15 December 2025
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Impacts of Heavy Vehicle Reform
Productivity Commission

By email: ncp@pc.gov.au

Dear Commissioners

IMPACTS OF HEAVY VEHICLE REFORM

The National Heavy Vehicle Regulator (NHVR) is grateful for the opportunity to contribute to the Productivity Commission's evaluation of a heavy vehicle reform package proposed by the Treasurer, the Hon Jim Chalmers MP.

In this submission, the NHVR provides some key insights to the topics outlined by the Commission in response to the Treasurer's request. Our submission also provides related information and analysis for consideration by the Commission that is materially relevant to the reform package.

This submission focuses on Information request 1 – 3 of the Commission's request, with some commentary for Information request 4 and 5, which are primarily the remit of jurisdictions and local government. Further, while some data is contained within submission, we also outline other data or information that can be provided separately to the Commission, at the Commission's request. The NHVR will need to consider each request individually to ensure the intended analysis is suitably informed by reliable and relevant data.

Supplementary to this submission, the NHVR intends to provide the Commission in early 2026 with additional insights on a range of related matters that, while not explicitly raised in the Commission's information requests, are material to a robust evaluation of the reform package. These may assist the Commission in testing assumptions, interpreting results, and understanding system-wide interactions across access, productivity, safety and infrastructure outcomes.

We look forward to continuing to work collaboratively with the Commission and other stakeholders to foster sustainable advancements across the heavy vehicle sector. Together, we can ensure a cohesive and efficient system that supports growth, innovation, and long-term safety, decarbonisation and economic benefits for all Australians.

For further detail regarding this submission, please contact Brayden Soo, Manager, Freight and Supply Chains. Mr Soo will also be the primary contact for any follow-up queries, data provision or analytical support should the Commission require to inform its assessment.

Yours sincerely

Kelli Walker
A/ Chief of Safety and Productivity

Enc (1) – NHVR Response – Impacts of Heavy Vehicle Reform – 15 December 2025

NHVR submission

Impacts of heavy vehicle reform

15 December 2025

About the NHVR

The National Heavy Vehicle Regulator (NHVR) is Australia's regulator for heavy vehicles.

We are headquartered in Brisbane and employ more than 1,000 people across the ACT, New South Wales, Queensland, South Australia, Tasmania and Victoria.

We were established in 2013 as a statutory authority to administer one set of laws – the Heavy Vehicle National Law (HVNL) – which applies in all Australia's states and territories except the Northern Territory and Western Australia.

Through leadership and advocacy, we administer a national statutory system to deliver streamlined regulatory services and administration to the heavy vehicle road transport sector, minimising regulatory burdens while fostering greater safety and productivity.

Vision

Our vision is to have a safe, efficient and productive heavy vehicle industry serving the needs of Australia.

Purpose

We provide leadership to, and work collaboratively with, industry and partner agencies to:

- Drive sustainable improvements to safety, productivity and efficiency outcomes across the heavy vehicle road transport sector and the Australian economy.
- Minimise the compliance burden; while ensuring the objectives of the Heavy Vehicle National Law are achieved and duty holders meet their obligations.
- Reduce duplication of, and inconsistencies in, heavy vehicle regulation across state and territory borders.

NHVR stakeholder profile

- 277,778 registered operators.
- 556,000+ people in the road freight industry (5.3% of Australia's total employment).
- 6 participating jurisdictions.
- 468 road managers in participating jurisdictions.

Australia's fleet

1,086,135 registered heavy vehicle units, including (this list is not exhaustive):

- 122,628 prime movers
- 188,273 semi-trailers
- 179,398 freight-carrying trucks
- 119,187 agricultural vehicles and tractors
- 39,938 buses

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Information request 1: Increasing heavy vehicle road access to reduce emissions and increase productivity

A key limiting factor in the take-up of high productivity vehicles is uncertainty about, and constraints to, where those vehicles can be used. The Heavy Vehicle National Law (HVNL) requires road owners, who are largely responsible for maintaining and upgrades of their roads and bridges, to be involved in decisions about what access is provided to heavy vehicles. The tensions between road owners' understandable desire to protect their assets and opportunities for productivity, environmental, and safety gains through larger vehicles remains a defining issue.

Appropriate reforms to assess under this proposal, e.g. increases in general mass limits under the HVNL

Considerations for baseline mass increases

The most material and policy-relevant reforms to assess is the uplift of as-of-right mass from General Mass Limits (GML) to Concessional Mass Limits (CML) and as-or-right vehicle length limits from 19m to 20m that will be delivered by the Heavy Vehicle National Law (HVNL) Amendment Act 2025. These reforms represent the baseline change that will help unlock productivity benefits for the existing fleet. While mass and length limit increases are acknowledged as a productivity gain, they can impact on overall network access. Network access remains a discretionary decision for road managers as the asset owners.

The National Transport Commission has already undertaken assessment and modelling in regard to productivity benefits of these changes and would be able to provide useful input.

Considerations for Euro VI mass increases

The Australian Government has recently introduced a new emissions standard for new heavy vehicles: the Australian Design Rule (ADR) 80/04 which aligns with the European Euro VI standard. This has resulted in up to 0.5t heavier Euro VI compliant heavy vehicles than earlier models. The increased mass is due to the required additional advanced emission systems. The increased mass limits commenced on 1 November 2024.

The pavement cost and emissions benefits of the changes could be usefully incorporated into the Commission's analysis.

Importantly, mass concessions afforded to the prescriptive fleet do not apply to existing PBS approvals. Should an operator wish to add a Euro VI prime mover to an existing PBS Vehicle Approval they need:

- A new Design Approval, which requires the engagement of a PBS assessor.
- A new Vehicle Approval, which requires the engagement of a PBS certifier.
- A new access permit which requires making an application via the NHVR and consideration by road managers.

There is no guarantee of an operator maintaining their existing level of road access when a new access application is made. Separately, some jurisdictions have imposed restrictions on the number of variants it will accept as part of an access application. For example one jurisdiction will accept no more than 10 variants per application. Hence where an operator may have had an existing single access permit to cover a hundred vehicle combinations, the introduction of a Euro VI vehicle into their PBS fleet can result in 10 (rather than one) access applications being required. This has a direct cost in terms of additional application fees, administrative costs for operators, costs to the regulator in processing a larger number of access application, and administrative costs for road managers to considering consent. Hence, upgrading to a Euro VI compliant heavy vehicles creates additional financial risks, potentially affecting their uptake within the PBS fleet.

The Commission could usefully look at the negative incentives and costs associated with the implementation approach for the additional mass concession for Euro VI vehicles. As part of this, and if it accepted that current arrangements may deter operators from upgrading to Euro VI vehicles, then the Commission could also consider the lost opportunities of transitioning to a fleet with a better productivity, emissions and safety profile. This could include costs associated with higher levels of road trauma. There is existing modelling of the relative productivity, environmental and safety outcomes associated with expansion of the PBS fleet that can be used for this purpose.

Considerations for heavy Low and Zero Emission Vehicle (LZEV) mass increases

LZEVs will be heavier and will impose higher pavement wear than comparable Internal Combustion Engine (ICE) vehicles. Their integration must be analysed within the broader fleet mix to accurately reflect system-wide impacts on road wear, maintenance cycles and infrastructure investment. Austroads has already quantified and projected cumulative road damage, maintenance requirements and lifecycle cost impacts under different LZEV mass scenarios, uptake rates and pavement surface type, and this should be incorporated into the Commission's assessment. The trade-off between sustainability benefits and infrastructure impacts should be explicitly outlined and quantified.

