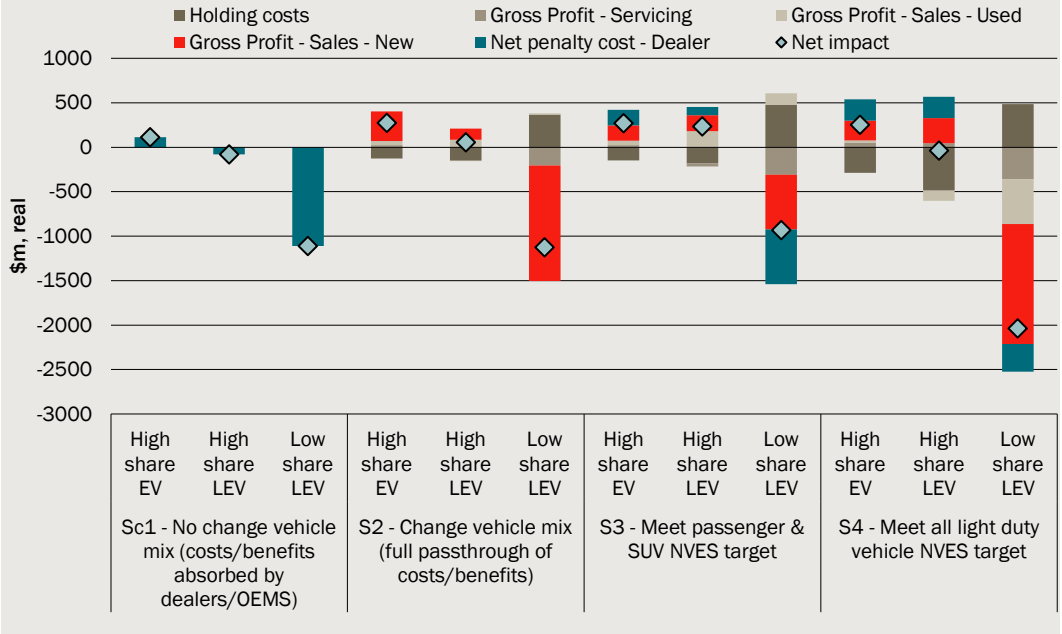
- Under Scenario 1, where no change in vehicle sales occurs, dealers selling a high share of EVs see modest gains, while low-share LEV dealers (high ICE share) face substantial losses due to the absorption of the penalty share with the OEM.
- This disparity largest under scenario 4, which requires meeting the 'all light-duty vehicle' NVES targets, resulting in the highest gross profit gains for high-EV dealers and the largest losses for low-share LEV dealers. High-EV dealers benefit from increased new car sales but somewhat reduced servicing costs, while low-share LEV dealers are disproportionately impacted by penalties and the shift in vehicle mix.
- For LCVs, the distributional impact follows a similar pattern but with slightly lower gains and losses. Due to our assumptions regarding the realistic price changes in the LCV segment scenarios 2 to 4 show the same results.

Total gains or losses per vehicle sold have a wide range from:

- High-EV dealers achieve notable gains, particularly under scenario 2, with impacts reaching up to $2 314 per vehicle for passenger cars and SUVs. In contrast, low-share LEV dealers face substantial losses, peaking at $1 329 per vehicle for passenger cars and SUVs in scenario 4.
- Dealers with a high share of LEVs fall in between, with mixed outcomes—gains reaching up to $313 per vehicle in scenario 4 but smaller gains or losses under less stringent scenarios.
- For LCVs, high-EV dealers see consistent benefits of up to $1 600 under scenario 2 to 4, while low-share LEV dealers face losses up to -$630 per vehicle under scenario 1.

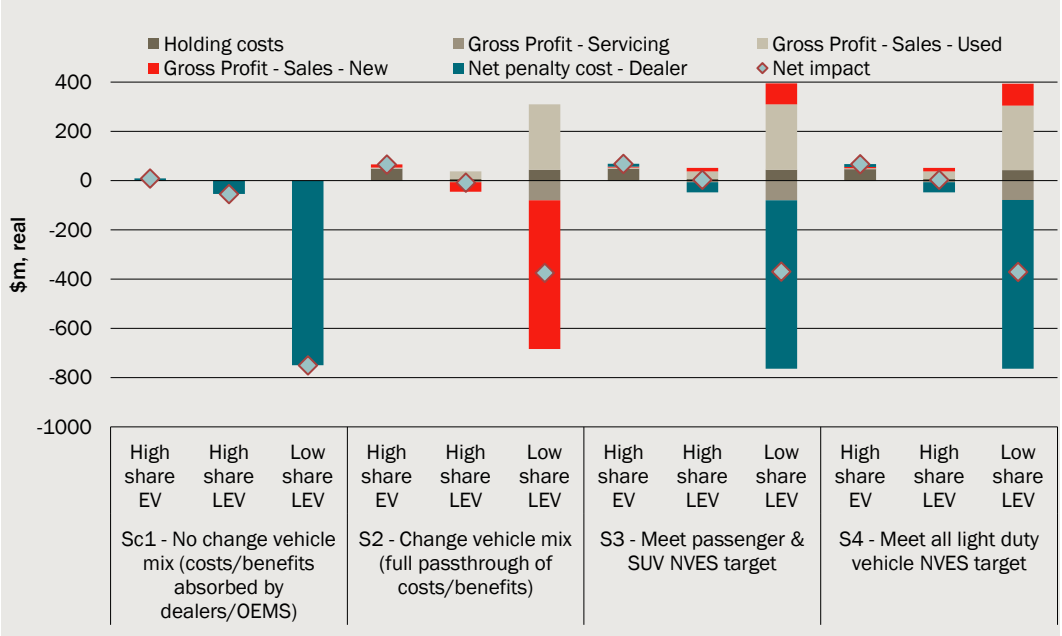
Overall, the policy amplifies disparities within the dealer industry. It rewards those aligned with EV sales while placing a considerable burden on those dependent on ICE vehicles. Scenarios with broader compliance requirements (such as Scenario 3 and 4) create the greatest opportunities for EV-focused dealers but also the greatest challenges for ICE-heavy segments.

4.6 Dealer impact by vehicle segment Passenger and SUVs – total, 2025-2029



Data source: CIE

4.7 Dealer impact by vehicle segment LCVs – total, 2025-2029



Note: Positive 'Holding cost' are a gain, while negative figures are a loss.

Data source: CIE

4.8 Dealer impact by vehicle segment Passenger and SUVs – per car, 2025-2029

	Scenario 1 No change in vehicle sales (costs/benefits absorbed by dealers/OEMS)	Scenario 2 Change in vehicle mix due to full passthrough of costs/benefits	Scenario 3 Change in vehicle mix to meet passenger & SUV NVES target	Scenario 4 Change in vehicle mix to meet all light duty vehicle NVES target
	$/vehicle	$/vehicle	$/vehicle	$/vehicle
Net penalty cost - Dealer				
High share EVs	845	0	865	862
High share LEVs	- 60	0	70	159
Low share LEVs	- 463	0	- 303	- 154
Total	- 279	0	- 97	44
Gross Profit - Sales – New cars				
High share EVs	0	1 763	841	802
High share LEVs	0	95	135	187
Low share LEVs	0	- 603	- 303	- 673
Total	0	- 228	- 74	- 224
Gross Profit - Sales – Used cars				
High share EVs	0	252	256	100
High share LEVs	0	61	134	- 76
Low share LEVs	0	5	64	- 250
Total	0	38	101	- 155
Gross Profit - Servicing				
High share EVs	0	118	111	179
High share LEVs	0	- 9	- 29	30
Low share LEVs	0	- 95	- 152	- 179
Total	0	- 52	- 91	- 70
Holding Cost				
High share EVs	0	- 675	- 737	-1 036
High share LEVs	0	- 106	- 135	- 326
Low share LEVs	0	171	236	242
Total	0	27	42	- 77
Total				
High share EVs	845	1 458	1 336	907
High share LEVs	- 60	41	176	- 25
Low share LEVs	- 463	- 522	- 459	-1 015
Grand total	**- 279**	**- 215**	**- 119**	**- 481**

