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Economists

Economic benefits of heavy vehicle regulatory reform

A final report for the NHVR

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Executive Summary

In 2008, the Council of Australian Governments (COAG) signed a national partnership agreement to deliver a far-reaching reform agenda to deliver a seamless national economy. The reform agenda aimed to deliver more consistent regulation across jurisdictions, to help reduce regulatory costs incurred by businesses due to inconsistencies across jurisdictions.

The heavy vehicle regulatory reform was part of this ambitious reform agenda and involved:

- the introduction of the Heavy Vehicle National Law (HVNL), which would set out national arrangements for the regulation of heavy vehicles; and
- the establishment of the National Heavy Vehicle Regulator (NHVR) to administer the HVNL.

The NHVR has asked HoustonKemp to undertake an independent assessment of the economic benefits and costs that can be attributed to heavy vehicle reform. We understand that this would help inform the NHVR's submission to the Productivity Commission's (PC) inquiry into the economic impact of national transport reforms and further areas of reform.

Our approach to this project

Our approach to estimating the benefits of heavy vehicle reform involves the following key steps:

- examine the key initiatives and activities that the NHVR has undertaken since establishment; and
- for each initiative or activity, consider:
 - > what would have happened if the legacy regulation had continued to operate; and compare this with
 - > the actual situation that has occurred.

The above steps allow us to assess the effect of heavy vehicle reform on different initiatives and activities. We expect that the reform has delivered benefits because:

- some activities or initiatives could or would not have occurred in the absence of reform; or
- reform has led to improvements in outcomes achieved from some activities or initiatives, eg, lower overall cost of delivering the initiative or improved outcomes for industry because it is delivered in a nationally consistent manner.

We have grouped the benefits of heavy vehicle reform into four categories, namely:

- red tape reduction benefits: the reduced time and effort operators spend to comply with the law;
- productivity benefits: the broader productivity benefits operators have achieved due to reform;
- safety benefits: the reduction in heavy vehicle crashes; and
- regulatory efficiency benefits: the reduced costs of providing regulatory services to industry.

Heavy vehicle reform has delivered significant economic benefits, ranging from 5.4 to 12.6 billion.

We estimate that the benefits associated with heavy vehicle reform range from \$5.4 billion to \$12.4 billion in net present value (NPV) terms over our 22 year evaluation period – Table E-1.

Productivity benefits represents the largest benefit category, ranging from \$4.5 billion to \$9.3 billion. The NHVR has delivered productivity benefits by:

- increasing the uptake of productivity initiatives, such as the Performance Based Standards (PBS) scheme and the National Heavy Vehicle Accreditation Scheme (NHVAS) mass management module; and
- introducing a new, nationally consistent decision making framework for making access decisions for Restricted Access Vehicles (RAVs).

Red tape reduction benefits are the second largest benefit category, ranging from \$0.3 billion to \$1.3 billion in NPV terms over the evaluation period. Most of the red tape reduction arises from having one set of rules to replace multiple jurisdictional based rules. This is followed by facilitating the introduction of electronic work diaries and a number of other initiatives designed to reduce compliance burden for operators.

Safety benefits are estimated to range from \$0.3 billion to \$1.1 billion. The NHVR has undertaken key activities that are expected to have improved road safety outcomes, including:

- improving the monitoring and sharing of information across borders;
- developing and collecting a nationally consistent dataset to inform decision making; and
- encouraging operators to adopt good practice safety management systems to facilitate compliance with the law through targeted guidance and education.

To examine whether heavy vehicle reform has delivered improved safety outcomes, we have compared trends in the number of fatal crashes in jurisdictions that have participated in heavy vehicle reform with other comparable benchmarks (eg, safety trends on light vehicles and heavy vehicle fatality trends prior to 2014). Our analysis shows that heavy vehicle safety outcomes in jurisdictions that have participated in reform have improved at a faster rate than comparable benchmarks, suggesting that heavy vehicle reform has led to significant safety benefits.

Heavy vehicle reform has also delivered significant **regulatory cost savings**, estimated to range from \$0.3 billion to \$0.7 billion over the evaluation period. To examine the estimated cost savings from heavy vehicle reform, we have:

- examined the costs of undertaking ongoing heavy vehicle regulatory activities prior to reform; and
- reviewed the costs that have been incurred to implement reform and undertake ongoing regulatory activities.

Our analysis suggests that although there were significant costs to implement reform, these costs have been more than offset by the reduced cost of delivering regulatory services to industry.

Table E-1: Estimated benefits of heavy vehicle reform – \$b in NPV terms over 22 years

Benefit category	Estimated benefits
Productivity benefits	\$4.5 – 9.3
Red tape reduction benefits	\$0.3 - \$1.3
Safety benefits	\$0.3 - \$1.1
Regulatory cost saving benefits	\$0.3 - \$0.7
Total benefits	\$5.4 - \$12.4

1. Introduction

In 2008, the Council of Australian Governments (COAG) signed a national partnership agreement to deliver a seamless national economy. The agreement was a far-reaching reform agenda comprising 27 deregulation priority reforms, eight competition reforms and reforms to improve regulatory performance.

The reforms aimed to deliver more consistent regulation across jurisdictions, to achieve the following objectives:¹

creating a seamless national economy, reducing costs incurred by business in complying with unnecessary and inconsistent regulation across jurisdictions;

enhancing Australia's longer-term growth, improving workforce participation and overall labour mobility; and

expanding Australia's productive capacity over the medium-term through competition reform, enabling stronger economic growth.

The national transport reforms for heavy vehicles, rail safety, and domestic commercial vessels were part of this ambitious reform agenda. This involved establishing national laws for each area, which would then be administered by newly established national regulators, the National Heavy Vehicle Regulator (NHVR), the Office of the National Rail Safety Regulator (ONRSR), and the Australian Maritime Safety Authority (AMSA).

The transport reforms were expected to deliver significant economic benefits over 20 years. Most of the benefits were expected to result from the national heavy vehicle law reforms (\$5.6 billion to \$12.4 billion),² followed by the maritime safety regulatory reforms (\$103 million to \$123 million)³ and the national rail safety reforms (\$28 million to \$71 million).⁴

Given that it has now been around five years since the national laws came into effect, COAG has directed the Productivity Commission (PC) to assess the economic impacts of the transport reforms and recommend further areas of reforms.

To assist the PC with its review, the Department of Infrastructure, Regional Development and Cities (DIRDC) engaged HoustonKemp to develop a common framework that could be used to quantify the benefits and costs of each of the national transport reforms. Since then, the NHVR has asked us to implement this framework to estimate the economic benefits and costs that heavy vehicle reform has delivered so far.

The remainder of this report is set out as follows:

- section 2 sets out what has occurred so far under heavy vehicle reform and the expected economic benefits associated with heavy vehicle reform;
- section 3 describes the methodology we have used for this project;
- section 4 discusses how the NHVR has improved the productivity of the heavy vehicle sector and the associated productivity benefits;
- section 5 sets out how the NHVR has improved heavy vehicle safety outcomes and the likely safety benefits;

¹ COAG, *National Partnership Agreement to Deliver a Seamless National Economy*, p 4.

² National Transport Commission, *Heavy Vehicle National Law Regulation Impact Statement*, September 2011, executive summary.

³ DITRDLG and AMSA, *National Approach to Maritime Safety Regulation: Regulation Impact Statement*, April 2009, p 10.

⁴ National Transport Commission, *Rail Safety National Law Regulatory Impact Statement*, November 2011, p v.

- section 6 explores the initiatives that the NHVR has undertaken to reduce the burden on industry, ie, reduce red tape;
- section 7 examines how the costs of undertaking heavy vehicle regulatory activities has changed because of reform; and
- section 8 summarises the results of our analysis.

In addition, appendix A.1 provides the detailed assumptions and calculations we have used to calculate the benefits.

2. The national heavy vehicle law reforms

2.1 What benefits were expected from the reform?

The objective of the Heavy Vehicle National Law (HVNL) was to introduce one set of regulatory rules for heavy vehicles, to replace the previous system of inconsistent jurisdictional based rules. The regulatory impact statement (RIS) identified 368 variations in the rules to be harmonised by the national law, with most of these being of a minor technical or definitional nature.⁵ Around 34 rule variations were identified to have high to medium economic impacts or were more complicated in nature.