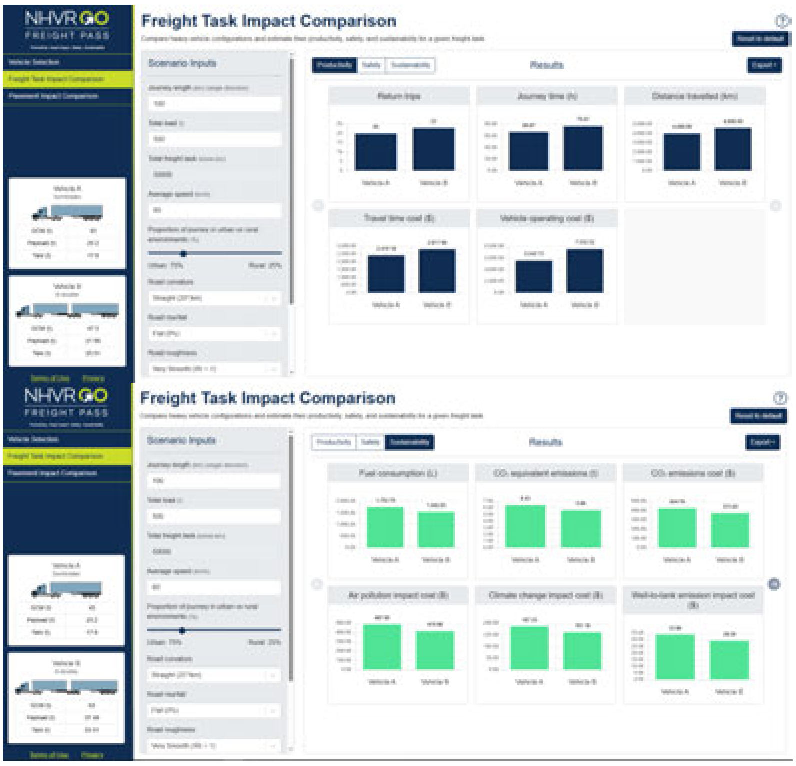
Austroads' project NEF6392 Future Freight Vehicles and Buses modelled 2,475 representative pavement sections, drawn from the Victorian and Queensland state road networks, using Austroads derived pavement deterioration and work effects models. The representative sections reflect multiple combinations of attributes. The results can be used to examine the consequence of the various scenarios on their network performance and budget needs. The library of pavement analyses is contained in both a separate Microsoft PowerBI tool and spreadsheet files.

Considerations for higher productivity freight vehicle mass increases

Modelling should also account for the increased uptake of more productive Performance Based Standards (PBS) combinations. PBS vehicles deliver significantly higher freight productivity and, on a payload-normalised basis, impose less pavement wear per tonne transported due to fewer trips, fewer vehicle passes, and more axles distributing mass. While axle mass limits remain unchanged, the system-wide impacts, including reduced vehicle kilometres travelled, are essential to an accurate assessment of road wear and infrastructure cost impacts.

Additionally, reduced distance travelled and payload optimisation contribute to measurable safety and sustainability benefits, including lower emissions and safer road environments due to reduced heavy vehicle traffic. These trade-offs can be quantified using the NHVR's Freight PASS web app, which is broadly aligned with the Australian Transport Assessment and Planning (ATAP) Guidelines. Incorporating these factors into modelling ensures a more comprehensive evaluation of the broader impacts of higher productivity freight vehicle mass increases.

The NHVR anticipates the Freight PASS web app will be publicly available on the NHVR website from January 2026, enabling the Productivity Commission to build and quantify productivity, sustainability, safety and pavement wear trade-off amongst over 11 million possible vehicle configurations – refer screenshots below as examples.



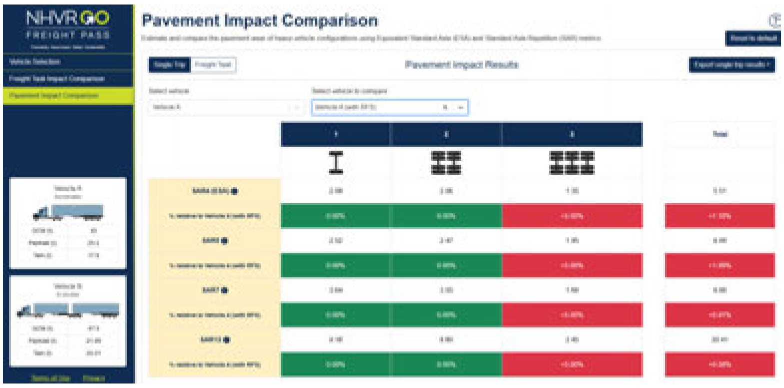


Figure 1: Example screenshots from the NHVR Freight PASS Web App

Additional cost of road wear and infrastructure maintenance

The Freight PASS tool includes a pavement wear calculator. The calculator assists users to estimate vertical pavement wear effects and costs. It considers various factors like different pavement types, vehicle configurations, axle configurations, axle masses, tyre sizes, and road-friendly suspension, offering a wide-ranging analysis.

The calculator offers users a number of measures to standardise evaluation of relative pavement impacts (i.e. apples-to-apples comparison). This includes:

- Payload productivity - the amount of payload that can be moved per vehicle per unit of damage
- Wear Productivity Index – a ratio of the cumulative pavement damage between vehicles to transport a 100t payload freight task
- Marginal cost of pavement wear – an estimated cost of pavement wear per vehicle to transport 100t payload by 1km

In modelling the impacts of vehicle mass on pavement wear, the Commission should consider:

- The load proportioning effects of road-friendly suspension factors, which has material impact on pavement wear calculations. The relevant factors have been incorporated into the NHVR Calculator.
- The Queensland Department of Transport and Main Roads has published values relating to the marginal costs of pavement wear, per unit of damage, across different pavement surface types. Other data sources only consider pavement wear associated with vehicle configuration, which makes it difficult to capture a full picture of the relationship between mass and pavement wear. It may be worthwhile considering the broader applicability of Queensland pavement wear cost rates for assessing national costs.

Intersection with other infrastructure barriers necessary to take up reformed regulation

The intersection of heavy vehicle reform with existing infrastructure barriers is primarily the responsibility of infrastructure providers (i.e. road managers in the context of the NHVR and the HVNL).

Key barriers affecting the uptake of more productive and higher-mass vehicles include:

- Bridge capacity – structural limits on weight and load distribution.
- Pavement condition – durability and suitability for higher-mass vehicles.
- Dimensional constraints – vertical clearance, lane width, and physical barriers.
- Storage and manoeuvring space – including turning lanes, boom gates, and level crossings.

Infrastructure providers are best placed to advise on these constraints and barriers, and their input is essential to inform any regulatory changes and quantification of costs and benefits.

Implementation issues, including how governments should apportion any increased road infrastructure costs between levels of government

The introduction of reforms allowing higher mass (including to maintain payload parity, in the context of heavy electric vehicles) and more productive heavy vehicles has direct implications for road infrastructure wear and replacement costs.

To implement these reforms effectively and equitably, governments could consider the following issues and mechanisms:

Reassessment of road user charges:

Increased mass and axle loads result in higher wear and tear on pavements, bridges, and other road assets. Road user charges should be revisited to reflect these incremental costs, ensuring that vehicles contribute appropriately to the maintenance and renewal of the infrastructure they use.

Mass, Distance, Location (MDL) charging, which is a current project by the Australian Government, provides a mechanism to link user fees directly to the distance travelled and the type of roads used and the level of wear caused by vehicles. In other words, vehicles pay proportionally for the roads they stress, and the generated revenue is hypothecated accordingly for reinvestment into the network that is consumed (i.e. direct to the relevant roads and road owner), creating a transparent, efficient funding mechanism.

MDL charging systems ensure that heavy vehicles contribute proportionally to the infrastructure they actually wear. This mechanism works hand-in-hand with equitable apportionment between levels of government, providing transparent, evidence-based allocation of costs to the jurisdictions responsible for the roads affected.

Earlier adoption of MDL charging will support cost recovery from higher-mass vehicles while incentivising efficient use of the network and careful route selection.

The NHVR understands that the Department of Infrastructure, Transport, Regional Development, Communications, Sports and the Arts (DITRDCSA) has undertaken analysis for MDL charging. This could be useful material for the Commission in its analysis, but recognising this is unlikely to have been updated in the context of the HVNL Review. Further, the NTC could be contacted to provide its latest Operator Cost Model, which contains the data, assumptions and methodology for Heavy Vehicle Charges Determination.

There is a structural change in the fleet which has implications for road user charging

As the fleet shifts increasingly toward PBS vehicles, B-doubles and road trains, the road user charging system faces a structural challenge. Fewer vehicles are now performing a larger share of the freight task, resulting in reduced per-vehicle fixed-charge revenue. This trend is further compounded by improvements in fuel efficiency and utilisation of longer vehicles with more trailers, placing more pressure on the system to recover costs through fuel-based charging. Analysis of data from the NHVR's National Roadworthiness survey, when vehicles are converted into the same categories as the ABS Survey of Motor Vehicle Use, yield the following results.

Table 1: Comparison of average distance travelled over 5 years

	ABS Survey of Motor Vehicle Use (2020)	NHVR National Roadworthiness Survey (2024)
Average annual distance travelled		
Rigid trucks	21,100 km	43,471 km
Articulated trucks	78,300 km	102,491 km
Buses	24,600 km	50,759 km
Relative Standard Error		
Rigid trucks	3.08%	1.52%
Articulated trucks	1.83%	1.49%
Buses	4.80%	1.99%

Note: The NHVR advises that the above change is likely the result of a combination of sampling from both surveys, as well as increasing productivity of vehicles (e.g. due to the driver shortage, existing vehicles are being used more, rather than distributed amongst many vehicles, to maintain a lower vehicle to driver ratio).