Source: CIE

4.9 Dealer impact by vehicle segment LCVs – per car, 2025-2029

	Scenario 1 No change in vehicle sales (costs/benefits absorbed by dealers/OEMS)	Scenario 2 Change in vehicle mix due to full passthrough of costs/benefits	Scenario 3 Change in vehicle mix to meet passenger & SUV NVES target	Scenario 4 Change in vehicle mix to meet all light duty vehicle NVES target
	$/vehicle	$/vehicle	$/vehicle	$/vehicle
Net penalty cost - Dealer				
High share EVs	769	0	920	920
High share LEVs	- 434	0	- 353	- 353
Low share LEVs	- 666	0	- 663	- 663
Total	- 630	0	- 614	- 614
Gross Profit - Sales – New cars				
High share EVs	0	1 038	298	304
High share LEVs	0	- 327	119	123
Low share LEVs	0	- 586	82	86
Total	0	- 541	89	92
Gross Profit - Sales – Used cars				
High share EVs	0	306	306	303
High share LEVs	0	266	266	263
Low share LEVs	0	258	258	255
Total	0	260	260	256
Gross Profit - Servicing				
High share EVs	0	45	45	45
High share LEVs	0	- 55	- 55	- 54
Low share LEVs	0	- 78	- 78	- 76
Total	0	- 74	- 74	- 73
Holding Cost				
High share EVs	0	3 567	3 567	3 451
High share LEVs	0	53	53	51
Low share LEVs	0	42	42	41
Total	0	84	84	82
Total				
High share EVs	769	4 955	5 134	5 023
High share LEVs	- 434	- 63	31	31
Low share LEVs	- 666	- 363	- 358	- 358
Grand total	**- 630**	**- 271**	**- 255**	**- 257**

Source: CIE

Sensitivity testing

We test the sensitivity of the results to alternative assumptions (table 4.10):

- A lower cost/benefit of $50 reflecting the penalty for an infringement
  - Lower penalties for exceeding the NVES, reduce the costs of the market response scenarios market compliance scenarios (scenarios 1 and 2). This is because a lower penalty reduces the costs of complying with the NVES, where OEMs do not seek to change consumer behaviour. A lower penalty makes achieving the NVES target emissions less likely.
- A higher cost/benefit of $125, assuming OEMs are willing to pay a premium above the penalty cost for credits, as they do not want to be perceived as paying a penalty.
  - A higher penalty increases the costs of market response scenarios and scenario 3, where penalties are payable for LCVs. This sees relatively lower costs for actually meeting the NVES target (scenario 4), and makes achieving the NVES target emissions more likely.
- Higher and lower own-price elasticities
  - A higher elasticity means that consumers decrease their demand more significantly in response to price increases, and vice versa for lower elasticities. Higher elasticities see larger costs for scenarios which increase prices and vice versa.
- Higher and lower cross-price elasticities
  - A higher cross-price elasticity means that consumers increase their demand for used cars more significantly in response to price increase for new cars, and vice versa for lower elasticities.
- A greater degree (50 per cent) or complete lack (0 per cent) of sharing of the costs and benefits of the NVES between dealers and OEMs.
  - Where dealers absorb none of the costs or benefits of NVES penalties and credits, the cost of the NVES are limited to the impact on volume and composition of new car sales.
  - The more costs and benefits are shared with dealers, the larger the cost.
  - We expect OEMs to a large extent to decide how much of the cost to pass onto dealerships, recognising it is in the OEMs interest for their dealership networks to be financially viable.
- A greater decrease or no change in the sticker emissions of ICE over time.
  - The faster emissions fall, the lower the cost of the NVES, as the gap between base case emission and the NVES targets becomes smaller.

The sensitivity analysis shows that some of the key drivers of the net impact on dealers comes from the level of the penalty, the price elasticity assumptions which determine how strong consumers react to changes in the market, the development of sticker emissions for ICE vehicles over time (i.e., how much more efficient can they become), and cost/benefit sharing arrangements between the dealers and OEMs.

4.10 Sensitivity tests of net impact on the aggregate industry –, 2025 to 2029

	Scenario 1 No change in vehicle sales (costs/benefits absorbed by dealers/OEMS)	Scenario 2 Change in vehicle mix due to full passthrough of costs/benefits	Scenario 3 Change in vehicle mix to meet passenger & SUV NVES target	Scenario 4 Change in vehicle mix to meet all light duty vehicle NVES target
	$m, real	$m, real	$m, real	$m, real
Central case	**-1 871**	**-1 110**	**- 722**	**-2 123**
$50 penalty/credit	- 936	- 727	- 737	-2 097
$125 penalty/credit	-2 339	-1 568	-1 309	-2 059
High price elasticity	-1 871	-2 087	-2 194	-1 644
Low price elasticity	-1 871	- 514	16	-2 515
High cross-price elasticity	-1 871	-1 167	- 897	-1 939
Low cross-price elasticity	-1 871	-1 481	-1 338	-1 850
Optimistic base case	-1 880	-1 264	-1 091	-2 052
Dealers absorb 50% of costs/benefits	-7 797	-5 353	-4 491	-3 794
Dealers absorb 0% of costs/benefits	0	- 52	- 57	-1 521
No change in sticker emissions (ICE) over time	-2 449	-1 617	-2 720	-3 791
Accelerated decrease in sticker emissions (ICE)	-1 336	-1 045	- 270	- 108

Source: CIE

Other impacts on dealers

Stock holding costs

Stock holding costs have been estimated to reflect the differences in time taken to sell EVs compared to ICE vehicles. If these apparent differences hold into the future, this may see costs increasing for dealerships are the share of EVs sales increase.

This is estimated in the following steps in two parts: the floorplan capital cost and the cost of physical space.

The floorplan financing or capital cost is estimated as follows:

- The average stock holding time is assumed to be 45 days based on an industry benchmark[21]
- We assume the difference in stock holding time for new ICE vehicles and EVs is proportional to the reported difference in used holding times (chart 4.11). This implies a stock holding time of around 68 days for EVs compared to 45 for ICE vehicles.

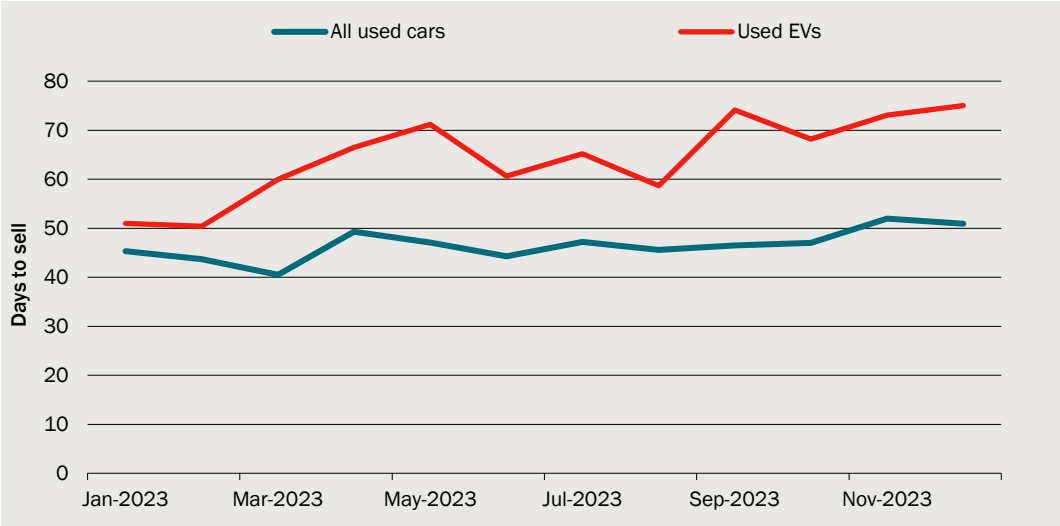
21 Deloitte 2022, 2022 Dealership Benchmarks.

- The cost of capital is assumed to be 10.5 per cent, which is applied to the wholesale price paid for dealers for stock.
- These costs are then applied to the scenarios accounting, with the cost overtime varying due to:
  - Changes in the total number of sales
  - Changes in the composition of sales (i.e. EV vs ICE)
  - Changes in the wholesale price of difference vehicles

The space cost of longer holding periods is estimated as follows:

- The opportunity cost of dealership space is assumed to be $740 per square meter per year, which is the average of the benchmark capital city rental costs.[22]
- We assume each car occupies 14.04 square meters (5.4 m by 2.6 m)
- This cost is combined with sales by vehicle type and the assumed stock holding times to estimate the space cost of longer holding periods.