It was envisaged that reform would promote evidence based, consistent and transparent decision making in the following key areas:

- accreditation of some operators;
- vehicle standards and exemptions;
- vehicle access decisions; and
- vehicle registration related activities.

It was envisaged that this would lead to significant productivity improvements for the industry, which would in turn lead to safety and environmental benefits as there would be fewer heavy vehicles on the road.

Having multiple and inconsistent sets of rules meant that crossing borders was considered a 'high stress' operation for drivers,⁶ where, under previous arrangements:⁷

...some drivers may not comply because it is complicated and time consuming, while other drivers may attempt to comply but fail to do so due to a lack of understanding of what is required.

It follows that having one set of rules was expected to increase operator's compliance with the law, and so improve safety outcomes. The removal of multiple rules was also expected to reduce compliance costs for operators and administration costs for government.

The net benefits from the reform were expected to range between approximately \$5.6 billion under the 'pessimistic' scenario and \$12.4 billion under the 'best bet' scenario in net present value (NPV) terms⁸ over a 20-year period – table 2-1. Improvements in productivity benefits was expected to be the largest area of benefits (\$3.9 to \$8.7 billion). This was followed by reduction in red tape (\$0.9 to \$1.9 billion), safety benefits (\$0.4 to \$1.9 billion), regulatory cost savings (\$0.2 to \$0.5 billion) and environmental benefits (\$0.1 to \$0.3 billion).

⁵ National Transport Commission, *Heavy Vehicle National Law Regulation Impact Statement*, September 2011, executive summary.

⁶ *Ibid*, p 6.

⁷ *Ibid*, p 5.

⁸ *Ibid*, executive summary. This figure reflects estimates from the top-down approach.

Table 2-1: Expected economic gains from heavy vehicle reform – NPV over 20 years⁹

Benefit	Net benefits
Productivity benefits	3.9 - 8.7 billion
Safety benefits	0.4 - 1.0 billion
Red tape benefits	0.9 – 1.9 billion
Regulatory cost savings	0.2 – 0.5 billion
Environmental (noise and carbon) benefits	0.1 – 0.3 billion
Total	5.6 - 12.4 billion

2.2 What has occurred so far

In 2011, COAG agreed to establish a national system for regulating heavy vehicles over 4.5 tonnes, consisting of uniform laws administered by a national regulator. The HVNL commenced on 10 February 2014, with the NHVR being appointed as the independent regulator for heavy vehicles in all states and territories, except for Western Australia and the Northern Territory.

The NHVR commenced operations on 21 January 2013, administering the National Heavy Vehicle Accreditation Scheme (NHVAS), the PBS scheme and fatigue management, including managing driver work diaries.

When the HVNL commenced on 10 February 2014, the NHVR also commenced delivery of a range of services, including the processing and issuing of access permits for restricted access heavy vehicles and vehicle standards. Compliance and enforcement activities were delivered by participating jurisdictions under service level agreements. However, the processing and issuing of access permits was more complicated than envisaged and was delegated to road agencies.

Since then, the NHVR has achieved several more key milestones – table 2-2. Many of these activities are aligned with the benefit areas identified in the RIS. For example, the NHVR has actively sought to facilitate the use of higher productivity vehicles, including making national notices available and making it easier to be part of productivity schemes, such as the PBS scheme and the NHVAS. The NHVR has also sought to improve heavy vehicle safety outcomes through, for example, encouraging industry to adopt safety management systems and improving the monitoring and sharing of information across borders.

⁹ Ibid, executive summary. This figure reflects estimates from the top-down approach.

Table 2-2: Key corporate milestones for the NHVR

Time	Milestone
21 January 2013	NHVR commences operation and is responsible for the administering the NHVAS ¹⁰ , the PBS scheme and fatigue management, including work diaries
10 February 2014	The HVNL commences. The NHVR commences access and vehicle standards operations. Compliance and enforcement activities are undertaken by road agencies via service level agreements. The NHVR becomes the single administrator of the NHVAS and sets nationally consistent business rules and states for all participants irrespective of location or state.
October 2014	NHVR publishes a suite of National Compliance & Enforcement Industry Bulletins to assist drivers and operators in understanding their obligations under the HVNL
February 2015	Suite of National Compliance & Enforcement Operational Guidelines implemented in consultation with Partner Agencies to promote consistency in the delivery of on-road HVNL compliance activities
March 2015	Tasmania introduced HVNL fatigue laws including training of authorised officers
March 2015	NHVAS business rules updated to include the strengthening of the auditing requirements and commencement of auditor registration as part of the NHVAS review (with a transitional period until 1 July 2016)
May 2015	Access permits from Tasmania transitioned back to the NHVR The NHVR published the first gazette notice for PBS vehicles – National Class 2 PBS Level 1 & 2A Truck and Dog Trailer Notice
May 2016	The NHVR publishes the National Class 1 Special Purpose Vehicle Notice
June 2016	Revised NHVAS audit framework release including auditor code of conduct
July 2016	Rollout of the national heavy vehicle inspection manual , which introduced consistent inspection standards
August 2016	Rollout of the NHVR Portal – Customer Module
August 2016	Release of Setting the Agenda – Strategies for a Safer, Productive and more Compliant Heavy Vehicle Industry 2016-2020 – a five year blue-print linking the 3 key strategies.
August – October 2016	The NHVR conducted the National Roadworthiness Baseline Survey of 7130 heavy vehicles, the largest ever undertaken across Australia and Australia's first health check of the mechanical condition of the heavy vehicle fleet. Data from 11,066 vehicle units was collected.
February 2017	Developed and published guidelines for developing and registering Industry Codes of Practice .
March 2017	The NHVR introduced PBS Pre-advised Design Approvals
April 2017	The NHVR launched the National Safety Camera Network and rollout of 5 new automatic number plate recognition cameras in Victoria. The national safety camera network is a critical step towards a national camera network and better data sharing across borders.
May 2017	Active Vehicle module (AVM) released on the NHVR website – this allowed NHVAS operators and industry visibility of vehicles active in the mass and maintenance management modules.
2017	The first operation, Operation SnowSafe , is conducted using the National Compliance Information System
2017	Delivered Chain of Responsibility (CoR) National Education and Awareness Campaign and introduced the CoR Gap Assessment Tool
August 2017	Transition of all access permit services from ACT to the NHVR
September 2017	Release of Vehicle Standards Bulletin 6: National Code of Practice for Heavy Vehicle Modifications (VSB6) . The new version was the largest review undertaken since the Bulletin was first released in 1992.
October 2017	Transition of some services from South Australia to the NHVR
December 2017	Transition of all access permit services from South Australia to the NHVR
December 2017 – January 2018	RTO Registration opens for NHVAS fatigue competency course
2018	Rollout of the NHVR Portal – Road Manager Module to support permit processing by more than 430 road managers
January 2018	Personal Use Fatigue Exemption available, providing greater flexibility to operators using standard hours

¹⁰ Although applications were received by the NHVR, the decision making power was only delegated by Queensland, Victoria, Tasmania and the Northern Territory.

February 2018	National Roller Brake Testing Procedure released
March 2018	Safety Industry Operator's Group formed
April 2018	' Tell a mate ' Social Media Safety Campaign launched
April 2018	A survey was conducted to understand the way Industry manages safety.
May 2018	Safety Management System guidance material and tools launched Transition of all access permit services from Victoria to the NHVR Released the Electronic Work Diary Policy Framework and Standards
July 2018	Heavy Vehicle Confidential Reporting Line established Transition of services from Tasmania back to the NHVR
July 2018	New NHVAS fatigue competency came into effect – TLIF0005 and TLIF0006
September 2018	Rollout of the NHVR Portal – Registration Module
October 2018	Delivered the NHVR Fatigue Safety Forum
November 2018	NHVR Registration Checker App , first national registration app specific for heavy vehicles, allowing checks regardless of which state or territory the heavy vehicle is registered in.
November 2018	NHVR Safety Policy released
November 2018	Published the National Compliance and Enforcement Policy

2.3 The reform has been more limited in scope than initially anticipated

The estimated benefits in the RIS assumed that the HVNL would be implemented without change and in all states and territories. However, there have been several notable changes to the HVNL and its implementation, compared to what was assumed in the RIS, which are expected to have reduced the expected benefits from the reform. For example, heavy vehicle registration and licensing chapters in the HVNL have not been enacted and Western Australia and the Northern Territory have elected not to participate in the reform.