The combined effect is clear: fewer vehicles are being registered than forecast, those vehicles are more productive, and aggregate fuel consumption is declining. This elevates the importance of transitioning to usage-based and configuration-sensitive charging to ensure cost recovery and fair distribution of infrastructure funding (e.g. MDL-based approaches). Without reform, diminishing revenue will deepen the road funding deficit and is likely to exceed the shortfall identified in DITRDCSA's modelling.

In practice, this means fewer vehicles are paying annual registration fees, fuel-based charges are contributing less in aggregate, and total revenue is falling, even as freight volumes remain stable or increase. The current system does not accommodate this decoupling of vehicle numbers from infrastructure usage and relies on assumptions that no longer reflect the modern freight task.

To maintain sustainable and fair funding:

- Registration model reform is essential:
    - Introduce variable registration charges that reflect productivity, mass and actual road impact, rather than relying solely on broad configuration categories.
    - Alternatively, reduce reliance on fixed registration revenue altogether and shift toward usage-based charging mechanisms (e.g. MDL charging).
- Rebalance the revenue mix:
    - Shift from fixed charges (such as registration) to charges that reflect actual road use and impact, for example, weight-distance charging on specific road segments.
    - Treat PBS vehicles as a distinct class within cost-allocation and pricing models. PBS combinations have different productivity profiles, axle configurations, total kilometres travelled, and road-impact characteristics compared with conventional B-doubles or semitrailers. Bundling them into traditional configuration classes masks these differences and leads to inaccurate cost recovery, under-charging for some vehicles, and over-charging for others. Explicitly modelling PBS as a separate class improves equity and ensures charges better match the true cost of infrastructure use.

PBS creates a complexity for understanding how the fleet will structurally change and how charging could be conceptualised

While B-doubles and road trains volumes are growing, they are proportionally reducing in favourability compared to PBS vehicles. However, there are natural limits to how much the overall structure of the heavy vehicle fleet can change to PBS. These limits are dictated primarily by the nature of the freight task and the type of commodity being transported. The following insights can also translate to how the Commission could forecast the future size of the fleet and its composition, inside and outside of PBS.

PBS does not make all vehicle types interchangeable. For example:

- Rigid trucks (negligible PBS volumes) will never be replaced by truck and dog combinations, B-doubles, or A-doubles because they are essential for short-haul, urban delivery, and other last-mile applications.
- Truck and dog combinations are unlikely to transition into other configurations because of their strong fit for the construction sector and their ability to access constrained urban job sites with better manoeuvrability and tipping capability.
- PBS B-doubles, A-doubles, and road trains handle linehaul and regional freight where productivity gains can be achieved through network-approved access and higher mass limits. These tasks require large vehicles, not smaller ones.

Implication:

- PBS improves the efficiency of the vehicles already suited to a particular freight task, but it does not cause freight to shift between segments (e.g. last-mile rigid truck work does not suddenly become B-double work). As a result, the overall fleet will continue to comprise distinct operational categories, each with its own optimal vehicle type, even as PBS adoption grows.
- It is likely that the number of trailers in the entire fleet will continue to increase more than the number of hauling units. NHVR analysis of registration data since 2018 shows consistent greater uptake of dollies and trailers relative to

hauling units on a normalised basis. In other words, the fleet is becoming more productive, and longer multicombination vehicles are increasing their share of the overall fleet composition.

- As such, we are likely to see:
  - More PBS-approved vehicles, but no structural shift, in the non-line-haul segment (i.e. smaller than B-doubles).
  - Optimisation within the line-haul segment, such as B-doubles shifting to A-doubles, or A-doubles shifting to larger road train variants where network access permits.

From a cost recovery perspective, this means:

- The fleet will not converge to a smaller number of ultra-productive vehicles. Instead, it will remain diverse, with each segment evolving independently. Road use and cost attribution will remain distributed across vehicle types, and charging mechanisms must continue to reflect this diversity.
- Shifts within a segment (e.g. B-doubles to A-doubles) may still result in network-specific cost impacts and revenue implications, but they will not fundamentally reduce the need for tailored pricing across classes.
- Trailers contribute substantially to road wear but are not typically subject to road user charges in the same way as powered units. As a result, the charging base becomes further disconnected from the infrastructure cost base, especially where axle loads increase but powered vehicle numbers do not. To ensure charging remains equitable and sustainable, cost attribution and revenue mechanisms will need to account for the growing presence and impact of trailers in the freight task.
- Therefore, while the overall efficiency of the fleet may increase, PBS is unlikely to dramatically reduce the number of vehicle types or tasks being performed, placing a ceiling on the total system-level revenue savings that could be achieved through productivity alone.

This reinforces the importance of:

- Segment-specific cost modelling and vehicle class representation in charging determinations.
- Recognising that cost recovery must remain flexible and responsive to evolving configurations within, but not beyond, each functional vehicle segment.
- A transition to MDL charging instead of the current PAYGO system.

Table 2: Summary of key issues of higher productivity vehicles and road use charges

Factor	Effect	Charging Implication
Longer vehicles with more trailers improve productivity.	Fewer trips and fewer hauling units are required to carry the same freight task.	PAYGO charges and registration fees reduce overall, even as the freight task grows.
Fleet size reduces relative to what it would have been without productivity improvements, especially hauling units relative to trailer units.	Fewer hauling units required to perform the same freight task.	Decline in total registration revenue, as counts fall, compared to a less productive fleet. PAYGO under-recovers unless adjusted for productivity effects
Increased trailer use.	While hauling units reduce or stabilise, trailers increase to support more productive combinations.	Trailer charges are significantly lower than hauling units; growth in trailer numbers adds wear and mass but contributes disproportionately less to revenue.
Longer vehicles travel more kilometres.	Fewer vehicles doing more kilometres each.	Per-vehicle cost appears higher, potentially skewing vehicle class cost allocations unless task is normalised by tonne-km or productivity factor. Without adjustments to revenue generated through fuel (i.e. at the pump), the system risks recovery shortfall.
Structural change within vehicle classes only	Certain vehicle types (e.g. rigids, truck and dogs) unlikely to shift into entirely different configurations due to task or commodity.	Limits to fleet-level productivity gains; most changes will be within vehicle classes (e.g. B-doubles to A-doubles), not across them.
Growth in PBS share of fleet.	PBS vehicles continue to grow at over 20% Compound Annual Growth Rate, but remain a relatively small share of total vehicle volume.	Masking effect in charging averages, with PBS benefits diluted in models that do not isolate their impact from the wider fleet.
Use concentrated on high-	Road wear becomes more concentrated on B-double	Network-wide cost averaging can under-recover for

Factor	Effect	Charging Implication
productivity networks.	road train and PBS-approved routes (note, this is not saying they will necessarily cause more wear overall).	critical freight corridors while over-recovering for low-use rural roads.
PAYGO model is backward-looking.	Charges are based on past expenditure, not future infrastructure demand or inflation.	As infrastructure costs rise faster than CPI (e.g. from labour and construction escalation), charging lags behind, compounding under-recovery over time.

How imported vehicles can comply with both international and domestic standards to allow vehicles (including heavy zero emission vehicles) to be imported without being repurposed

To reduce the burden of meeting Australian specific compliance requirements, the ADRs provide alternative means of compliance which align with other major global markets. Providing these alternative pathways greatly reduces the situation where an imported vehicle needs to be repurposed to meet local requirements.

These alternative compliance options include:

- Electric vehicles: Conformance with electrical safety guidelines under one of the following standards:
    - ADR 109/01,
    - United Nations Economic Commission for Europe (UNECE) R100,
    - United Nations Global Technical Regulation (GTR) No. 20 or
    - United States Federal Motor Vehicle Safety Standards (FMVSS) No. 305 standards.
- Hydrogen vehicles: Compliance with pressurised fuel system standards under one of the following standards:
    - ADR 110/00,
    - UNECE R134 or
    - GTR 13

Availability of data on road use, the structure of the road network, and different heavy vehicle users (and user industries).

The NHVR has the following additional data sources that may be useful to the Commission.