4.11 Days to sell used vehicles – EVs vs all vehicle types



Data source: AADA and Autograb (2024), 2023 Automotive Insights Report

Table 4.12 shows holding costs across all vehicle sales. Across the five years of the NVES, is it expected that holding costs will increase by between $60 and $850 million depending on the scenario, which corresponds to annual costs of between $12 and $170 million per year.

The space costs for LCVs are lower across all scenarios, as the price changes modelled see a larger drop in demand, while floorplan costs increase due to higher prices for ICE LCVs. For passenger and SUVs, both floorplan and space costs are generally higher due to the increase in the share of EV sales, with the costs offset by some extent to lower demand due to higher prices and changes in wholesale prices.

22 https://www.pitcher.com.au/insights/property-the-dealers-largest-and-least-measured-asset/

Note this analysis is based on EVs taking longer to sell compared to ICE vehicles. This is likely to vary by OEM, depending on demand for particular models and may change overtime.

4.12 Total holding costs compared to base case – 2025 to 2029

	Passenger	SUV	LCV	Total
	$ million	$ million	$ million	$ million
Floorplan financing				
Scenario 1	-	-	-	-
Scenario 2	24.1	32.1	18.4	74.6
Scenario 3	22.5	65.9	18.4	106.8
Scenario 4	31.1	12.2	19.5	62.7
Space				
Scenario 1	-	-	-	-
Scenario 2	101.8	-1.5	-115.6	-15.3
Scenario 3	58.7	63.7	-115.6	6.9
Scenario 4	171.8	728.8	-113.5	787.0
Total holding cost				
Scenario 1	-	-	-	-
Scenario 2	125.8	30.6	-97.1	59.3
Scenario 3	81.2	129.6	-97.1	113.7
Scenario 4	202.8	740.9	-94.1	849.7

Source: CIE

The timing of when NVES compliance is measured

Under the NVES, compliance is measured at importation rather than the point of sale, with a cutoff date of December 31 each year. OEMs may be incentivised to bring forward deliveries.

Circumstances where this may occur include:

- Importing higher-emission vehicles earlier to meet a December 31 cut off. This enables the vehicle to count towards an earlier years target, potentially reducing the cost to the OEM as emission targets falls overtime.
- Importing lower-emission vehicles in earlier years to generate NVES credits sooner. could leave dealers with excess stock, higher holding costs, uncertain EV demand, or the need for deep discounts.

This can result in costs for dealers from:

- Floor plan and the cost of physical space in addition to those discussed and measured in the previous section.
- Where excess stock cannot be held by dealerships, there may be a need for additional discounting.

– In some cases, the additional deliveries may be used as demonstrators (i.e. the demonstrator fleet may increase unnecessarily). These vehicles would then eventually be sold at a discount.

It may also impost additional NVES costs on dealerships (where costs are shared). This risk could be resolved if NVES compliance was instead measured at the time of sale.

The potential cost of this will depend on by how much delivery of vehicles is brough forward and how many vehicles are effected.

Based on assumed holding periods, for EVs (67.5 days) and other vehicle types (45 days), we estimate average holding costs of around $1,938 per vehicle, which represent around 33 per cent of the average gross profit per vehicle (table 4.13). If the holding time were to increase, due to stock being delivered earlier to meet the NVES cut-off average costs would be higher and account for larger share of gross profit.

4.13 Holding time and costs

Additional holding time	Average holding cost	Difference relative to base line	Share of average gross profit
Days	$ per vehicle	Per cent	Per cent
Base line	$1,938	NA	33%
10	$2,254	16.3%	39%
20	$2,570	32.6%	44%
30	$2,885	48.9%	49%

Note: Base line holding time is assumed to be 67.5 days for EVs and 45 days for other vehicle types.

Source: CIE

Infrastructure costs for dealers new to selling EVs

There are upfront capital costs for dealerships to able to sell EVs. Insofar as the NVES results in more dealerships selling EVs (or brings forward when dealerships sell EVs), it will impose infrastructure costs on dealerships. Where the NVES brings forward the sale of EVs, the infrastructure cost due to the NVES reflects the timing of the cost.

Capital costs to sell EVs include:

- on-site charging infrastructure, and
- specialist tooling for after-sales services.

The costs of charging infrastructure vary by dealership location, reflecting the typical operation size in terms of fleet size and daily servicing capacity (table 4.14). [23]

[23] Energetics, *Electric Vehicle Charging Infrastructure Guidance Report*, Australian Automotive Dealership Association (AADA), April 2024, https://www.aada.asn.au/wp-content/uploads/2024/04/2024.04.10-Electric-vehicle-infrastructure-guidance-report.pdf

4.14 Characteristics of an average dealership by location

Characteristic	Unit	Urban area	Regional/Rural area [a]
Fleet size	Number of cars per dealership	80	31
Car servicing capacity	Number of cars per day	30	23
Planned EV charging capabilities	% of fleet size	10	10
EV charging stations	Number of charging car spots	8	4

[a] Weighted average based on the number of dealerships in regional and rural areas.

[b] This assumption estimates the number of on-site charging stations needed, though it varies by each dealership's business decisions in practice.

Source: Energetics, *Electric Vehicle Charging Infrastructure Guidance Report*, Australian Automotive Dealership Association (AADA), April 2024, pp.13-18

The total cost of installing charging stations at each dealership is primarily determined by the type of EV chargers to be installed and the extent of electrical infrastructure upgrades required to support the planned charging capabilities. As shown in the table 4.15, there are three main levels of upgrades, each reflecting the varying complexities of modifications needed to accommodate on-site EV charging facilities. To estimate indicative costs for an average dealership, we assume:

- Level 2 chargers are installed, and
- a medium-scale electrical infrastructure upgrade is required to support the charging facilities for these dealerships.

4.15 The scale of electrical infrastructure upgrades

Requirement	Large	Medium	Small
Engagement with Utilities	Coordination with utility companies for necessary power supply upgrades.	Moderate engagement with utilities for supply cabling modifications.	No engagement with utilities; infrastructure upgraded onsite without supply modification.
Engagement of technicians	Involvement of Accredited Service Providers (Level 2 for installation/connection and Level 3 for design).	Likely requires engagement of Accredited Service Providers (Level 2 for installation/connection, or Level 3 for design).	Likely requires engagement of Accredited Service Providers (Level 2 for installation/connection, or Level 3 for design).
Required Modifications	High voltage and transformer upgrades needed to support EV infrastructure.	Low voltage mains upgrade or high voltage transformer upgrade/modification may be needed.	No modification needed for transformers; infrastructure upgraded to support additional load.
Required Equipment	Level 3 DC ultra-fast charger step-down transformer, especially for rural areas with longer driving distances.	Level 3 DC ultra-fast charger step-down transformer is typically not required, but can be added if needed in the scenario tool.	Level 3 DC ultra-fast charger step-down transformer is typically not required, but can be added if needed in the scenario tool.
Indicative cost	$411,000	$44,000	$20,000

Source: Energetics, *Electric Vehicle Charging Infrastructure Guidance Report*, Australian Automotive Dealership Association (AADA), April 2024, pp.13-18

In addition, special tools for bater removal are required in dealership workshops where maintenance and battery replacement are performed. Additional regular serving tools are also needed to use alongside with the battery removal tool. The number of battery removal tools required per dealership is expected to be determined by the servicing capacity (as shown in the table 4.14), and the following assumptions.

- We assume that, on average, 5 per cent of the cars serviced per day are EVs in both urban and regional/rural areas.
- The number of EVs serviced daily determines the number of battery removal tools required. For example, if a dealership expects to service 2 EVs per day, it will need 2 sets of battery removal tools.
- Regular tools are required on a one-on-one basis to complement the battery removal tools.

Including the costs of charging infrastructure and tooling, an average dealership in an urban area will spend $240,000 when introducing an EV lineup for the first time. In regional or rural areas, the same setup is expected to cost an average dealership $169,000. (table 4.16). Given many OEMs are likely to introduce EVs on under the base case (in the absence of the NVES), the NVES may bring forward these costs for some dealerships, as opposed to imposing additional costs.

4.16 Indicative costs of infrastructure set up for dealers new to EV lineup by location

Cost	Urban area	Regional/rural area [a]
	$ per dealer	$ per dealer
Cost of battery removal tools [b]	20,000	10,000
Cost of regular servicing tools [c]	10,000	5,000
Cost of charging infrastructure set up [d]	210,000	154,000
Total capital cost	**240,000**	**169,000**

[a] Weighted average based on the number of dealerships in regional and rural areas. The number of dealerships by location is provided in the Energetics, *Electric Vehicle Charging Infrastructure Guidance Report*, Australian Automotive Dealership Association (AADA), April 2024.