Critical changes to the enacted HVNL from that which the RIS was based upon are likely to have also affected the benefits achieved from the reform. For example, the Queensland Audit Office noted that: ¹¹

There were also some critical amendments to the proposed HVNL, which had the effect of increasing the level of involvement that road managers and, in particular, local governments have in the access decision-making process. This will also reduce the overall benefits that the NHVR will ultimately deliver.

In other words, the HVNL enshrined the right road managers had to determine the best manner (as far as road managers are able) in which heavy vehicles access their roads, which potentially increased the burden that higher productivity vehicles face in gaining access to the road network, thereby reducing the productivity benefit associated with reform.

The magnitude of this burden, and whether it has indeed been a burden, is related to whether road managers were previously involved in the access decision-making process. As we understand it, the HVNL formalised the pre-existing notion that road managers are responsible for managing Heavy Vehicle access to their roads. Put another way, the HVNL made it clear that road managers had to assess heavy vehicle access in accordance with reference to a set of criteria, thereby reducing the uncertainty to industry.

The discussion above highlights that the implementation of the reform has differed from what was envisaged in the RIS. Notwithstanding this, heavy vehicle reform has delivered significant economic benefits, which are discussed in turn below.

¹¹ Queensland Audit Office, Heavy Vehicle Road Access Reforms, June 2016. Report 20: 2015–16, p 10.

3. Our approach

To understand the contribution of heavy vehicle reform, it is necessary to draw a clear link between the activities and programs of the NHVR and how these activities differ from what would have occurred absent the reform. In this way, we can build a picture of how heavy vehicle reform has led to improved outcomes compared to what might have otherwise occurred.

In this section, we describe the high-level framework that we have developed to estimate the benefits that have been achieved from heavy vehicle regulatory reform. That is, we have sought to understand the NHVR's key achievements, how these achievements deliver benefits, and quantify these benefits based on the best available information.

3.1 How the heavy vehicle reform has led to benefits

Our approach to estimating the benefits of national heavy vehicle reform is a bottom-up approach which involves, where possible, summing up the benefits across each of the activities and programs undertaken as a direct consequence of the reform. The advantage of using a bottom-up approach is that it provides a clear logical link between the purpose of each activity, and how each activity has delivered benefits compared to what might have occurred absent the reform. In our experience, this qualitative description provides a strong basis for demonstrating that a reform has, or can be expected to, deliver benefits.

For each initiative or activity, estimating the benefits that have been realised requires consideration of:

- what would have happened if the legacy regulation had continued to operate (ie, **the counterfactual base case**), and compare this with;
- the actual situation that has occurred since the establishment of the NHVR (ie, **the realised case**).

What would have happened if the legacy regulation continued to operate is a hypothetical question, and consequently, the key is to determine what are reasonable assumptions that illustrate what would have been likely to happen, given historical outcomes under legacy regulation.

In other words, while the NHVR is likely to be undertaking activities that deliver benefits to the industry and broader society, it is likely that some or many of these activities would also have been delivered under legacy regulatory arrangements.

We expect that the benefits from heavy vehicle regulatory reform arise because:

- some activities or initiatives could or would not have occurred in the absence of reform; or
- reform has led to improvements in outcomes achieved from some activities or initiatives, eg, lower overall cost of delivering the initiative or improved outcomes for industry because it is delivered in a nationally consistent manner.

3.2 Identifying benefit categories resulting from heavy vehicle reform

The benefits of heavy vehicle regulatory reform can be grouped into four principal categories, namely:

- improving productivity of the heavy vehicle sector;
- improving heavy vehicle safety outcomes;
- reducing red tape for industry; and
- improving efficiency of delivering regulatory activities.

The benefit categories are generally consistent with those set out in the 2011 RIS. Each of these benefit categories are described in further detail below and are the focus for the benefit quantification methodology.

3.2.1 Improving productivity of the heavy vehicle sector

All of the benefit categories are expected to lower the overall cost of regulation to operators, and so improve the productivity of the industry. However, the heavy vehicle reform is also expected to deliver productivity improvements beyond reducing the cost of regulation and reducing red tape for industry alone.

For example, the HVNL was expected to improve the productivity of the fleet through improving regulatory practices associated with the consistency of vehicle standards and road access. These productivity benefits result from introducing a more consistent vehicle standard and road access decision-making framework, thereby facilitating the greater use of higher productivity vehicles across the road network.

3.2.2 Improving heavy vehicle safety outcomes

Improving safety outcomes was one of the key benefits expected from moving towards nationally consistent regulation for the heavy vehicle sector. The NHVR has achieved this by implementing policy which promotes national coordination of safety related regulatory activities, improving data and information gathering related to safety risks, and by encouraging the industry to adopt improved safety practices and systems. These initiatives are likely to reduce the risk of a heavy vehicle related crash occurring, thereby reducing the number of crashes involving fatalities or serious injuries.

3.2.3 Reducing red tape for industry

A major driver for the heavy vehicle reform was to reduce the regulatory burden on industry. For example, one of the key benefit drivers in the RIS was that industry would only need to comply with one set of laws and rules, rather than multiple jurisdictional based laws. The NHVR has also undertaken several activities aimed at reducing the time operators need to comply with the law, eg, introduction of electronic work diaries on a nationwide scale and the NHVR portal, and the use of notices that reduces the need for permits.

3.2.4 Improving the efficiency of delivering regulatory services

The final benefit category involves the achievement of direct cost savings in the delivery of regulatory services. As a matter of principle, the heavy vehicle reform was expected to eliminate duplication of effort across jurisdictions and deliver a more effective regulatory regime, thereby resulting in lower costs in administering and delivering heavy vehicle regulatory services.

3.3 Quantifying the benefits from heavy vehicle regulatory reform

The final part of the methodology involves quantifying the benefits resulting from each activity. For each activity, this requires considering what would have occurred absent reform, or whether national reform led to activities occurring earlier than might have otherwise been achieved.

At a high level, we have quantified the benefits arising from heavy vehicle regulatory reform by considering what has happened since the reform occurred (**the realised case**) and compared this with our assessment of what would have happened if reform did not occur (**the counterfactual base case**). The approach we have used varies depending on the benefit area.

- for productivity benefits, we have:
 - > examined how the NHVR has changed uptake of productivity schemes and overall productivity of the industry; and
 - > assessed the productivity gains industry receives on a per tonne kilometre basis.
- to calculate safety benefits, we have:
 - > examined the trends in heavy vehicle safety outcomes since the HVNL commenced in 2014;

- > compared this with possible benchmarks of what heavy vehicle safety outcomes would have been without reform, eg, what were the historical trends in crash rates before reform and what has been the trends in light vehicle safety outcomes; and
- > made conservative assumptions about likely safety benefits based on our analysis above.
- to estimate red tape reduction benefits, we have:
 - > examined how each project or initiative has reduced the compliance burden for industry; and
 - > the number of operators or heavy vehicles that are affected by the project or initiative.
- to assess regulatory cost savings, we have:
 - > examined what were the costs of undertaking ongoing heavy vehicle regulatory activities prior to reform;
 - > reviewed the costs that have been incurred to implement reform and undertake ongoing regulatory activities; and
 - > consider how these costs could change in the future.

Given the hypothetical nature of the question ‘what would have happened if reform did not occur’, there is bound to be some uncertainty regarding what reasonable benefit assumptions are. We have sought to estimate a **low benefits** scenario and a **high benefits** scenario to capture this uncertainty. Doing so provides a sense of magnitude of what the likely benefits from heavy vehicle reform are while also incorporating the uncertainty regarding the exact benefits are.

We have sourced our assumptions from the Australian Transport Assessment and Planning (ATAP) guidelines where possible.¹² The ATAP guidelines provide guidance on how to undertake cost benefit analysis, including parameters that should be used in economic assessments. The ATAP guidelines have been endorsed by all Australian jurisdictions and are published by the Transport and Infrastructure Council.