- Estimates of fleet size and composition from National Exchange of Vehicle and Driver Information System (NEVDIS) registration data, and segmentation of operators based on number of registrations. It should be noted that this information has limitations as vehicle registrations are by component units (hauling units, dollies, trailers etc.), which are inherently modular (i.e. a group of registrations might form a vehicle configuration one day, and different grouping could form a smaller or larger vehicle another day). It is not reasonably practicable to make point-in-time estimates on the structure of the heavy vehicle fleet based on registered component units. Should it be useful, the NHVR is aware that Transport for New South Wales has engaged consultants to hypothecate the configuration make up of the fleet, and these assumptions and modelling could be useful for the Commission.
- Estimates of average annual vehicle kilometres across different vehicle types, based on results from the NHVR's National Roadworthiness survey. The Commission's analysis requires understanding of potential distance travelled by heavy vehicles. The previous ABS Survey of Motor Vehicle Use (SMVU) data is outdated, and was last collected over 5 years ago. The NHVR's data is preferred for modelling of active vehicles as it is more current, segments the fleet more granularly, has a larger sample size, and a statistical evaluation undertaken has returned low Relative Standard Error values than the SMVU. Further NHVR data is collected in-situ, rather than self-reported by industry, and NHVR has not imputed results from nil responses as was done by the ABS (e.g. using data from larger companies who responded to generate data points for smaller companies who did not respond to the ABS survey). The ABS also incorporates nil use vehicles in their calculations (i.e. artificially reduced average distance travelled of active fleet vehicles). However, it is acknowledged that extrapolating data across the entire fleet would also need to consider nil use vehicles, whereby ABS data could be useful.
- A model that forecasts the future growth of PBS vehicles, PBS vehicle design approvals and PBS vehicle approvals and resourcing effort to maintain current service levels. This may assist the Commission to understand transition and growth scenarios for analysis, including the structural change of the fleet (e.g. smaller proportion of non-PBS

vehicles and higher proportion of PBS vehicles, and fewer overall vehicles that are undertaking the road freight task, compared to a non-PBS world).

- The NHVR can provide the Commission with outputs from the Historic Access Reporting Tool (HART), if sufficient detail can be provided to extract the data. The HART enables filtering and analysis of access permit applications, supporting a deeper understanding of past decisions, route demand, and response times. The HART also generates data for the NHVR Access Permit Rapid Cost Benefit Analysis (Rapid CBA) tool, which can be provided to the Commission. This complementary Rapid CBA tool estimates and forecasts potential fees and labour costs associated with access permits, and the opportunity-cost to the NHVR, road managers and industry from reforms which might increase or decrease permit numbers. The Rapid CBA is relevant to Information Request 2 and represents the NHVRs preferred approach to estimating fee and labour cost impacts across access permit reform proposals and participation/uptake rates.

The NHVR refers the Commission to these other data sources and providers to assist its analysis:

- Transport Certification Australia (TCA) holds telematics data for a segment of the fleet, notably PBS vehicles, which are subject to monitoring conditions of access under the HVNL. The NHVR is prohibited by the HVNL from sharing this data, but TCA are not subject to the same regulatory restrictions.
- BITRE forecasts cover Australian freight and key transport modes, including road freight, located here. The NHVR advises the Commission that our observation is BITRE actuals have fallen between the Reference Scenario and High Scenario for the years since the forecasts were originally published (i.e. an indication that Australia's freight task is growing faster than anticipated, and increasingly preferencing road freight). This data can be reconciled against fleet size estimates for the Commission to estimate per vehicle payload productivity. This might inform more accurate estimations, or adjustments to BITRE's methodology (i.e. the NHVR considers BITRE's modelling to be consistently conservative relative to real-world growth in all forecast years).

Divergent PBS access and payload productivity growth trends and potential relationship with commercial viability

The NHVR provides the Commission with the following high-level insights relevant to Information Request 1, specifically regarding access policy and uneven productivity outcomes across jurisdictions.

There is variability in how jurisdiction approach asset management, and this flows through to their approach to heavy vehicle access. This largely relates to where on the 'protect / consume' continuum they sit in relation to the use of roads and bridges. For example, NSW has indicated its policy approach is a shift from asset preservation to asset optimisation, which is a policy not shared by all jurisdictions. These differences have had an effect on payload productivity.

PBS vehicles hold the greatest potential for lifting average payload productivity. However, access barriers for these modern vehicles vary between jurisdictions and limits national consistency in the use of optimal vehicle configurations. The result is increased traffic volumes, a higher risk of crashes, greater emissions and road wear, and rising transport and logistics costs, all of which ultimately impact consumers.

Inconsistent productivity gains constrain the effectiveness of Australia's domestic and international freight network. Given the interconnected nature of supply chains, inefficiencies in one part of the system can cause delays and cost increases throughout the entire journey. Meeting rising freight demand is best met by more productive vehicles doing more of the freight task, regardless of where that task begins or ends.

Consistent access to high-productivity vehicles, particularly PBS A-doubles, is not merely a matter of harmonisation between states and territories, it's essential to unlocking the full capacity of the national fleet and modernising Australia's economy. Without coordinated reform, inefficiencies will compound, placing an increasing burden on businesses, consumers, and our economy.

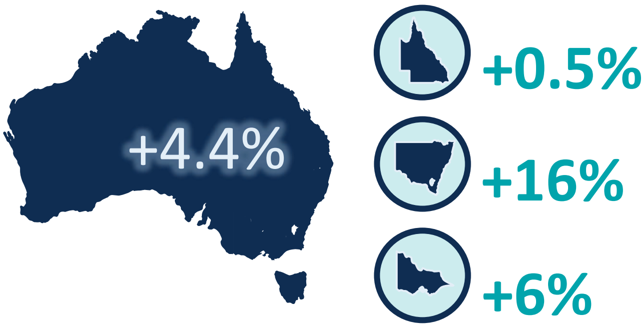


Figure 2: Average payload productivity for articulated vehicles (2014-2020)[1]

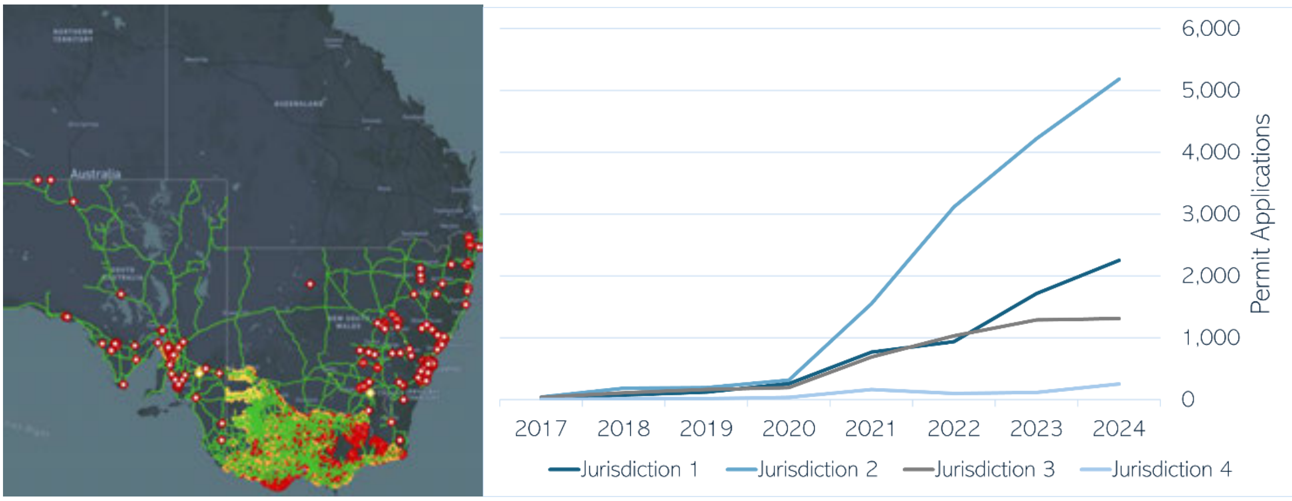


Figure 3: Comparison of PBS Level 2B networks and access permit applications across jurisdictions

[1] Australian Bureau of Statistics (2020), Survey of Motor Vehicle Use, Australia.

Information request 2: National Automated Access System

It is well understood that current access approval arrangements are a drag on the uptake of high productivity vehicles. The National Automated Access System (NAAS) will go a long way to addressing this issue.

Future coordination and alignment between the states and territories

The NHVR supports the development of the NAAS and through the Strategic Local Government Asset Assessment Project (SLGAAP) is assisting local government road managers to assess structures such as bridges and culverts. This work provides important asset data for use within the NAAS.