[b] Each set of battery removal tools is priced at $10,000, according to industry stakeholders. The total cost of the battery removal tools is calculated by multiplying the number of tools by the unit price.

[c] According to industry stakeholders, regular servicing tools are less expensive than battery removal tools. For analysis purposes, we assume the cost of regular tools to be 50% of the cost of battery removal tools. Regular tools are required on a one-to-one basis to complement the battery removal tools. The total cost is then calculated by multiplying the cost of a set of regular servicing tools by the number of tools needed.

[d] The estimates are based on assumptions regarding the type of chargers selected and the required scale of electrical infrastructure upgrades, as well as the estimates provided in the Energetics, *Electric Vehicle Charging Infrastructure Guidance Report*, Australian Automotive Dealership Association (AADA), April 2024,

Source: CIE.

Overtime, as EVs account for a larger share of new car sales there are likely to be additional capital costs, even for dealerships who already sell EVs. These costs will to larger extent be dictated by the pace of EV uptake.

Additional ongoing costs to be expected

In addition to the capital investment required to set up infrastructure, dealers incur ongoing costs to maintain and operate the EV lineup, which are higher than those for

running an ICE lineup or represent additional costs on top of the ICE lineup. While the exact size of these ongoing costs is difficult to estimate due to variability in EV sales strategies at the dealer level, they are generally negligible compared to the initial capital investment. Also as noted previously, many of these costs would have been incurred even in the absence of the NVES. The NVES will bring forward these costs, insofar as it brings forward the uptake of EVs.

- EV holding cost
  - EV holding costs tend to be higher than ICE vehicles due to slower turnover. This is discussed earlier in this chapter.
- EV battery on-site storage cost
  - While new batteries are typically stored at the OEM Parts warehouse, dealers must store used batteries prior to recycling. These batteries may need to be kept on-site for 3 to 6 months during the warranty claims process. Additionally, dealers must store the batteries in isolated, fire-resistant facilities.
- Hiring or training technicians
  - Dealers need to hire new technicians or train existing staff to specialise in working with EVs. Some manufacturers may offer technical training or certification for dealership technicians or provide reimbursement for training costs.
- Electricity cost for charging facilities
- Marketing cost for EV lineup
  - EV advertising differs from ICE vehicle advertising, resulting in possible incremental marketing costs.

The role of competition

New OEMs are expected to enter the new car market under the base case and scenarios. For example, there are a large number of Chinese EV brands expected to enter the market over the coming years.

As these OEMs seek to gain market share, their presence is likely to affect the competitive dynamics in the market and may see price falls for EVs in excess of what is anticipated. If this occurs it would increase the likelihood of achieving the NVES targets but would also affect the distribution of impacts with the costs associated with incumbent OEM brands seeing greater losses.

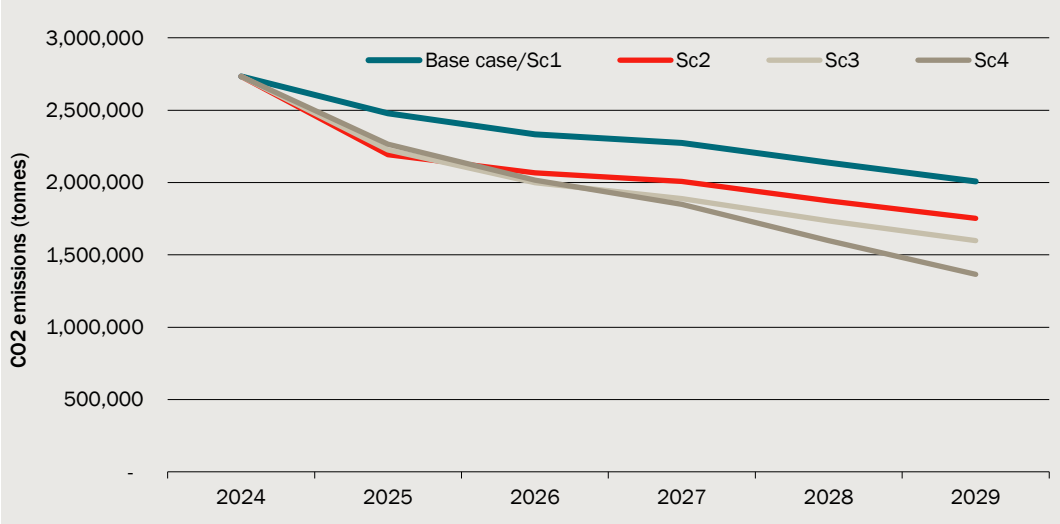
Impacts on emissions

Annual CO2 emissions have been estimated to capture the impact of changes in the vehicle mix sold and to calculate the cost of abatement. An average travel distance of 15,000 km per annum has been assumed. As the share of EVs increases, total emissions from vehicles sold decrease over time (chart 4.17):

- Meeting the NVES target (scenario 4) would reduce CO2 emissions by 640,000 tonnes annually by 2029, a reduction of 32 per cent compared to the base case.

- If penalties and benefits were passed to consumers (scenario 2) CO2 emissions would reduce by 254,000 tonnes annually, a 13 per cent reduction by 2029.
- Meeting the NVES target for passenger cars and SUVs (scenario 3) would reduce CO2 emissions by 408,000 tonnes annually, representing a 20 per cent reduction by 2029.

4.17 Annual CO2 emission from vehicles sold



Data source: CIE

Marginal cost of abatement

We assess the marginal cost of abatement by measuring the cost per avoided tonne of CO_2 relative to the base case. Costs are calculated either solely as the net impact on dealers from 2025 to 2029 (as presented in previous sections) or as the net impact on dealers plus the penalty/benefit absorbed by the OEM.

Note this is the marginal cost of abatement from the perspective of dealerships. The actual marginal cost of abatement is likely to be much higher; for example, including consumer impacts, previous works has found a marginal cost abatement of up to $260 per tonne for passenger cars, $370 per tonne for SUVs and $880 per tonne for LCVs.[24]

We estimate the total tonnes of avoided emissions by calculating the expected emissions from cars sold during the 2025–2029 period. Key assumptions include:

- Expected lifespan of cars: 20 years
- Average annual distance travelled: 15,000 kilometres

24 CIE 2024, Proposed New Vehicle Efficiency Standard: Impacts on consumers, vehicle markets, emissions and fuel excise, prepared for the Australian Automobile Association.

- Emissions factors: Based on DCCEEW projections for Australia's electricity grid, used to calculate emissions for EVs and PHEVs[25] which are scaled for real life emissions
- Discount rate: Emissions are discounted using a real discount rate of 2.25 per cent for the social cost of carbon[26]

We note that this does not include a range of other impacts, such as the welfare loss for consumers or the cost of OEMs.

Overall, we estimate that cars sold between 2025 and 2029 will emit over 230 million tonnes of CO_2 over their expected lifetimes under both the base case and scenario 1 (table 4.18). Scenario 2 results in a reduction of 24 million tonnes, scenario 3 a reduction of 32 million tonnes, and scenario 4 a reduction of 35 million tonnes.

4.18 Marginal abatement cost

	Base Case	Scenario 1: Costs/benefits absorbed by dealers and OEMs	Scenario 2: Costs/benefits fully passed onto consumers	Scenario 3: Change vehicle mix to meet the passenger and SUV NVES target	Scenario 4: Change vehicle mix to meet the NVES target for all light-duty vehicles
Total Emission over 20 years (million tonnes)	230.2	230.2	206.3	198.4	194.9
Change in emissions (million tonnes)	0.0	0.0	-23.9	-31.8	-35.2
Net impact on dealers plus penalty absorbed by OEMs ($m)	0	-15 594	-10 347	-8 551	-6 124
Net impact on dealers ($m)	0	-1 871	-1 016	- 742	-2 123
Marginal abatement cost – Dealer plus penalty ($/t)	**NA**	**NA**	**433**	**269**	**174**
Marginal abatement cost – Dealer ($/t)	**NA**	**NA**	**43**	**23**	**60**

Source: CIE

For scenarios 2 to 4, where emissions are avoided, scenario 4 has the largest net impact on dealers. It leads to a significant drop in gross profits from the sales of new and used cars, resulting in the highest cost per avoided tonne for dealers at $60 per tonne. However, when the full penalty is considered (with a portion absorbed by the OEMs), scenario 4 yields the lowest overall cost at $174 per tonne. This is because it avoids the largest amount of emissions and has the overall lowest cost, although—as noted above—this does not take into account the welfare implications of the dramatic changes in the car market required to achieve these emission reductions.