We have also relied on information available from other research reports and information provided by the NHVR. In some cases, we have applied our judgement of what reasonable assumptions are to calculate the benefits. We understand that the NHVR intends to seek feedback from industry to validate some of these assumptions.

Finally, the time period we have evaluated is from 2012 to 2033, or 22 years. This comprises of the two years before the HVNL commenced and 20 years after the commencement of the HVNL.

¹² Please refer to <https://atap.gov.au/> for further information on ATAP guidelines

4. Productivity benefits

4.1 How restricted access vehicles access the road network

Heavy vehicles that comply with the legally prescribed mass and dimension requirements, eg, are not over a certain size or mass, have general access to the road. These vehicles are known as general access vehicles and have access to the road network unless the road is sign-posted otherwise.¹³

Vehicles that do not comply with the legally prescribed mass and dimension requirements are known as restricted access vehicles (RAVs). Examples of RAVs include road trains or vehicles operating under the PBS scheme.

The routes that RAVs have access to are specified in a government gazette. Decisions about these routes are based on assessment of the infrastructure capability to support the vehicles, and road network safety considerations. To gain access to additional routes, heavy vehicle operators must apply for a permit to the NHVR or state road transport authority and seek the consent of the relevant road managers.¹⁴ In the process of seeking consent from the road manager, the NHVR also requests that the road manager consider the route to be included as a route approved under the gazette. The NHVR routinely reviews permit applications to identify routes for road manager consideration to be included in notices.

To manage the effect RAVs have on the network, road managers may restrict access. In some cases, road managers approve access but request that the NHVR impose certain conditions on access, for example, requiring the vehicle to be monitored through the Intelligent Access Program and limiting the vehicle to specified speeds on some sections of the road. Another example of a condition is requiring the installation and use of certain safety equipment on the vehicle.

4.2 Arrangements prior to the HVNL

Prior to the HVNL, each road manager had its own access decision-making process, influenced by the respective State road authority, and so there was inconsistency across borders as to the circumstances and/or conditions by which access to a route would be allowed.

This meant that decision-making varied significantly between jurisdictions – some road managers (eg, road authorities and larger local councils) had very rigorous processes and assessment requirements in place to assess permit applications, whereas many others had significantly fewer systems and less capability in place to assess permits. We understand that this often meant that local councils were not closely involved, or not involved at all, in access decision-making. This led to poor outcomes, as local councils were the asset managers of local roads.

For many operators, an ongoing and significant problem is the 'last/first mile' issue. This is where an operator has approval to operate a more productive vehicle along most of a route, except for a small section of road. In such cases, the operator would have to operate a heavy vehicle that met the 'lowest common denominator' of road access conditions, which implies a vehicle with lower productivity.

We understand that the pre-existing decision-making framework encouraged 'hot running', which is where operators would take a risk and travel on routes where they did not have the necessary access permits for their vehicle, rather than apply for a permit. 'Hot-running' was more likely to occur, as the permit application

¹³ We note that operators also have a duty of care to ensure that their vehicles will fit on the road.

¹⁴ The NHVR is currently undertaking a delegations project that will transition all access permit delegations and application processing to the NHVR by the end of 2019.

process under pre-existing arrangements was highly costly for operators, often being associated with long processing times, inappropriate or inconsistent conditions, and/or a persistent risk of rejection.

4.3 How the heavy vehicle reform improved productivity of the industry

One of the highest benefits expected from introducing the HVNL was the productivity gains from introducing a new access decision-making framework, which was expected to increase the uptake of higher productivity vehicles and initiatives, and so improve the overall productivity of the heavy vehicle fleet.

A key concern about the pre-existing decision-making framework was that it:¹⁵

can lack transparency, is sometimes inconsistent with agreed ATC and COAG policy and is not subject to review. Operators seeking a permit may be unclear as to who is the relevant decision maker and who to lodge their application.

This would have likely reduced an operator's ability to plan and willingness to invest in higher productivity vehicles or initiatives.

To address this inconsistency in decision making, the HVNL legislated that road managers can only refuse consent for an access permit for identified reasons, ie, such as safety, infrastructure or amenity reasons, thereby introducing a national framework for making access decisions. To facilitate this, the NHVR has produced assessment guidelines and provides technical advice to road managers as required, to facilitate decision making.

The NHVR has also worked closely with heavy vehicle operators and road managers to improve road access and more consistent application of conditions, with the end objective where permits are used only as the exception.

By improving the framework for access decision making by road managers, the HVNL and the NHVR is expected to have facilitated greater use of higher productivity heavy vehicles for Australia's road transport task. This can be expected to have delivered significant productivity benefits both to the industry and the wider economy. In addition, involving local councils in a more structured, consistent and transparent national decision making process, as well as supporting road manager assessment capability, can help improve local amenity and manage the infrastructure wear caused by heavy vehicles.

4.4 Quantifying the productivity benefits of heavy vehicle reform

The NHVR has delivered productivity benefits by making it easier for industry to:

- realise the benefits of participating in productivity initiatives, such as the PBS scheme and the NHVAS; and
- use more productive RAVs, such as B-doubles and road trains.

We discuss how we have quantified these benefits in more detail below.

4.4.1 Higher uptake of performance based standard scheme

Overview of the PBS scheme and uptake prior to heavy vehicle reform

PBS vehicles are considered to be higher productivity vehicles and may have restricted access to the road network.¹⁶ The PBS scheme commenced operation in October 2007, with a purpose of encouraging the use of innovative heavy vehicles. Rather than require that vehicles meet 'prescriptive' legal limits on size and mass, the PBS scheme allows operators to use a vehicle so long as it meets certain performance standards.

¹⁵ National Transport Commission (NTC), *Performance Based Standards – Regulatory Impact Statement*, March 2011, p 66.

¹⁶ Level 1 PBS vehicles may have General Access, whilst higher level PBS vehicles have restricted access.

It was envisaged that the PBS scheme would deliver productivity benefits to industry while still meeting reasonable safety, road asset protection and environmental standards.

The PBS scheme was expected to deliver significant benefits when it was first introduced. However, the National Transport Commission (NTC) found that uptake of the scheme had been limited. Further the NTC noted that:¹⁷

... while PBS has had limited success in improved productivity for some operators, many industry members have been discouraged from participating in the scheme due to the uncertainty around obtaining the desired road network access. In addition, industry participation has been subdued due to the limited flexibility and high cost of participation in the scheme. The NTC found that while the ATC formally adopted the PBS scheme in 2007, in practice, states and territories have not implemented the reform in a consistent manner.

The NHVR has made it easier participate in the PBS scheme and realise its benefits

To address the issues identified above, the NTC recommended a move to a national assessment and access framework, using the HVNL and NHVR to improve national consistency and certainty of access. The NTC considered that this would involve:

- the NHVR administering the PBS scheme to improve national consistency and certainty of access;¹⁸ and
- publishing national maps that showed the networks PBS vehicles can access.

Additional uptake of scheme due to heavy vehicle reform

The establishment of the PBS scheme predates the NHVR. It follows that the PBS scheme would have existed even if the NHVR was not established, and so the productivity benefits operators obtain from using the PBS scheme cannot be attributed to the NHVR in its entirety.

Estimating the NHVR's contribution therefore requires answering the following questions:

- what would the likely uptake be if the NHVR was not established; and
- what has been the uptake of the PBS scheme so far and what will it be going into the future?

We have assumed that uptake without the NHVR would be as forecast in an earlier 2014 Austroads report.¹⁹ The report forecasts three scenarios, namely:

- a high uptake scenario, where PBS vehicles have access to all major interstate networks in 2014;
- a medium uptake scenario, where PBS vehicles' access to the network is gradually increased on major interstate networks; and
- a low uptake scenario, where there is no change in PBS vehicle access on major interstate networks.

The report considers the high and low uptake scenarios as improbable and that the medium uptake scenario is the most probable outcome.

The actual number of PBS vehicles has been significantly higher than even the high uptake scenario in the Austroads report. For example, the estimated actual number of PBS vehicles at the start of 2019 was around 8,200; almost double the 4500 vehicles expected in the most likely, medium uptake scenario, and 60 per cent higher than the 5,300 vehicles in the high uptake scenario.