SLGAAP has worked alongside relevant jurisdictions to maximise the consistency of asset data collected for the different asset assessment modules that will underpin the NAAS. All SLGAAP data is stored in the Asset Capability Module within NHVR Go, accessible by the relevant road managers.

For the Commission's modelling, it is important to note the completeness of data on bridges and culverts, and the capability of road managers to provide the operating parameters for each of their assets, will impact on the speed of delivery and breadth of benefits.

How best to determine which roads might be eligible for automatic access, initially and on an ongoing basis

The NHVR understands that the NAAS will not provide 'automatic' access but provides opportunities for access decision making to be more automated. This will be underpinned by pre-loading of road managers' parameters for asset use.

Existing networks and identifying routes subject to a large number of permit requests (e.g. via the NHVR's Historic Access Reporting Tool (HART)) provide useful starting points in identifying priorities. However, when interpreting demand signals for modelling purposes, it is important to recognise that:

- High permit demand does not necessarily result in increased access, as decisions remain subject to local risk appetite and asset condition.
- NAAS improves transparency and processing time but does not remove all administrative effort or engineering considerations for councils.

If modelling assumes that demand alone will drive immediate expansion of automated access, the outcomes may not reflect the operational decision-making of asset owners. Accounting for these constraints is essential to avoid projecting accelerated access gains that road managers, particularly smaller but no less important road managers with large freight tasks, may not be able to readily support.

The technical and administrative practicalities of scaling up Tasmania's model to the whole of Australia

A national rollout requires addressing several operational, administrative and governance factors that will materially influence the timing and distribution of benefits across jurisdictions. These include:

- IT and data requirements: A national platform requires integration with existing systems, consistent data inputs, and a complete set of asset parameters.
- Administrative and workforce capability: Many road managers will need training and resourcing to maintain asset information to support automated decisions.
- Local risk appetite and asset capability: Access outcomes will continue to vary due to differences in asset condition and risk tolerance among road owners. NAAS enables faster and more consistent decisions but does not change existing engineering constraints or policy settings. In some cases, automated decisions may be more conservative than manual ones.

For modelling purposes, it is important to consider how these factors constrain the rate at which NAAS coverage can expand, and the approved roads in an automated system versus a manual system with direct oversight by engineers (e.g. applied bridge loading factors might be more conservative with less access granted in an automated system). The interaction between automated access and existing access notices also warrants consideration. Road managers with slower notice expansion or with incomplete network coverage may create gaps in end-to-end access, influencing the scale and timing of productivity benefits.

Ultimately, the key determinant of rollout speed is both the technical system design and the availability and completeness of the underlying asset and network data required to populate the NAAS. If modelling does not account for this dependency, it may overestimate the pace of benefits realisation or assume access improvements that are not achievable in the near term. Conversely, incorporating these constraints will provide a more realistic assessment of how NAAS implementation can unfold across different jurisdictions and network types and the benefits that follow.

The costs and benefits of the current access permit system borne by heavy vehicle operators

There are now over 90,000 access permit applications submitted by industry every year. The fee the NHVR charges recovers about one-third of the administrative cost[2]. Each permit application, on average, costs industry over $220 in fees and application time, and costs road managers over $450 in assessment time[3]. A conservative estimate is that, over the past three financial years, the labour and fee impact of the permitting process has exceeded $180 million to the NHVR, road managers and industry[4].

For industry, access permits can mean delayed movements, increased compliance costs, and reduced productivity. For government and the NHVR, the growing permit load places pressure on already stretched resources and systems. Without meaningful reform, the volume and complexity of permit requests will continue to rise in line with freight growth and vehicle innovation, compounding inefficiencies and inflating costs across the entire system.

As NHVR data indicates, industry applications are becoming increasingly more complex over time, with more road manager engineering assessments (consent requests) and NHVR administrative effort (cases) triggered per application. This trend reinforces the need to reduce the reliance on individual permits by expanding as-of-right access under the existing notice regime. The promise of fewer permits under the NAAS could be partially achieved now through the expansion of access notices (which remove the need for individual permits).

In considering the costs associated with permits, it would be beneficial to consider the additional costs of goods associated with delayed freight movement and higher operating costs.

Table 3: Access permit statistics over time

Year	Industry applications	NHVR cases	Road manager consent requests
FY2021	69,891	117,886	195,444
FY2022	77,141	143,951	233,843
FY2023	81,444	151,380	249,240
FY2024	86,532	172,862	286,170
FY2025	94,088	196,629	318,027

The structure and composition of the heavy vehicle industry is evolving, with a significant proportion of operators being smaller, independent businesses. The largest 10 companies have only 2.4% market share of the national fleet and 93% of operators have less than 5 hauling units, and their market share is 54% of the national fleet.

This distribution suggests that smaller operators may experience disproportionate exposure to regulatory and administrative burdens. Limited resources and capacity can make navigating complex and inconsistent access regulations more challenging, potentially increasing the risk of unintentional non-compliance.

Understanding these dynamics can inform modelling of access system efficiency, resource allocation, and potential productivity improvements across the sector. For example, our analysis indicates that reducing the administrative

[2] NHVR Cost Recovery Study Project
[3] Assumptions include 2 hours resource time for each stakeholder as per the HVNL RIS 2011; wages derived from ABS AWOTE for Transport, Postal and Warehousing and Public Sector; and an access permit fee of $88
[4] Assumptions include 2 hours resource time for industry and road managers as per the HVNL RIS 2011 and NHVR averages; wages derived from ABS AWOTE for Transport, Postal and Warehousing and Public Sector (2024); and an access permit fee of $88.

burden by just one hour per week for small operators (those with fewer than five hauling units) could unlock over $700 million[5] annually in labour productivity improvements.

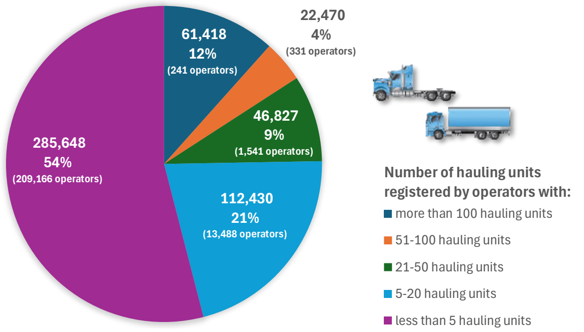


Figure 4: Market share by fleet size (hauling units) in Australia (June 2025)[6]

Availability of data on road use, the structure of the road network, and different heavy vehicle users (and user industries).

The characteristics of user industries are not a determining factor for NAAS, as its decisions are based on engineering constraints, asset capability and vehicle configuration, not the type of freight or operator. Industry behavioural insights are therefore not a substitute for the structural data the system requires. Instead, information on vehicle types, mass and route demand are more useful, and can be drawn from the NHVR's HART dataset, which offers a long-term and detailed picture of permit activity. In modelling terms, HART provides a more realistic indication of which vehicle classes and corridors are likely to benefit first from automation.

Regulatory telematics data, including datasets held by TCA, provides additional information on vehicle movements. However, this represents only a small, non-representative subset of the total heavy vehicle fleet. Coverage is skewed toward the largest fleets, certain freight tasks, and higher-value commercial operations. Modelling that relies too heavily on telematics risks drawing conclusions that do not extend to the broader fleet or reflect the operational patterns of smaller operators, special purpose vehicles or oversize/overmass movements.

In general, the accuracy of modelling NAAS benefits will be strengthened by recognising the variability and limitations of the underlying datasets and the considerable tasks of each local road manager making decisions about each of their assets to enable dynamic decision making. If these constraints are not reflected, the resulting projections may not fully align with the way networks are currently classified or how the broader fleet operates.

[5] Calculated using ABS Average Weekly Ordinary Time Earnings for Transport, Postal and Warehousing (2024).
[6] NEVDIS registration data as of June 2025, processed by the NHVR.

Information request 3: National Heavy Vehicle Driver Competency Framework

The rising average age of heavy vehicle drivers, currently 48 years old[7], combined with a lack of younger entrants, is making the driver shortage issue increasingly difficult to address. Recruitment challenges are stark: only 53% of truck driving vacancies are being filled[8]. This widening gap between the demand for and supply of qualified drivers is placing growing pressure on the existing workforce to meet an expanding freight task.

One way to mitigate this gap is through the use of more productive vehicles, which can reduce the total number of drivers required to move a given freight volume. However, these vehicles often require drivers with multi-combination (MC) licences, a class traditionally the longest and most difficult to acquire, meaning that workforce planning must account for both licence availability and acquisition timelines.