25 DCCEEW 2024, Australia's emissions projections 2024, Department of Climate Change, Energy, the Environment and Water, Canberra, November. CC BY 4.0. This publication is available at https://www.dcceew.gov.au/climate-change/publications/australias-emissions-projections2024.

26 Source??

Scenario 2 has the second-highest cost per tonne for dealers at $43 per tonne, and the highest when the full penalty is included at $433 per tonne. This is because passing on the costs and benefits to consumers does not lead to a sufficient change in emissions, resulting in high penalties that must be shared between OEMs and dealers. Under the central case, OEMs absorb most of the penalty while dealers are able to offset some losses in the used car market.

Scenario 3 results in the lowest cost per tonne for dealers and the second-highest when the full penalty is included, and it falls between Scenarios 2 and 4 in terms of emissions reduction and costs.

In particular, if the full penalty is included, the results show that the cost per tonne of carbon is significantly higher than the average Australia Carbon Credit Unit (ACCU) spot price of $36 per tonne. This suggests that the policy is comparatively expensive relative to the expected emissions reductions, especially considering that consumer welfare effects have not been included in the analysis.

A Data

The data sources used in analysis are summarised in the table A.1.

A.1 Data used in the analysis

Data source	Description
Blue flag, *Australian Automotive Brand CO2 Forecast (2024 - 2029)*, Provided by AADA, March 2024.	The workbook provides information of historical sales of new cars by make, forecast of average CO_2 emission by make, forecast of fine by make, and average car price comparison by make.
Blue flag, *EV sales forecast*, Provided by AADA, February 2024.	The workbook summarises information of potential model launches from social media, low- and zero emission vehicle target by make, battery production, and forecast of new car sales by segment and fuel type
BDO, *2023 BDO Automotive Non-Luxury Dealership Benchmark*, Referred in AADA Dealernomics Automotive Statistics 2024, 2024,<https://www.aada.asn.au/wp-content/uploads/2024/04/Dealernomics-Automotive-Statistics-2024-Final.pdf.	The report provides the motor industry benchmarking figures estimated by BDO. The information of gross profit (%) of servicing and parts forms the assumption of profitability in our analysis.
Deloitte Australia, *2024 Dealership Benchmarks*, March 2024, https://www.deloitte.com/au/en/Industries/automotive/analysis/2024-dealership-benchmarks.html	The report provides the Australian new vehicle market benchmarks. The information of gross profit (%) of new and used car sales forms the assumption of profitability in our analysis
AutoGrab & AADA, *2023 Automotive Insights Report*, 2024.	The report provides an overview of the supply and demand for used cars in 2023, including information of days to sell, sales volume and used car price.
Australian Government, 'Search and compare vehicles', in *Green Vehicle Guide*, 2024, https://www.greenvehicleguide.gov.au/	The data portal provides details of vehicle attributes by make and model, including tailpipe CO_2 emission, annual fuel cost, fuel consumption, fuel range, and battery range.
T Baker, 'Top 100 most popular cars in Australia in 2023: every bestselling vehicle', in *Chasing Cars*, 2024, https://www.chasingcars.com.au/news/car-industry/top-100-most-popular-cars-in-australia-every-best-selling-vehicle/.	The data forms the foundation of the car attributes and purchase price database, which is used to establish the base case and provide parameters for the choice model.
A Misoyannis, 'Australia's best-selling Electric Cars of 2023: Every Model Listed', in *Drive.com.au*, 2024, https://www.drive.com.au/news/best-selling-electric-cars-2023-full-year/.	The data forms the foundation of the car attributes and purchase price database, which is used to calculate price premium over ICE in the base case and provide parameters for the choice model.
A Misoyannis, 'Australia's best-selling hybrids and plug-in hybrids of 2023', in *Drive.com.au*, 2024, https://www.drive.com.au/news/australias-best-selling-hybrids-phevs-of-2023/.	The data forms the foundation of the car attributes and purchase price database, which is used to calculate price premium over ICE in the base case and provide parameters for the choice model.

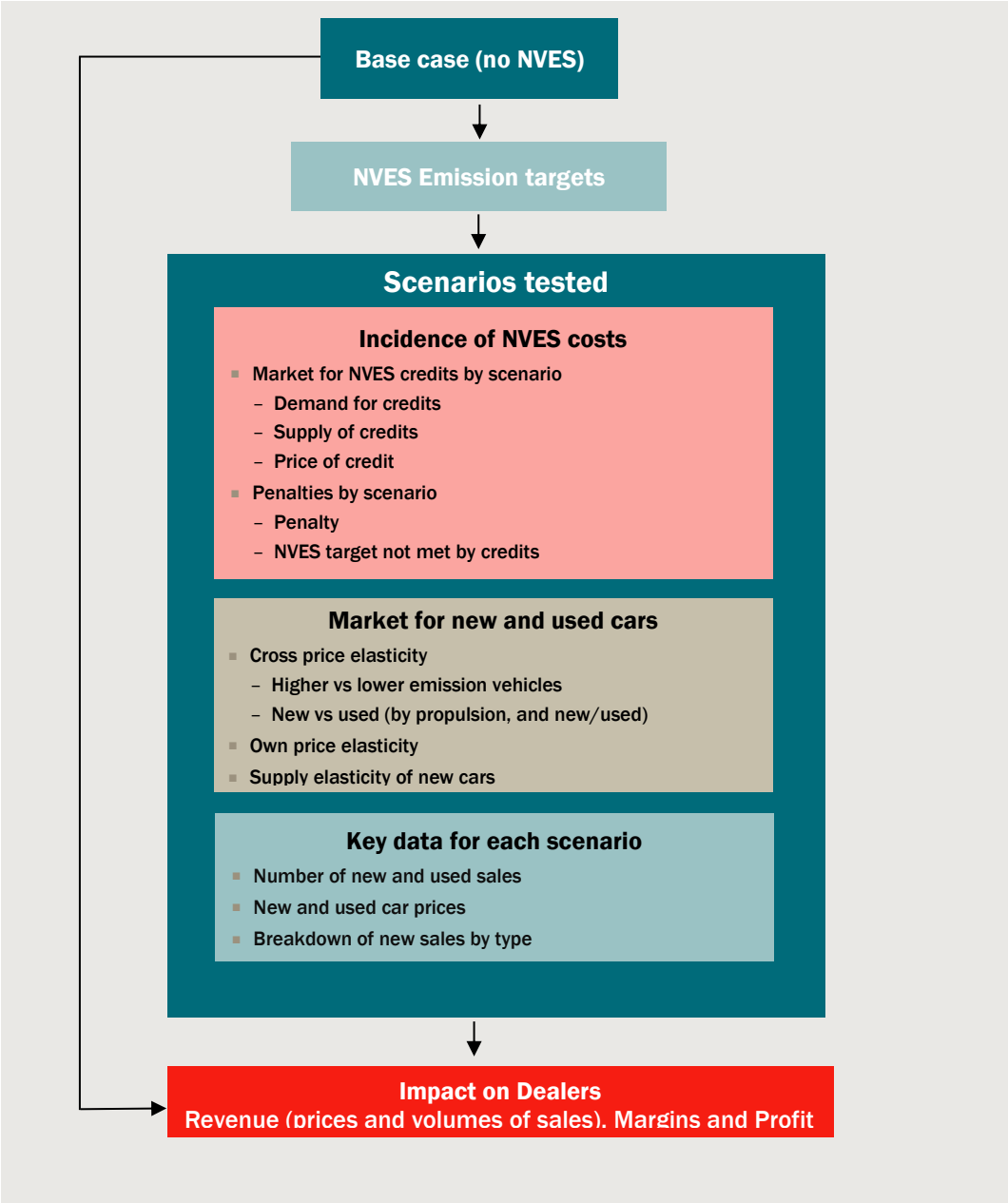
Carsguide, 'Car Values & Specs', 2024, https://www.carsguide.com.au/price,	The data forms the foundation of the car attributes and purchase price database.
RAC, *Car running costs guide 2023*, 2024, https://www-cdn.rac.com.au/-/media/files/rac-website/car-and-motoring/running-costs/car-running-costs-2023-ebook.pdf?modified=20230914033736.	The data is used as parameters for servicing cost.
CIE, *Demand for electric vehicles - A discrete choice survey*, Prepared for Australian Automobile Association, 2019. https://www.thecie.com.au/publications-archive/demand-for-electric-vehicles	The CIE choice model is used to derive price changes in the scenarios and model the demand for new cars.