¹⁷ National Transport Commission (NTC), *Performance Based Standards – Regulatory Impact Statement*, December 2011, p vi

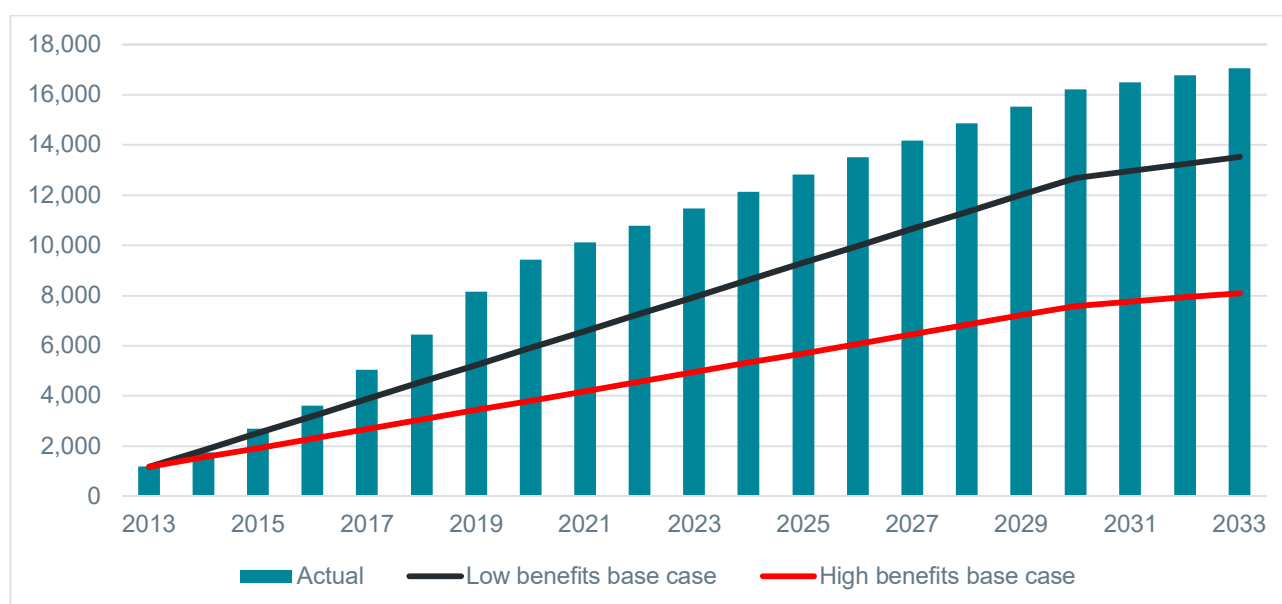
¹⁸ The PRP, which was established by the NTC in 2007/2008, is responsible for advising the NHVR on suitable PBS designs.

¹⁹ Austroads, *Quantifying the Benefits of High Productivity Vehicles*, July 2014

For the purposes of calculating a benefit estimate, we have assumed that the NHVR is responsible for the higher than expected uptake in PBS vehicles so far and that this high growth will continue in 2020. From 2020 to 2030, we have assumed that the growth in PBS vehicles will be the same as the high uptake scenario in the Austroads report. This is represented as 'actual and forecasts' series in figure 4-1 below. This uptake scenario is then compared with the low and high uptake scenario in the Austroads report to estimate a likely range of benefits that the NHVR has delivered.

The approach to forecasting uptake under the NHVR can be considered conservative given the growth in actual PBS vehicles to date. It assumes that growth in actual uptake going forward would 'slow down' in the next year, increasing at the rate suggested in the Austroads report instead.

Figure 4-1: Actual (2011- 2019) and forecast (2020 onwards) number of PBS vehicles ²⁰



We estimate that the economic benefits associated with the additional uptake of PBS scheme ranges from \$2 billion to \$4 billion in present value (PV) terms over the 22 year period. We describe how we have calculated productivity benefits in Appendix A.1.

4.4.2 Higher uptake of NHVAS – mass management module

Overview of the NHVAS – mass management module

The NHVAS is a voluntary productivity and compliance scheme that recognises operators who implement and maintain robust safety and other management systems. The scheme was first introduced in 1999. The NHVAS is generally considered to be a 'win-win', where operators are provided with more flexibility in how they manage their compliance obligations, while also maintaining higher safety and vehicle standard requirements.

The mass management module is one of the modules under the NHVAS. The mass management module encourages heavy vehicle operators to demonstrate that they have developed and implemented a system for loading their truck correctly and ensuring that their trucks are not overloaded, either overall or on an axle group basis. In return, operators can operate at concessional mass limits (CML), which allow operators to

²⁰ To quantify the benefits, we have compared the actual uptake with the counterfactual base case. The benefits are higher when the difference in uptake between the actual case and base case is higher. Given this, the high benefits base case has a lower assumed uptake and the low benefits base case has a higher assumed uptake.

carry additional mass above the general mass limit (eg, one extra tonne for vehicles with an allowable gross mass not exceeding 55 tonnes), with no additional restrictions on their access.

Prior to the NHVR, the NHVAS was administered by jurisdictional road agencies, which each had its own accreditation process and additional mass allowance. The inconsistency in mass allowance meant that interstate heavy vehicle operators would need to operate at the 'lowest common denominator' to comply with the requirements of each jurisdiction

The NHVR has promoted consistency in how accreditation is obtained, managed and monitored, including applying any additional mass allowances operators have, thereby encouraging uptake from industry.

Additional uptake of scheme due to heavy vehicle reform

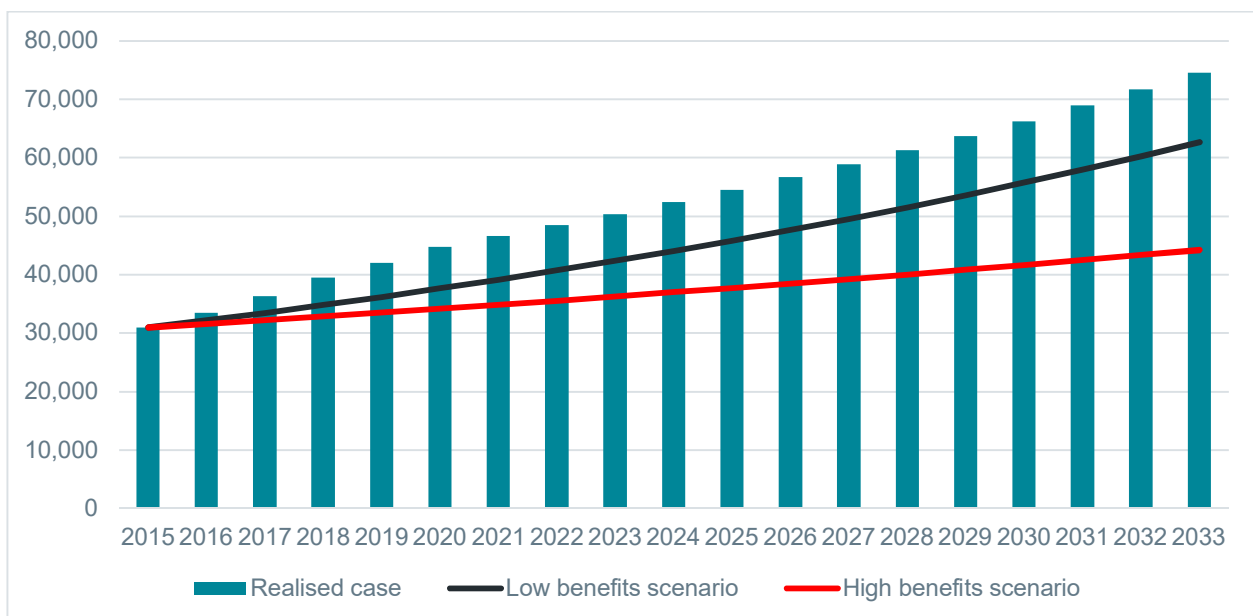
The uptake of the mass management module has experienced significant growth since heavy vehicle reform commenced. For example, the number of vehicles enrolled has increased from around 31,000 vehicles in 2015 to around 39,000 vehicles in 2018, representing a yearly growth rate of around 8.4 per cent. By way of comparison, the increase in heavy vehicle kilometres travelled during the same period was around 4 per cent in jurisdictions that have enacted the HVNL.