The shortage not only threatens productivity and supply chain reliability but also increases safety risks, as over-extended drivers face heavier workloads. Without targeted strategies to attract and retain new entrants, the freight sector's capacity to respond to rising demand and implement efficiency and safety improvements will remain constrained.

What are the largest hurdles for timely or accelerated implementation of these reforms

The largest hurdles to the timely or accelerated implementation of these reforms stem primarily from licensing, which remains a jurisdictional responsibility rather than an NHVR function.

Accelerating implementation of licensing framework timeframes (including the accompanying training) must be balanced with robust measures to uphold training quality, ensure meaningful competency assessments, and prioritise road safety. A poorly executed rollout risks undermining the intended benefits, including improving driver skill levels and addressing sector-wide labour shortages. Industry collaboration, continuous monitoring, and evaluation mechanisms will be key to maintaining high standards while enabling quicker upskilling of drivers.

Additionally, a clear and phased approach to reforms will help mitigate risks and ensure alignment with the evolving demands of the freight sector. This includes providing appropriate support to training organisations, promoting industry participation, and streamlining administrative processes to facilitate faster yet reliable applications. By managing timeframes with competency-driven precision, Australia can unlock the full potential of higher productivity vehicles while safeguarding efficiency, compliance, and safety across the national fleet.

If a national competency framework is to be established, the essential first step is achieving agreement on the tasks and operational contexts the framework must cover. Reaching a shared, evidence-based task analysis across jurisdictions and industry is a significant hurdle, as it requires consensus on the competencies needed for different vehicle classes, operating environments and freight tasks. Without this foundational work, it would be counterproductive to develop or release training materials, assessment tools or accreditation pathways, as these would risk misalignment with the actual task requirements. The absence of an agreed task baseline therefore represents the most substantial barrier to progressing a consistent, nationally scalable competency framework at pace.

What federal, state & territory or private bodies are expected to handle the various stages and aspects of implementation

Responsibility for implementation of the Framework will remain distributed across federal, state and territory agencies, with industry and training providers carrying out practical delivery. Key responsibilities are as follows:

State and Territory Driver Licensing Authorities (DLAs)
DLAs will continue to own and administer heavy vehicle licensing. They set licensing conditions, approve training providers, issue licences and ensure compliance with the nationally agreed framework. As the licensing function is legally and practically retained by jurisdictions, the transition to a fully national heavy vehicle licensing system is unlikely to be

[7] BITRE (2023), Road Transport Workforce: Age Profile of Drivers
[8] Jobs and Skills Australia (2025), Occupation Shortage List

supported by states and territories. DLAs should therefore remain the primary entities providing requirements and operational guidance to Registered Training Organisations (RTOs).

Austroads
As the technical steward of the framework, Austroads should continue to lead development of the regulatory, policy and competency standards, including training materials, assessment instruments and national guidance. Austroads will coordinate interjurisdictional agreement on minimum standards and national implementation timelines.

RTOs and the training sector
RTOs will be responsible for delivering training and assessment requirements once adopted by jurisdictions. They will need to update training programs, invest in assessor capability uplift and ensure alignment with the revised national materials. Industry training providers and private assessors will play a critical role in operationalising the reforms.

NHVR
The NHVR does not hold responsibility for licensing but is a key stakeholder in ensuring licensing reforms align with safety, compliance and productivity objectives. NHVR should be formally consulted on the development of any new driver training streams or training modules, particularly those relating to high-productivity vehicles, alternative fuel vehicles and emerging technologies. Input from NHVR ensures new competency pathways are practical, enforceable and aligned with the realities of heavy vehicle operations.

Australian Government (DITRDCSA)
DITRDCSA provides overall policy direction, oversees national harmonisation efforts and may support funding or transitional assistance programs where required. However, it does not implement licensing directly.

Industry and employers
Industry will support implementation by integrating new competency expectations into recruitment, on-the-job training, and progression pathways. Large operators may also provide data and feedback to support monitoring and evaluation.

What timeframes are sensible for accelerated implementation of the reforms

The NHVR acknowledges the critical need for accelerated timeframes in implementing the Framework. Given the priority placed on increasing the use of higher productivity vehicles, such as PBS vehicles, swift action is essential to ensure the availability of skilled and qualified MC licence holders. While accelerated reforms are necessary, it is equally important to ensure these reforms are executed properly and sustainably.

While the shift toward MC licences is improving, progress remains too slow. Without a rapid rollout of a more fit-for-purpose training and licensing framework and uplift in driver supply and competency, the ongoing shortage will constrain freight sector capacity, heighten the risk of non-compliance under deadline pressures, escalate costs and risk the safety of people on our roads. Without acceleration, the number of MC licence holders, which are qualified and competent, will struggle to keep pace with the demand for PBS vehicles, which are increasing at over 20% per year.

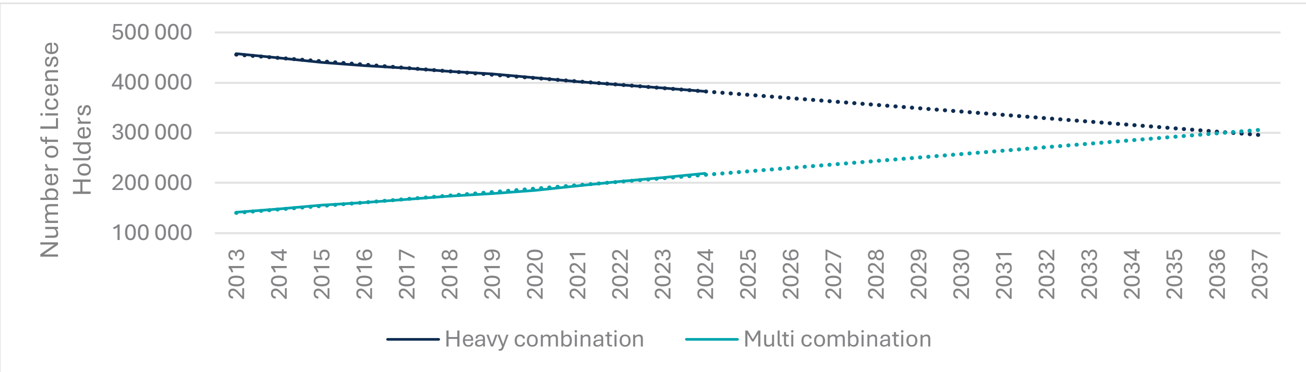


Figure 5: Change in volume of different heavy vehicle driver license classes in Australia[9]

[9] BITRE (2024), Australian Infrastructure and Transport Statistics Yearbook 2024

Data relevant to quantitative estimates of productivity impacts of the reforms and how best to quantify the impact of the reforms.

The NHVR has undertaken some high-level analysis which could be useful to the Commission, alongside the Consultation-RIS undertaken by the NTC in its development of the Framework (e.g. the calculated economic benefits from safety and reduced crashed rates from more competent drivers).

With an estimated 26,000 driver positions currently unfilled[10], the driver shortage is already impacting Australia's supply chain and economic potential. Driver shortage effects are widespread, and can include delayed deliveries and reduced capacity for businesses to operate efficiently and be commercially viable. About 40% of businesses are forced to carry excess stock to buffer against disruptions and unexpected demand[11], adding costs through increased storage needs and constraining liquidity[12].

As the freight task grows more productive vehicles like PBS combinations offer a way to move more freight with fewer trips and, in turn, fewer drivers. As an example, potential access constraints aside, we estimate that if all conventional B-doubles currently on the road were replaced with PBS equivalents, 4,800 fewer drivers would be required to fulfil the same freight task[13]. While this can help attenuate some impacts of the shortage, it also places greater emphasis on the need for a workforce that is qualified to operate these complex vehicles safely and efficiently.

Competent drivers also enhance the overall efficiency of freight operations, by reducing the risks of incidents that lead to vehicle downtime, delays and costly supply chain disruptions. A workforce with higher standards also reduces compliance breaches, minimising the risk of penalties and regulatory interventions that slow down freight movement. Additionally, the lengthy upskilling process required under the current model acts as a deterrent for younger people and career changes, contributing to the ageing workforce. These are all factors the Commission should consider in its evaluation, some of which has already been considered by the NTC and Austroads in their related work.

As road freight demand grows in response to population and economic expansion, it will also become increasingly clear that driver shortages will place a hard ceiling on the capacity of the freight system and, ultimately, on Australia's economic output. This isn't merely a short-term challenge; it poses a long-term risk to the nation's productivity and economic resilience.