Source: See the table.

B Modelling approach and key parameters

The overall approach to measure the impact of the NVES on dealers is summarised in chart B.1.

B.1 Approach to measure NVES impacts



Source: CIE

The key parameters are summarised in the tables B.2 to B.4

B.2 Servicing costs per vehicle

Vehicle segment	Fuel type	Servicing cost	5-year servicing cost	Gross profit 5-year servicing cost
	$/month	$/annum	$PV	$PV
Passenger	EV	22	259	761	320
SUV	EV	25	303	890	374
LCV	EV	29	342	1,006	423
Passenger	Hybrid / ICE	43	518	1,523	640
SUV	Hybrid / ICE	50	605	1,780	748
LCV	Hybrid / ICE	57	684	2,012	845

Note: Servicing costs for EVs are assumed to be 50 per cent of Hybrid/ICE costs as per CIE consultations with dealers.

Source: CIE Consultation. RAC (2023) https://www-cdn.rac.com.au/-/media/files/rac-website/car-and-motoring/running-costs/car-running-costs-2023-ebook.pdf?modified=20230914033736

B.3 Service retention rate

Year	Service retention
	%
1st Year	92
2nd Year	81
3rd year	65
4th year	48
5th year	40

Source: Deloitte (2022), 2022 Dealership Benchmarks,https://www.eprofitfocus.com/media/0aiean34/2022-dealership-benchmarks-australia.pdf, p.30

B.4 Gross profit for dealers

Business segment		Gross Profit
		%
New Cars	as a share of sales revenue	12.0
Used Cars	as a share of sales revenue	10.0
Servicing	as a share of servicing revenue	42.0

Source: AADA (2024), DEALERNOMICS AUTOMOTIVE STATISTICS 2024, p. 11 https://www.aada.asn.au/dealernomics-automotive-statistics-2024/

C Modelling demand for vehicles

Overview of methodology

As illustrated in the chart C.1, the methodology of evaluating the impact of NVES on demand for new vehicles follows a bottom-up approach. It begins with the fuel type (Level 4) and progresses upward through the vehicle segment – passenger vehicle, SUV and light commercial vehicle (Level 3) to the broader new vehicle markets (Level 2).

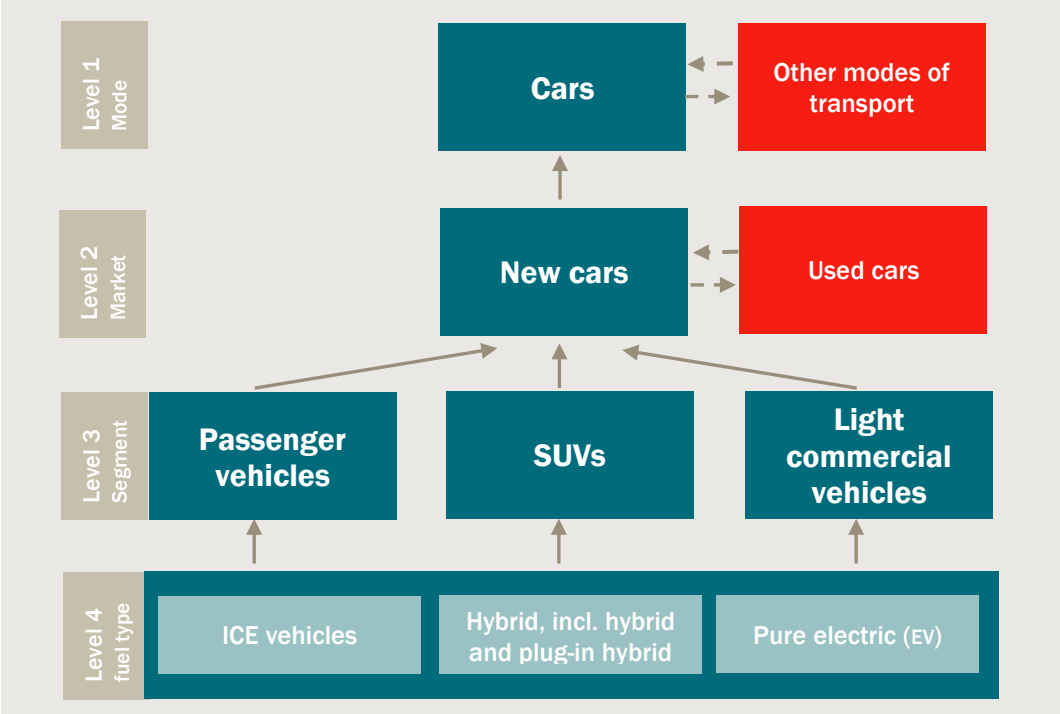
For the given market share by fuel type in a vehicle segment, as discussed in the base case and scenarios in the chapters 2 and 3, we calculated the average purchase price of each fuel type. The calculation works backward from the market shares specified in each scenario, using the CIE choice modelling study of demand for electric vehicles.[27] The study explored how consumer preferences for ICE, low- and zero-emissions vehicles change in response to variations in purchase price and vehicle attributes, measured as the likelihood of an average consumer choosing a specific fuel type, namely, the market share. The derivation of price change is discussed in detail in the following section.

The segment-wide average price is calculated by summing the products of market shares and their corresponding average purchase prices from Level 4. The segment-wide average prices in the scenarios are then compared to those in base case as percentage changes, which are then applied to the own-price elasticity of demand for new vehicles to determine the change in quantity demanded.

The quantify demanded for used vehicles are then extrapolated based on an observed relationship between new and used vehicle sales, as provided in the 2023 Automotive Insights Report (AIR) by AutoGrab.

[27] CIE, *Demand for electric vehicles - A discrete choice survey*, prepared for Australian Automobile Association, 2019.

C.1 Overview of modelled demand structure



Source: CIE.

Derivation of price change

Consumer choice model

We reverse-engineer the price change for each fuel type in a segment required to achieve the market share specified in the scenarios, based on the CIE choice modelling study of demand for electric vehicles.[28]

The CIE developed a choice model of electric vehicle uptake to explore how the demand shifts – in terms of market share – in response to changes in purchase price and other vehicle attributes. The model also includes ICE and hybrid models as alternatives to purely electric models. An online survey instrument was used to collect data for the study. This well-established technique elicits consumer preferences for vehicle attributes. It evaluates the likelihood of an average consumer choosing a fuel type based on a given set of purchase price and attributes. Using this model, we can derive the price change required for each fuel type to achieve its specified market share.

The following attributes were identified the key drivers of demand for a new vehicle and included in our analysis for price change.

- Specifications

28 CIE, *Demand for electric vehicles - A discrete choice survey*, Prepared for Australian Automobile Association, 2019. https://www.thecie.com.au/publications-archive/demand-for-electric-vehicles

  - Fuel type
  - Driving range on battery, or driving range on fuel tank
  - Acceleration (sprint time for 0 to 100 km/h)
  - Towing capacity (braked)
  - Carbon emissions (grams of CO_2 per km)
- Costs
  - Purchase price (after taxes and subsidies, includes cost of home charging kit for electric vehicles)
  - Running cost (fuel and servicing after taxes and subsidies).

The vehicle attributes as inputs to the choice model are summarised in the table C.2. Specifications and running costs are assumed to remain constant throughout the evaluation period.

The average purchase price of ICE vehicles is based on the 2024-25 price for mid-trim models, weighted by the sales volume of the top 100 selling models in 2023. The mid-trim level of ICE is chosen as the baseline for a like-for-like comparison with other fuel types. For other fuel types, the average price difference between them and their comparable ICE versions (namely, the price premium over ICE vehicles) is calculated and added to the average purchase price of ICE vehicles to determine their average purchase prices. Price parity is assumed in the base case (see the table C.4)

Other attributes relevant to recharging an electric vehicle are also included in the model.[29]

- Availability of charging points at destinations
- Time to charge to 80 per cent at destination charging points
- Availability of charging points on major highways
- Time to charge to 80 per cent at highway charging
- With these attributes, we also calibrated the model to have the same market shares as the base case specified in the chapter 3.