For the purposes of calculating a benefit estimate, we have assumed that:

- in the absence of heavy vehicle reform, the number of vehicles enrolled in the NHVAS mass management module would grow at two to four per cent per year (ie, the counterfactual base case); and
- the higher than expected uptake so far is the result of heavy vehicle reform and this high growth will continue until 2020, and then grow at four per cent from 2021 onwards.

This is represented as 'actual and forecasts' series in figure 4-2 below.

Figure 4-2: Actual (2011- 2019) and forecast (2020 onwards) number of vehicles enrolled in the mass management module^{21 22}



²¹ We note that the Northern Territory participates in the NHVAS. The figures do not include Northern Territory.

²² To quantify the benefits, we have compared the actual uptake with the counterfactual base case. The benefits are higher when the difference in uptake between the actual case and base case is higher. Given this, the high benefits base case has a lower assumed uptake and the low benefits base case has a higher assumed uptake.

We estimate that the economic benefits associated with the additional uptake of the NHVAS mass management module ranges from \$0.5 billion to \$1.2 billion in PV terms over the 22 year period. We describe how we have calculated productivity benefits in Appendix A.1.²³

4.4.3 Facilitate the use of more productive RAVs

As discussed earlier in section 4, a key concern with previous regulatory arrangements was that they lacked transparency and were inconsistent across borders. This often resulted in last/first mile issues, particularly on local roads, where operators would not be able to obtain access for the most productive vehicle, and so would use a less productive vehicle instead.

The HVNL introduced a consistent decision-making framework for access where road managers can only reject an access permit application for identified reasons, such as safety, infrastructure or amenity reasons.²⁴ In contrast, under previous arrangements, many of the road managers who were actively involved in decision making operated in an environment with less accountability and transparency, and often did not justify or document the reason for rejecting an access application.

The NHVR has undertaken several additional initiatives and activities to facilitate the use of more productive vehicles and the move towards the new, nationally consistent decision-making framework. For example, the NHVR has:

- published various national notices for several RAV classes;
- sought to expand the network available via notices;
- provide technical support and released assessment guidelines to assist road managers with their assessment process; and
- introduced the road manager module in the NHVR portal to support more than 430 road managers in the assessment of permit applications.

Quantifying the benefits of facilitating the use of more productive RAVs

There is evidence to suggest that heavy vehicle productivity has increased in recent years. Table 4-1 below shows average load carried per trip for rigid and articulated trucks, a key measure of heavy vehicle productivity. The average load for both vehicle types has remained relatively stable from 2010 to 2016 but have both experienced an increase from 2016 onwards, ie:

- for rigid vehicles, load carried per vehicle ranged from 5.4 to 5.7 tonnes per trip from 2010 to 2016 but increased to 6.1 tonnes in 2018 – a seven to 13 per cent increase; and
- for articulated vehicles, load carried per vehicle ranged from 24.7 to 25.8 tonnes per trip from 2010 to 2016 but increased to 27.4 tonnes in 2018 – a six to 11 per cent increase.

Table 4-1: average load carried per trip by vehicle type (tonnes)²⁵

Year	Rigid vehicles	Articulated vehicles
2010	5.4	25.4
2012	5.6	24.8
2014	5.7	24.7

²³ We have excluded the Northern Territory when calculating benefits. We expect that including the Northern Territory would result in an increase in benefits.

²⁴ Noting that this does not necessarily require evidence, rather the road manager only needs to cite an identified reason.

²⁵ ABS, Survey of Motor Vehicle Use, Australia, 12 months ended 30 2018, 9208.0.

2016	5.5	25.8
2018	6.1	27.4

It is unclear what is driving this increase in average load carried per vehicle in 2018. That said, the increase in uptake of the PBS scheme and NHVAS mass management module is likely to have only played a small role in the overall increase in productivity – in 2018, there were approximately 0.5 million heavy vehicles with less than 10 per cent enrolled in the PBS scheme or the NHVAS mass management module. It follows that the productivity of heavy vehicles that are not enrolled in either the PBS scheme or the NHVAS mass management module have also likely increased significantly in recent years.

We estimate that the increase in load in recent years alone would result in benefits of around \$1 billion per year, or \$11 billion in PV terms over 20 years.²⁶ That said, we expect that some of these productivity gains would be due to investment in the road network, which is unrelated to heavy vehicle reform. It is also unclear whether the increases observed in 2018 would continue to be observed in the future or continue to grow.

The HVNL RIS assumed that the benefits of improved decision making for RAVs would be double the benefits achieved from improving PBS uptake. As PBS is a subset of RAVs, the RIS implicitly assumes that the productivity benefits to non-PBS RAVs would be similar in size to productivity benefits for PBS vehicles.

For the purposes of estimating the productivity benefits for non-PBS RAVs, we have used the same assumption as the RIS. That is, we have assumed that the economic benefits range from \$2 billion to \$4 billion in PV terms over the 22 year period.

²⁶ We have calculated this figure with reference to the freight task undertaken by articulated vehicles and rigid vehicles, and the savings that would be achieved from the increase in average load for common vehicle types.

5. Safety benefits

5.1 What has the NHVR done to improve safety outcomes

A key focus of the HVNL and the NHVR has been to improve the safety of the heavy vehicle sector. The reform has introduced one set of rules and is moving to a national approach to road safety, compliance and enforcement, and industry engagement.

The NHVR has undertaken key initiatives that are expected to have improved road safety outcomes, including:

- improving the monitoring and sharing of information across borders;
- developing and collecting a nationally consistent dataset to inform decision making; and
- developing guidance material and tools to encourage operators to adopt an effective safety management system.

5.1.1 Improved monitoring and sharing of information

Prior to the NHVR, there was limited monitoring and sharing of heavy vehicle related information across borders, in particular, information gathered via camera and compliance technologies. The NHVR is facilitating the sharing of information to all jurisdictions, including through the roll out of the Safety and Compliance Regulatory Platform (SCRIP) which will provide capability for all safety and compliance related information storage, analytics and reporting functions.

One example of how the SCRIP has improved information sharing is the National Compliance Information System (NCIS). This is a national set of heavy vehicle related compliance and monitoring data captured using state and territory cameras and other compliance monitoring and recording systems, including handheld devices. It contains nationwide information about heavy vehicles, their movements, drivers and operators, and thus provides a national picture of the heavy vehicle fleet, at an individual vehicle level.

By improving the monitoring and sharing of information, the NHVR is able to obtain an improved understanding of heavy vehicle safety risks, and more efficiently undertake targeted compliance activities. Over time, this should contribute to improved safety outcomes as well as reduced levels of non-compliance with the HVNL, which should result in a reduction in the number of heavy vehicle crashes, at least, on a per heavy vehicle basis.

5.1.2 Collecting and developing a nationally consistent dataset

Under previous jurisdictional based arrangements, data was collected on a state and territory basis. It follows that information collected was often inconsistent across jurisdictions and not necessarily available in all jurisdictions. This meant that a meaningful national dataset was unavailable.

Since its establishment, the NHVR has sought to collect a national dataset which enables evidence based decision-making processes. Examples include:

- the road worthiness program, which was the first survey to collect information on the mechanical condition of the national heavy vehicle fleet; and
- the registration data program, where the NHVR, in collaboration with States and Territories, has collected key registration data on heavy vehicles at a national level.

Having such a dataset allows the NHVR to understand trends in safety and risks on a national level, and so identify insights that previously may not have been available. This should in turn help to inform the NHVR's

approach to road safety, policy development and planning, to facilitate the achievement of improved safety outcomes.

5.1.3 Encourage compliance and uptake of good practices

Although not yet fully achieved, the NHVR has been working towards the establishment of a single set of rules.²⁷ Prior to the NHVR's establishment, each jurisdiction had its own heavy vehicle compliance rules, meaning that heavy vehicle operators working across jurisdictions had to comply with multiple laws. This likely increased the chance that an operator inadvertently breached the law within a jurisdiction, or operators chose to not comply given the complexity and time involved with compliance.