To assess the productivity impacts of licensing reform and the uptake of more productive vehicle combinations, the Commission could focus on data that quantifies how reforms alleviate the structural driver shortage, reduce unit freight task requirements, and lift the effective utilisation of labour and capital across the freight system. Some examples to help guide the Commission include:

- Understanding how driver capacity might be constraining the economy through their marginal contribution
    - The current shortage of 26,000 heavy vehicle drivers represents a measurable drag on economic output. With each heavy vehicle driver contributing an estimated $184,000[14] in Gross Value Added (GVA)[15], the current shortfall is constraining nearly $4.8 billion in economic output. This provides a baseline for estimating the potential productivity uplift from reforms that expand workforce supply or reduce demand for drivers.
    - This driver shortfall is projected to rise to 78,000[16] by 2029, constraining an estimated $14.4 billion in economic output. If the current driver shortage were filled, industry could contribute an additional 12% economic output, bringing its total contribution to just under $40 billion[17].

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[10] NatRoad (2024), Truck driver shortage: Australia in the global context.
[11] ABS (2022), Business Conditions and Sentiments - Insights into Australian business conditions and sentiments – June 2022.
[12] National Truck Insurance (2024), 2024 Australian Supply Chain in Review.
[13] Calculated based on payload differences between a B-double and a conservative PBS equivalent.
[14] Calculated using road transport GVA from Freight Australia (2022), Freight Performance Dashboard, escalated to 2024$, and drivers from Jobs and Skills Australia (2024), Truck Drivers ANZSCO 7331.
[15] GVA is a measure of the value a sector adds to the economy. In the context of freight, it reflects the economic contribution of each driver through the transport of goods. It excludes the costs of inputs, highlighting the direct output generated by the workforce.
[16] International Road Transport Union (2024), 2024 Global Truck Driver Shortage Report.
[17] Calculated using road transport GVA from Freight Australia (2022), Freight Performance Dashboard, escalated to 2024$, and drivers from Jobs and Skills Australia (2024), Truck Drivers ANZSCO 7331.

  - The Commission could look for national and state-level data on driver vacancies, workforce age structure, and licence progression rates (potentially collected already via the work for the National Driver Competency Framework C-RIS).
  - This analysis would ideally be undertaken in the context of BITRE freight task forecasts to estimate future labour demand under different growth scenarios.
- Understanding how capacity constraints could be mitigated through vehicle productivity
  - The NHVR estimates simply replacing all conventional B-doubles with equivalent PBS combinations could reduce labour requirements by ~4,800 drivers for the same freight task. This directly converts into measurable labour productivity gains and reduced capital and operating costs.
  - The Commission could undertake similar analysis by quantifying how structural changes in the fleet might affect driver requirements (volume and license class requirements).
  - NHVR has provided the Commission data and estimates that will enable it to, alongside other sources and assumptions, understand mix and volume of combinations (B-doubles, A-doubles, road trains, PBS A/B-doubles, etc.), and potential reduction of driver requirements through alternative vehicle choice.
  - It would be useful for the Commission to understand and estimate elasticity of freight operators' uptake of HPVs given access improvements or regulatory simplification.

Pilots and escorts are not sufficiently addressed by the National Heavy Vehicle Driver Competency Framework

To further support the Commission's analysis, the NHVR offers additional insights related to pilots and escorts, which are not covered under the Framework, as their specialised roles and training requirements extend beyond core heavy vehicle driver competencies, including traffic control, route planning for atypically large or heavy loads, communication with authorities, and sometimes advanced safety or emergency response skills.

While there is a heavy vehicle driver shortage, there is also a competency issue and resource shortage in pilot and escort drivers, who accompany heavy vehicles (mostly related to infrastructure builds) that amplify the overall economic problem. Even when a heavy vehicle has every technical approval and permit, on-the-day pilot/escort shortages, caused by limited drivers, concentrated demand, or sub-optimal synchronisation, force delays, partial moves or aborted trips. These hold-ups create knock-on impacts: demurrage, idle plant and labour, delayed construction, and supply chain ripple effects for downstream trades and suppliers. Industry and project owners routinely cite pilot/escort availability as a critical operational bottleneck for OSOM transport.

Mega projects make the problem systemic rather than occasional. Renewable energy projects, major infrastructure programs and one-off events (e.g. the Olympics) concentrate high volumes of OSOM deliveries into narrow time windows and along specific corridors. That surge increases pilot and escort demand beyond typical market capacity, highlights route constraints and increases community risk if movements are rushed or inadequately supported.

The commercial consequences are being experienced by government and industry. Delays and uncertainty add to project contingency lines, raise unit transport costs, and reduce asset utilisation; smaller operators face disproportionate exposure to cancelled bookings and one-off penalties. Over time, these inefficiencies reduce industry productivity, force higher capital and operating budgets into projects, and can even discourage optimal logistics choices.

Analysis of OSOM access permit applications over the past three fiscal years highlights a clear upward trend in movements likely to trigger pilot or escort requirements. It is important to note that NHVR data underestimates pilot and escort needs, as it excludes OSOM moves covered by existing access notices (i.e. permitless travel). Permit applications for vehicles exceeding 3.5 m in width rose from 28,368 in FY23 to 32,291 in FY25 (+14%). Vehicles over 25 m in length increased from 27,156 to 31,252 (+15%), while movements exceeding both width and length grew from 23,369 to 27,177 (+16%). This trend reflects growing demand for additional traffic management measures, including pilot and escort vehicles.

Industry consultation by NHVR suggests that only 50% of permit applications translate into actual contracted movements, and that the daily cost of an idle average OSOM vehicle ranges from $5,000 to $6,000 – this cost rises quickly with project complexity (e.g. wind farm projects). Even under a conservative assumption that just 10% of moves are delayed by a single day, and assuming one move per permit for an average task, the per day economic cost is estimated between $5.8 million and $9.7 million[18], these costs are ultimately passed on to government projects or consumers.

The analysis highlights that inconsistent pilot and escort arrangements across Australian jurisdictions are a persistent source of delays, added costs, and reduced productivity for OSOM movements. Despite numerous reviews and reform attempts, including the Australian Government's OSOM Review, the issue remains largely unresolved. Without a coordinated, national approach, operators must continue to navigate differing rules, plan for worst-case scenarios, and contend with scheduling conflicts that exacerbate project delays and inflate costs. Pilots and escorts are therefore essential to reduce unnecessary costs for industry, and also to support the timely delivery of major infrastructure and renewable energy projects, and to ensure safer and more predictable road access for oversize and overmass vehicles.

[18] Calculated using access permit data from NHVR's Historic Access Reporting Tool; permit application to contract success rate of 50% from an industry source; $5,000 - $6,000 per day OSOM vehicle delay cost from an industry source; a nominal 10% of remaining access permit applications being affected by a delay; and one OSOM vehicle per permit application.

Information request 4: Barriers to availability of EV truck charging infrastructure

Barriers to the availability of EV truck charging infrastructure largely fall outside the NHVR's remit, as the NHVR has no role in planning, funding or delivering charging infrastructure. However, the NHVR can offer observations about some factors that can influence the viability and uptake of zero-emission heavy vehicles from an operational standpoint.

Regulatory barriers to the roll out of charging infrastructure for battery heavy powered EV trucks

- Land use and zoning restrictions: Regulatory requirements on the use of land for EV charging stations may slow infrastructure development, particularly in areas critical to heavy vehicle operations such as freight hubs, rural depots, or highways. Local governments may require approvals, change-of-use permits, or compliance with zoning laws, which can vary by jurisdiction.
- Technical standards and specifications: Lack of harmonised or consistent guidelines relating to EV truck charging specifications could create challenges. For instance:
  - Standards on connector types or charging speeds may vary.
  - Vehicle weight restrictions at charging station access points may inadvertently exclude heavy EVs, limiting use.
- Grid access and planning approvals: Energy-related regulations, such as grid connection approvals, electricity distribution requirements, and delays in upgrades to accommodate high-capacity EV chargers, could hamper rollout efforts.
- Environmental and Infrastructure Impact Assessments: Stringent processes for obtaining approval for new charging sites, especially for large, high-capacity stations suitable for heavy vehicles, may cause delays.