29 These attributes are relevant to pure electric cars only. In the model, availability of charging points at destinations is assumed to be 50 chargers. Time to charge to 80 per cent at destination or highway charging points is assumed to be 1 hour. Availability of charging points on major highways – assumed to be 1 in the model. These attributes are assumed to remain unchanged throughout the evaluation horizon.

C.3 Vehicle attributes in the base case, 2025

Attribute	EV	PHEV	HEV	ICE
Passenger vehicle				
Battery range (km)	556	47	n.a.	n.a.
Fuel range (km)	n.a.	1,277	1,277	785
Acceleration (sec 0-100 km/h)	5	6	8	8
Towing capacity braked (kg)	1,000	1,000	1,000	1,000
Carbon emission (g CO_2/km)	n.a.	70	91	146
Purchase price ($'000)	53	48	40	35
Running cost ($/100 km)	7	15	10	17
SUV				
Battery range (km)	507	63	n.a.	n.a.
Fuel range (km)	n.a.	888	888	817
Acceleration (sec 0-100 km/h)	7	8	9	9
Towing capacity braked (kg)	1,690	1,780	1,740	1,740
Carbon emission (g CO_2/km)	n.a.	51	126	179
Purchase price ($'000)	61	59	52	47
Running cost ($/100 km)	7	14	13	20
Light commercial vehicle				
Battery range (km)	295	63	n.a.	n.a.
Fuel range (km)	n.a.	1,306	971	929
Acceleration (sec 0-100 km/h)	10	10	10	11
Towing capacity braked (kg)	1,253	3,210	3,210	3,210
Carbon emission (g CO_2/km)	n.a.	51	192	223
Purchase price ($'000)	84	84	61	53
Running cost ($/100 km)	8	18	17	22

Note: For those fuel types without price points available due to model unavailable, such as plug-in hybrid and hybrid in LCV segment, adjustment is made to find price premium over ICE versions based on information of future model to be available according to social media.

Source: CIE based on Australian Government, 'Search and compare vehicles', in *Green Vehicle Guide*, 2024, https://www.greenvehicleguide.gov.au/, accessed 16 December 2024. Carsguide, *Car Values & Specs*, 2024, https://www.carsguide.com.au/price, accessed 16 December 2024. T Baker, 'Top 100 most popular cars in Australia in 2023: every best selling vehicle', in *Chasing Cars*, 2024, https://www.chasingcars.com.au/news/car-industry/top-100-most-popular-cars-in-australia-every-best-selling-vehicle/,accessed 16 December 2024. A Misoyannis, 'Australia's best-selling hybrids and plug-in hybrids of 2023', in *Drive.com.au*, 2024, https://www.drive.com.au/news/australias-best-selling-hybrids-phevs-of-2023/, accessed 16 December 2024. A Misoyannis, 'Australia's best-selling Electric Cars of 2023: Every Model Listed', in *Drive.com.au*, 2024, https://www.drive.com.au/news/best-selling-electric-cars-2023-full-year/, accessed 16 December 2024.

In the base case, it is assumed that by 2030, price parity between ICE and EV will be achieved in passenger vehicle and SUV segments, and that EV price premium over ICE will reduce by 50 per cent Additionally, for all segments, HEV price premium over ICE remains unchanged, while PHEV price premium over ICE is assumed to reduce by 50 per cent (table C.4).

C.4 Assumption of price parity, 2025 - 2030

	2025	2026	2027	2028	2029	2030
	$/car	$/car	$/car	$/car	$/car	$/car
Passenger vehicle						
HEV	40,327	40,133	39,939	39,746	39,552	39,359
PHEV	48,263	47,013	45,762	44,512	43,261	42,011
EV	53,113	49,624	46,135	42,646	39,157	35,669
ICE	36,868	36,771	36,823	36,624	36,231	35,669
SUV						
HEV	51,852	51,662	51,473	51,283	51,093	50,904
PHEV	58,587	57,340	56,094	54,847	53,600	52,354
EV	61,103	58,085	55,067	52,048	49,030	46,012
ICE	46,901	46,541	46,339	46,149	46,153	46,012
Light commercial vehicle						
HEV	60,681	60,568	60,455	60,342	60,229	60,116
PHEV	83,692	80,821	77,951	75,080	72,210	69,340
EV	83,692	80,821	77,951	75,080	72,210	69,340
ICE	53,313	53,191	53,083	52,980	52,900	52,796

Note: Prices of non-ICE vehicles are calculated by adding average price premium relative to ICE. Price parity is assumed to be achieved through a linear reduction from 2025 to 2030.

Source: CIE.

Validation of price changes

Limitation of consumer choice model

Calibrating and using the CIE choice model, especially in the LCV segment, is challenging because of the limited information around preferences around high levels of EV uptake. The underlying choice survey which we have used to model price changes, only presented EV prices being 40 per cent lower. Given this level of price change is not sufficient to meet the NVES, it suggests a larger price change is required; however we have little information on how consumers would react to larger price changes. As a result, we need to be careful in interpreting the implied price changes for LCVs which on face value appear to be unrealistic (ICE price increasing by a lot and EV prices falling considerably). Although the shift is crucial for achieving a higher proportion of low-emitting vehicles in new car mix to achieve industry-wide emission targets, it appears disconnected from current preferences reflected in the model. In the model, as assume fixed consumer preference over the evaluation period.

Additionally, there is limited pipeline of zero- and low-emission models to replace their high-emitting work or towing vehicles which remain among the most popular vehicles for Australian consumers. Lack of near-term low-emitting options is reflected in our analysis by assuming no significant technological advancements and moderate price reductions in the base case (light commercial vehicle), further limiting the model's ability in capturing future dynamics.

Price cap

To address this, we applied a cap on the price change in LCV segment to ensure that the modelled price changes remain within a reasonable range that aligns with observable consumer behaviours. The cap is the price change derived from Scenario 2, which is the price change that is consistent with the penalties/credits set out in the NVES scheme. This is because inferring results from the choice model beyond what consumers were asked in the survey is may give misleading results, as we do not know how consumers would react to extreme price changes.

The validated, or capped, price change is then aggregated, using weighted average of market share to present overall price change and purchase price in new light commercial vehicle market.

The model's price change results for the passenger vehicle and SUV segments are generally reasonable. Price caps were also applied to passenger and SUVs as part of model testing, but are not used in the central results.

It is important to note that applying a cap on price changes in the segment implies that the resulting price adjustments may not be strong enough to encourage the shift in consumer preference toward low- and zero-emission vehicles. Consequently, there is a risk of not achieving the market shares outlined in the scenarios in Chapter 3, as well as a potential gap in the feasibility of achieving emission targets.

Aggregate own-price elasticity of new cars

We review the literature on own-price elasticity in the new car market to understand how aggregate demand for new cars responds to price changes predicted by the choice model.

The aggregate own-price elasticity for new vehicles measures how changes in new vehicle prices affect sales. Table C.5 summarises studies and their elasticity estimates. Unlike elasticities specific to individual vehicle models or segments, aggregate elasticity reflects the average responsiveness of all new car buyers to price changes. It shows the percentage change in total new car sales resulting from a 1 percent change in the average new car price.

There are two groups of studies and elasticity estimates:

- The first group investigates new car sales respond to price changes, holding other factors – for example, used car prices – constant. In our analysis, we use the simple average of these estimates (-0.79) as the central case assumption.
- The second group uses simulation to allow used vehicle prices to adjust over time, which results in smaller elasticity estimates.