Having one set of rules also means that the NHVR can engage with industry in a nationally consistent manner. For example, the NHVR has been actively engaging with industry to promote safety management systems and educate the industry about their obligations under the 'chain of responsibility' (CoR) laws (eg, through the CoR gap assessment tool). The NHVR also actively works with all agencies responsible for monitoring compliance with and enforcing the HVNL in the development of national regulatory compliance policies and guidelines to help achieve a consistent interpretation and application of the HVNL (ie, through the creation and implementation of compliance and enforcement policy).

The NHVR has established a national Heavy Vehicle Confidential Reporting Line (HVCRL) where participants in the heavy vehicle industry and the supply chain can report operational safety issues relating to transport activities. This was unavailable under previous arrangements. Core guidance materials and tools related to safety management systems have been developed and made available on the NHVR website. The 'Tell a mate' Social Media Safety Campaign was used to help raise awareness of the material produced.

Further, the NHVR has made it easier to be part of the PBS scheme and the NHVAS, both of which are designed to facilitate improved safety outcomes, as well as promoting productivity. These schemes are considered a 'win-win', where operators are provided with more flexibility in how they manage their compliance obligations, while also maintaining higher safety and vehicle standard requirements.

5.2 Estimating the safety benefits associated with heavy vehicle reform

We note that several of the NHVR's activities are expected to lead to improved safety benefits for industry. Many of these activities are complementary and target a variety of risks. However, it is difficult to measure the effects of an individual initiative and how it has improved safety outcomes.

Given this, we have focused on understanding how high-level safety outcomes (eg, fatality rates) have changed since the HVNL commenced in 2014. To model the effect of the NHVR on safety outcomes we will need to first construct a projection of the realised case out to 2033 by considering both the long-term trends *prior* to the introduction of the NHVR and the trends witnessed *since* then.

5.2.1 Heavy vehicle safety outcomes under the HVNL

Since the mid 90s road safety has improved remarkably, with fewer injuries and deaths, despite significant increases in population, number of vehicles on our roads and distance travelled by road users. This has been due to a significant and sustained decrease in injuries and fatalities per kilometre travelled on the road.²⁸ For example, the fatality rate has decreased from around 44 fatalities per billion safety weighted vehicle kilometres travelled (VKT)²⁹ in 1965 to around 4 fatalities per billion safety weighted VKT in 2017, or a 90 per cent reduction in fatality rates.

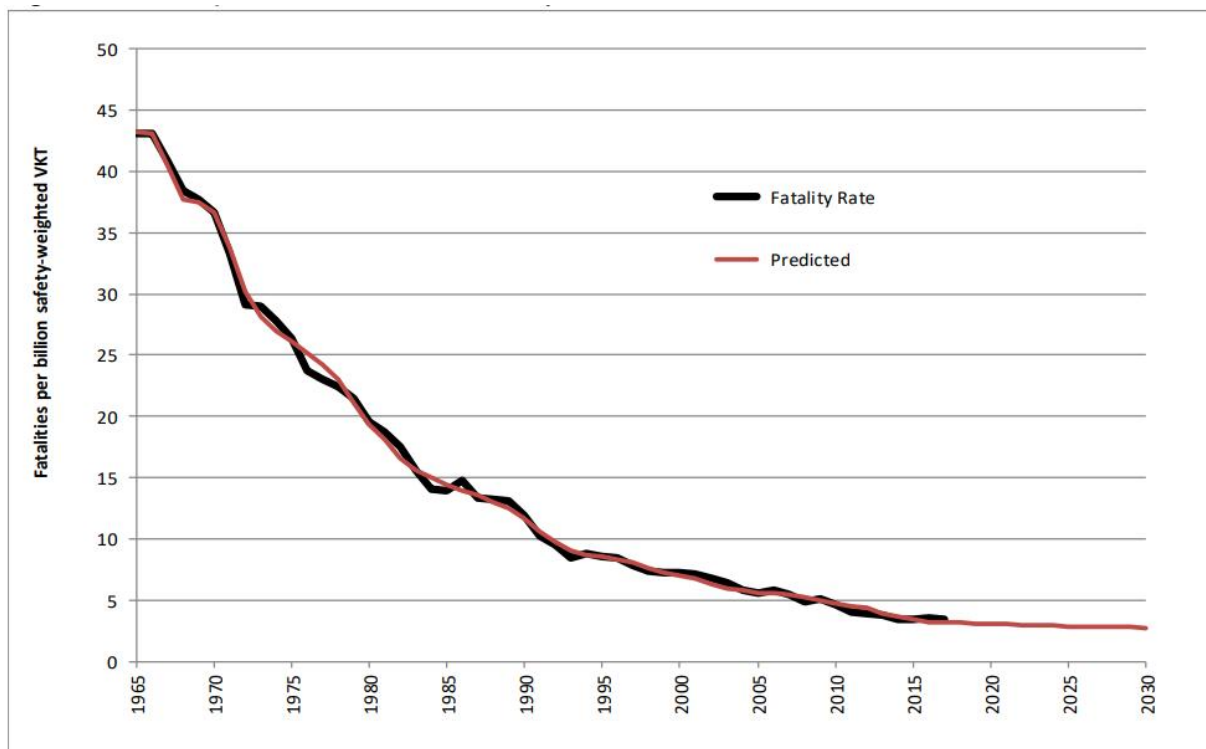
²⁷ An example of the persistence of disparities in rules is that states are still using derogations to suit their transport policies.

²⁸ DIRDC, *Modelling road safety in Australian states and territories*, 2018, https://bitre.gov.au/publications/2018/is_94.aspx

²⁹ Safety weighted VKT weights the VKT by the risk factors associated with different vehicle types. For example, light vehicles receive a weight of 1, buses a weight of 1.5, and trucks a weight of 2.

The substantial decline is often reported as being associated with a range of factors, such as the increased fitting and wearing of seat belts, random breath testing, speed cameras, mobile drug testing, and improvement in vehicle safety features and infrastructure. However, analysis from the Bureau of Infrastructure, Transport and Regional Economics (BITRE) shows that, going forward, it is unlikely that there will be significant reductions in fatalities per kilometre travelled. It follows that annual road fatalities will likely increase in line with kilometres travelled on the road network.³⁰ Put another way, BITRE's analysis suggests that road fatality rate per kilometre is expected to decrease only slightly from 2017 onwards.

Figure 5-1: Actual and predicted road fatality rate (fatalities per billion safety weighted VKT)³¹

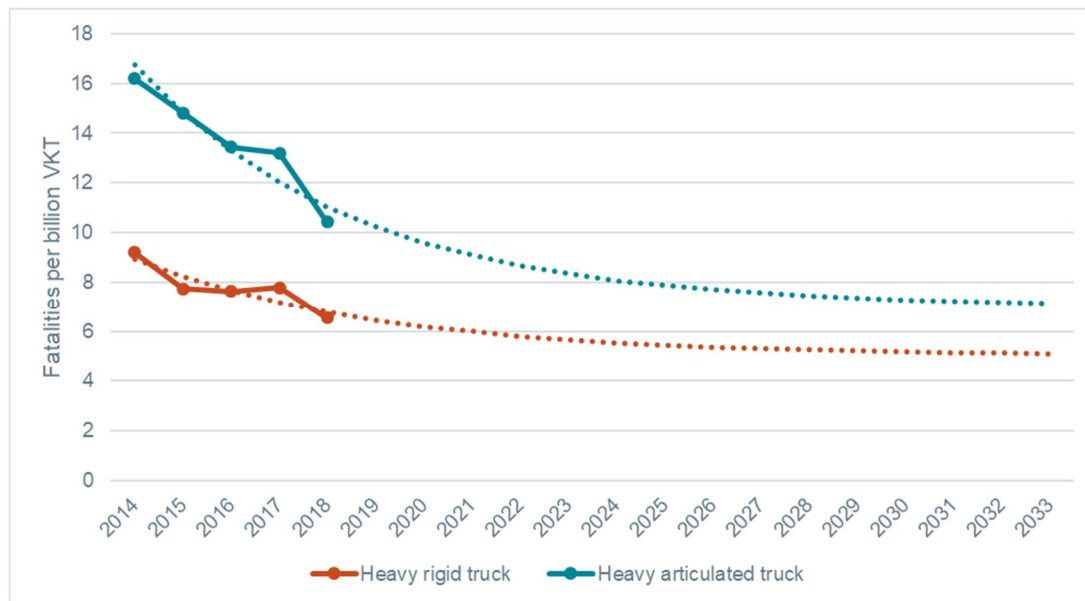


We have adopted BITRE's approach to forecasting fatality rates to estimate what the likely fatality rates for heavy vehicles will be in the realised case. The projection is shown in Figure 5-2. Please refer to the appendix for further details on how we have forecast fatality rates.