Other practical barriers that may be limiting installation and operation of charging infrastructure

- Space and location requirements: Heavy LZEVs require larger parking areas and turning radii, which makes the installation of dedicated charging stations more complex, especially in urban or limited space areas. Further, stations need to be strategically placed near freight hubs, warehouses, or along interstate highway corridors, some of which may lack infrastructure readiness.
- Energy grid capacity: High-powered charging from Heavy LZEVs places significant demands on the electricity grid. There may be technical limits to the power supply in rural or remote areas, making it more challenging to deploy charging infrastructure in regions where freight road transport is essential.
- Cost of installation: Setting up Heavy LZEVs charging stations often involves more significant financial investment than consumer-focused charging points, largely due to the higher capacity and scale needed.
- Compatibility issues: Heavy LZEVs from different manufacturers may have differing charging needs, such as voltage, connector design, or operational software, meaning stations may need to cater to multiple configurations. This lack of standardisation complicates operations and increases costs.
- Uptime and reliability: For a usable charging infrastructure network to function smoothly, charging stations must offer consistent uptime and predictable access for drivers. Maintenance challenges, equipment degradation, and lack of operational expertise may affect the reliability of the charging network.

Policy issues affecting the long-term implementation of an effective network of publicly accessible EV truck charging infrastructure.

- Investment models: Charging infrastructure requires substantial investment. The absence of clear government policies or financial incentives to support private sector involvement may discourage investment.
- Collaborative planning between government: Federal, state, and local governments must align regulations to ensure the effective rollout of charging networks. Disparate policies can result in gaps in the network, especially across state boundaries.

- Addressing peak demand energy challenges: Heavy LZEVs require large quantities of energy, and charging stations need to be capable of handling these loads. Policies that fail to incentivise upgrades to the national energy grid may delay implementation.
- Accessible site distribution and equity: Policies must address the geographic spread of public charging networks to ensure coverage in rural and remote areas, as well as access for all freight operators, regardless of fleet size.

Data

The NHVR also significant datasets relating to heavy vehicle operations through tools such as number plate recognition systems and compliance-related data collection.

In collaboration with energy regulators, infrastructure providers, and government bodies, NHVR data can used to offer actionable insights that guide the placement of refuelling stations and charging points. This approach ensures alignment with actual heavy vehicle usage patterns and facilitates practical infrastructure deployment, reducing barriers for freight operators transitioning to alternative fuel vehicles.

Relevant data includes:

Typical trucking routes

- NHVR datasets can be utilised to identify and validate high-frequency trucking corridors (e.g. interstate highways or freight-intensive regions such as the Bruce Highway or Hume Highway).
- Information regarding heavy vehicle routes used for specific freight types can help ensure refuelling and charging infrastructure aligns with demand centres. Further, restricted zones could indicate areas to rank as a lower priority or avoided.

Rest stops and freight hubs

- Data on commonly used heavy vehicle rest stops and major freight hubs can highlight sites where EV charging and hydrogen refuelling stations would be best positioned to serve truck operators efficiently.
- Integration of refuelling and charging stations into established rest areas aligns with industry practices and creates logistical efficiency.

Regional-specific demand

- NHVR's region-focused data (e.g. heavy truck volumes and patterns in rural, regional, and urban areas) ensures even coverage of infrastructure across high-traffic and remote low-density areas. Focus can be placed on areas where freight transport plays a vital economic role.

Information request 5: Curfews for EV trucks

Information Request 5 relates to matters that intersect only partially with the NHVR's remit. The NHVR's primary role in this space concerns vehicle standards and mechanical engineering and related externalities, rather than the policy settings or broader environmental or amenity concerns of road managers.

While many of the factors influencing fleet modernisation and the uptake of advanced technologies sit with other agencies, the NHVR can provide insights which interface with these considerations. The below response therefore focuses on the aspects most relevant to the NHVR's statutory functions and operational responsibilities.

Comparative noise levels of electric heavy vehicles and internal combustion engine heavy vehicles

Although the NHVR has not yet conducted its own noise testing to compare heavy vehicles with traditional combustion engines against electric heavy vehicles, some manufacturers, such as MAN, have undertaken such assessments. MAN conducted noise measurements at their test track in Munich, providing significant insights into the noise differences between these types of vehicles during specific scenarios, such as a 20 km/h drive-past and acceleration events.

Key findings on noise reduction:

- Electric heavy vehicles were measured to have noise levels approximately 6 dB lower than diesel trucks during a drive-past at 20 km/h.
- When comparing the two vehicles at this speed, a diesel truck was perceived to be as loud as four electric heavy vehicles combined.

Additional insights on diesel truck noise levels:

- The diesel truck used in MAN's testing recorded noise levels approximately 5 dB quieter than the average levels documented in literature for diesel vehicles at 20 km/h.
- Consequently, the noise difference between the electric heavy vehicle and the standard diesel truck (based on literature data) increased to 11 dB, leading to the conclusion that the electric vehicle is perceived to be approximately half as loud as a conventional diesel truck.

Findings from an accelerating drive-past:

- During an accelerating drive-past, a significant 12-dB reduction in noise levels was observed when comparing the electric heavy vehicle to a diesel truck.

Comparison with passenger cars:

- At 20 km/h, the electric heavy vehicle's noise level was recorded at 49 dB(A)/m, only 1 dB louder than a typical passenger car, which measures 48 dB(A)/m.

How significantly any noise reduction ameliorates the negative impacts of night-time travel

Night-time operation of heavy vehicles often leads to complaints regarding noise pollution, particularly in residential areas. Traditional internal combustion engine heavy vehicles are known to produce significant noise during travel, acceleration, and deceleration, disrupting sleep and negatively impacting health.

There have been a number of trials operated globally looking into night-time travel for heavy vehicles (Urban Freight Trials in London, Paris Silent Night Deliveries trial, etc). Other countries, such as Sweden, have already updated their Traffic Ordinance so municipalities can allow electric and hydrogen-powered heavy trucks to operate at night in noise-sensitive areas.

Electric heavy vehicles present an opportunity for improved community relations and reductions in noise-related disturbances. This might include:

- Sensitivity during off-peak/night times:
    - Noise from heavy vehicles is a common source of complaints during night-time, particularly in residential areas. Diesel engine vehicles cause significant disruptions due to engine noise, exhaust braking, and higher decibel levels during operations like deceleration.

  - Heavy EVs, with quieter operation (11–12 dB reduction), significantly reduce noise pollution. Regenerative braking systems operate almost silently, eliminating the problematic noise from exhaust braking, a frequent complaint.
  - Reduction in heavy vehicle noise at night reduces disruptions to uninterrupted sleep cycles. Research indicates that sleep disturbances caused by traffic noise can lead to stress, anxiety, and long-term health impacts. By addressing this root cause, electric heavy vehicles contribute to better health outcomes in communities.
  - Night-time environments feature naturally lower ambient noise, meaning loud heavy vehicles create a more noticeable disturbance. The quieter operation of EVs (similar to passenger cars) mitigate annoyance.
- Better public perception of heavy vehicles:
  - Night-time noise disturbances often contribute to negative perceptions of heavy vehicles among the general public. Reduced noise emissions with heavy EVs can improve relationships between freight operators and communities, promoting acceptance of overnight freight movement, reducing opposition, and easing curfews or restrictions.
  - ICE heavy vehicles rely on exhaust braking systems, which are a significant source of noise complaints. These systems lack regulated noise limits and are commonly identified as a disruptive factor. Heavy EVs utilise regenerative braking, an auxiliary braking system that operates almost silently, offering further noise reduction benefits during deceleration.

Implementation considerations, given different levels of government have responsibility for the implementation of curfews, particularly local governments in residential areas

Implementation considerations related to curfews fall outside the NHVR's remit, as responsibility for establishing and managing curfews rests with road managers, particularly local governments in residential or sensitive urban areas. Curfews are fundamentally land-use and amenity management tools rather than heavy vehicle regulatory mechanisms, and as such the NHVR does not set, administer or oversee them. For this reason, the NHVR does not propose to respond directly to this aspect of the request. Any assessment of curfew implementation, enforcement capability or community impacts is more appropriately addressed by the jurisdictions and local governments that determine and manage these restrictions.

How the effects of any reform could be quantified, including any data and modelling requirements

The effects of any reform relating to curfews for heavy EVs can be quantified using the ATAP Guidelines, with the analysis centred primarily on noise and other amenity-related outcomes rather than broader suite of heavy vehicle externalities. The environmental parameter values in the ATAP Guidelines are an important reference for facilitating a consistent approach towards quantifying the amenity costs of transport related initiatives in Australia.

It should be noted that the environmental parameter values are not direct costs to individuals or businesses but are borne by broader communities and ecosystems. Benefits accrue by either preventing or mitigating the impact (e.g. the socio-economic costs of health impacts or noise amenity).

Relevant data, formulae and assumptions relevant to the Commissions analysis can be segmented into urban and rural locations, covering passenger and freight vehicles, for day- and night-time and includes:

- Air pollution
- Noise pollution
- Additional costs in urban areas (barrier effects).