C.5 Summary of aggregate own-price elasticities for new vehicles

Time frame	Elasticity estimate	Study
Group 1 estimates: Holding other factors constant		
1971-1990	-1.08 [a]	S Berry, J Levinsohn & A Pakes, 'Automobile Prices in Market Equilibrium', in *Econometrica*, vol. 63, 1995, 841.
1989	-0.87	PS McCarthy, 'Market Price and Income Elasticities of New Vehicle Demands', in *The Review of Economics and Statistics*, vol. 78, 1996, 543.
1984-1990	-0.90	PK Goldberg, 'The Effects of the Corporate Average Fuel Efficiency Standards in the US', in *The Journal of Industrial Economics*, vol. 46, 2003, 1–33.
1993	-0.40 [a]	S Berry, J Levinsohn & A Pakes, 'Differentiated Products Demand Systems from a Combination of Micro and Macro Data: The New Car Market', in *Journal of Political Economy*, vol. 112, 2004, 68–105.
2000	-1.00	C Fischer, W Harrington & IWH Parry, 'Should Automobile Fuel Economy Standards be Tightened?', in The Energy Journal, vol. 28, 2007.
2001	-1.27	AM Bento et al., 'Distributional and Efficiency Impacts of Increased US Gasoline Taxes', in *American Economic Review*, vol. 99, 2009, 667–699.
1971-1990	-0.57	CR Knittel & K Metaxoglou, 'Estimation of Random-Coefficient Demand Models: Two Empiricists' Perspective', in *Review of Economics and Statistics*, vol. 96, 2014, 34–59.
1953-2013	-0.61	SP McAlinden et al., *The Potential Effects of the 2017-2025 EPA/NHTSA GHG/Fuel Economy Mandates on the U.S. Economy*, Centre for Automotive Research, September 2016.
1996-2016	-0.78	X Dou & J Linn, 'How do US passenger vehicle fuel economy standards affect new vehicle purchases?', in *Journal of Environmental Economics and Management*, vol. 102, 2020, 102332.
2014-2015	-0.34	B Leard, 'Estimating Consumer Substitution between New and Used Passenger Vehicles', in *Journal of the Association of Environmental and Resource Economists*, 2021.
Group 2 estimates: allow for price effects in used car market		
2000; calibrated	-0.36	C Fischer, W Harrington & IWH Parry, 'Should Automobile Fuel Economy Standards be Tightened?', in The Energy Journal, vol. 28, 2007.
N.A; calibrated	-0.18	J Chen, S Esteban & M Shum, 'Do sales tax credits stimulate the automobile market?', in International Journal of Industrial Organization, vol. 28, 2010, 397–402.

[a] Author calculations.

Source: Table 5-1 in M Jacobsen et al., *The Effects of New-Vehicle Price Changes on New- and Used-Vehicle Markets and Scrappage*, U.S. Environmental Protection Agency, 2021.

Substitution of new cars with used cars

Limited literature estimates the effects of price changes in new or used cars on the used car market. Table C.6 summarises estimated effects of new or used car price changes on used car market. In our analysis, we use a cross-price effect of 0.70, derived from a 1991 study by J. Murray & N. Sarantis, as it remains the most relevant reference despite being based on outdated data. The cross-price effect is smaller than unity, indicating imperfect substitution.

A recent study examining substitution patterns support the notion of imperfect substation: on average, 7 of consumers would switch to the used car market if their first-choice new vehicle model's price increased.[30] The remaining 93 would stay in the new car market and switch to other new car models.

The substitution pattern between new and used cars is nuanced. Consumers do not fully switch from new to used vehicles in response to price increase in new cars. For instance, a study found that 21.5 per cent of households would leave the new car market in response to a 1-per cent price increase by reallocating the budget to other goods.[31] Consumers who leave new car markets often hold on to their existing cars, reducing the supply of used cars, which is reflected by the negative elasticity of used car inventory with respect to new car prices. The price of used cars would rise as a result. This dynamic is also captured by the positive elasticity of used-vehicle price with respect to new-vehicle price in the literature (table C.6).

[30] B Leard, 'Estimating Consumer Substitution between New and Used Passenger Vehicles', in *Journal of the Association of Environmental and Resource Economists*, 2021.

[31] Table 7, average for selected car model. S Berry, J Levinsohn & A Pakes, 'Automobile Prices in Market Equilibrium', in *Econometrica*, vol. 63, 1995, 841.

C.6 Summary of estimated effects of price changes on the used car market

Time frame	Elasticity estimate	Source
Cross-price elasticity of demand for used cars with respect to new car prices.		
1977 to 1991	0.70	J Murray & N Sarantis, 'Quality, user cost, forward-looking behavior, and the demand for cars in the UK', in *Journal of Economics and Business*, vol. 51, 1999, 237–258
Elasticity of used-vehicle price with respect to new-vehicle price		
N.A; calibrated	1.69	J Chen, S Esteban & M Shum, 'Do sales tax credits stimulate the automobile market?', in International Journal of Industrial Organization, vol. 28, 2010, 397–402.
Aggregate own-price elasticity of demand for used car		
2003 to 2006	-1.23	D Jayarajan, S Siddarth & J Silva-Risso, 'Why New Car Dealers Sell Used Cars: A Structural Analysis of the Impact of Used Car Markets on the Automobile Distribution Channel' in *Association of Marketing Theory and Practice Proceedings,* 2018
2001	-0.54	AM Bento et al., 'Distributional and Efficiency Impacts of Increased US Gasoline Taxes', in *American Economic Review*, vol. 99, 2009, 667–699.
Elasticity of used car inventory with respect to new car prices		
2001	-0.08	AM Bento et al., 'Distributional and Efficiency Impacts of Increased US Gasoline Taxes', in *American Economic Review*, vol. 99, 2009, 667–699.
N.A; calibrated	-0.12	A Bento, K Roth & Y Zuo, 'Vehicle Lifetime Trends and Scrappage Behavior in the U.S. Used Car Market', in *The Energy Journal*, vol. 39, 2020.

Source: Table 5-2 in M Jacobsen et al., *The Effects of New-Vehicle Price Changes on New- and Used-Vehicle Markets and Scrappage*, U.S. Environmental Protection Agency, 2021.

D Detailed results

D.1 Dealer impact by vehicle segment Passenger and SUVs – total, 2025-2029

	Scenario 1 No change in vehicle sales (costs/benefits absorbed by dealers/OEMS)	Scenario 2 Change in vehicle mix due to full passthrough of costs/benefits	Scenario 3 Change in vehicle mix to meet passenger & SUV NVES target	Scenario 4 Change in vehicle mix to meet all light duty vehicle NVES target
	$m	$m	$m	$m
Gross Profit - Sales – New cars				
High share EVs	114	357	334	462
High share LEVs	- 80	147	267	520
Low share LEVs	-1 112	-1 270	-1 179	-1 661
Total	-1 077	- 766	- 578	- 680
Gross Profit - Sales – Used cars				
High share EVs	0	47	47	28
High share LEVs	0	83	159	- 114
Low share LEVs	0	12	118	- 503
Total	0	142	324	- 589
Gross Profit - Servicing				
High share EVs	0	31	32	70
High share LEVs	0	- 17	- 46	64
Low share LEVs	0	- 286	- 424	- 504
Total	0	- 271	- 438	- 370
Holding cost				
High share EVs	0	127	150	287
High share LEVs	0	143	187	490
Low share LEVs	0	- 369	- 459	- 486
Total	0	- 98	- 121	291
Total				
High share EVs	114	563	564	846
High share LEVs	- 80	357	568	960
Low share LEVs	-1 112	-1 913	-1 945	-3 154
Grand total	**-1 077**	**- 994**	**- 814**	**-1 348**

Source: CIE

D.2 Dealer impact by vehicle mix segment LCVs, 2025 to 2029

	Scenario 1 No change in vehicle sales (costs/benefits absorbed by dealers/OEMS)	Scenario 2 Change in vehicle mix due to full passthrough of costs/benefits	Scenario 3 Change in vehicle mix to meet passenger & SUV NVES target	Scenario 4 Change in vehicle mix to meet all light duty vehicle NVES target
	$m	$m	$m	$m
Gross Profit - Sales – New cars				
High share EVs	9	16	16	16
High share LEVs	- 54	- 28	- 28	- 27
Low share LEVs	- 749	- 599	- 599	- 597
Total	- 794	- 610	- 610	- 607
Gross Profit - Sales – Used cars				
High share EVs	0	4	4	4
High share LEVs	0	31	31	31
Low share LEVs	0	266	266	263
Total	0	302	302	298
Gross Profit - Servicing				
High share EVs	0	1	1	1
High share LEVs	0	- 9	- 9	- 9
Low share LEVs	0	- 112	- 112	- 110
Total	0	- 120	- 120	- 118
Holding cost				
High share EVs	0	- 48	- 48	- 46
High share LEVs	0	- 6	- 6	- 6
Low share LEVs	0	- 44	- 44	- 43
Total	0	- 98	- 98	- 95
Total				
High share EVs	9	- 27	- 27	- 25
High share LEVs	- 54	- 11	- 11	- 11
Low share LEVs	- 749	- 488	- 488	- 487
Grand total	**- 794**	**- 526**	**- 526**	**- 523**

Source: CIE

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