³⁰ DIRDC, *Modelling road safety in Australian states and territories*, 2018, available: https://bitre.gov.au/publications/2018/is_94.aspx

³¹ DIRDC, *Modelling road safety in Australian states and territories*, 2018, available: https://bitre.gov.au/publications/2018/is_94.aspx

Figure 5-2: Fatalities per billion vehicle kilometres in NHVR states



BITRE, Australian Road Deaths Database, 2019; ABS, Survey of Motor Vehicle Use, compiled for the years 2000-2018

5.2.2 Heavy vehicle safety outcomes without reform

In order to estimate the effect of the NHVR on road safety in Australia, we need to construct a plausible account of what *would have happened* had the NHVR not been formed. We believe that the NHVR has primarily affected road safety through two avenues.

1. Reduced the kilometres heavy vehicles travel by increasing the uptake of productivity schemes, such as the PBS scheme and the NHVAS mass module.
2. Reduced the fatality and serious injury rate per kilometre travelled as a result of the key initiatives the NHVR has undertaken and/or further developed as described above.

We have examined the likely magnitude of each of the two factors above, allowing an informed judgement of the likely safety benefits from heavy vehicle reform activities.

Increased uptake of PBS scheme and the NHVAS mass module

Vehicles enrolled in the PBS scheme and the NHVAS mass module are allowed to carry more per trip. It follows that increased uptake of the schemes will reduce the total distance travelled by heavy vehicles, thereby reducing the number of heavy vehicles on the road. We expect that reduced travel by heavy vehicles also directly reduces the expected number of crashes involving heavy vehicles, and so the expected number of heavy vehicle related injuries and fatalities.

There is also evidence to suggest that PBS vehicles are significantly safer on a per kilometre basis than other heavy vehicles. One study by the University of Melbourne found that PBS vehicles were involved with 75 per cent fewer serious and major accidents when compared to conventional rigid and articulated trucks on a per kilometre basis.³² Similarly, evidence suggests that operators who are accredited in the NHVAS –

³² Hassall, K., Thompson, R., *What are the safety benefits of Australian high productivity vehicles when compared to the conventional heavy vehicle fleet?*, Transportation Research Procedia, v 12, 2016, p 882.

in particular the maintenance management module – have a reduced crash rate of the associated vehicle by as much as 60 per cent on average.³³

However, some of the reduction in crash rates from participating in either the PBS or the NHVAS may not be entirely attributable to the schemes themselves. This is because these schemes are likely to attract operators that are focused on safety, and so the literature may have overstated the safety benefits of these schemes. That said, it is likely that participation in these schemes have helped improved safety outcomes for heavy vehicles.

Reduced injury and fatal crashes per kilometre

We have examined whether there have been any detectable changes in how safety has trended in the crash data, around the time of the commencement of the HVNL. More specifically, we have:

- examined the trends in heavy vehicle safety outcomes since 2014; and
- compared this with possible benchmarks for the scenario that would have occurred without reform, such as:
 - > safety trends in light vehicles;
 - > heavy vehicle safety trends before 2014; and
 - > heavy vehicle safety trends in Western Australia and Northern Territory.³⁴

The above analysis allows us to examine whether heavy vehicle safety outcomes in jurisdictions that have participated in heavy vehicle reform have decreased at a higher rate when compared to these benchmarks. – Figure 5-3.

We note that there is publicly available and up to date information on fatal crashes involving heavy vehicles, but that information on non-fatal crashes is more limited. Given this, our analysis has focused on trends in fatal crashes rather than other type of crashes. However, we expect that trends in fatal crashes and other types of crashes (particularly injury crashes) to be linked.

Although information on fatal crashes is available and up to date, the small number of fatal crashes since 2014 means that there is too little data to develop statistically significant results. That said, our analysis highlights that heavy vehicle safety outcomes in jurisdictions that have participated in heavy vehicle reform appears to have improved at a higher rate when compared to the relevant benchmarks.

Prior to 2014, light vehicle fatalities per kilometre and heavy vehicle fatalities per kilometre in jurisdictions that have participated in heavy vehicle reform were 91 per cent correlated but less than 1 per cent correlated after the HVNL commenced. The decline in correlation is due to heavy vehicle fatality rates dropping faster than light vehicle fatality rates.

Similarly, heavy vehicle safety outcomes in jurisdictions that have participated in heavy vehicle reform appear to be improving at a higher rate when compared to heavy vehicle safety outcomes in Western Australia and the Northern Territory. Prior to 2014, heavy vehicle fatality rates in jurisdictions that have participated in heavy vehicle reform were 80 per cent correlated with those in Western Australia and the Northern Territory. However, fatality rates are only 65 per cent correlated after the introduction of the HVNL as safety outcomes have improved at a higher rate in jurisdictions that have participated in heavy vehicle reform.

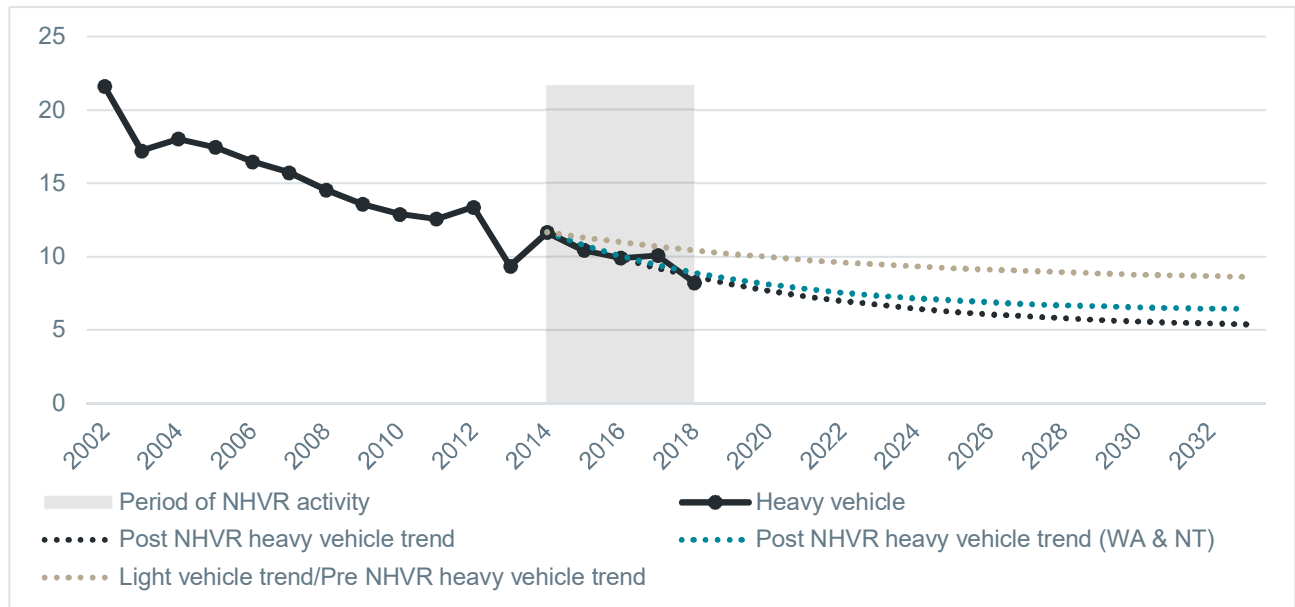
Figure 5-3 illustrates that since 2014, vehicle fatalities in jurisdictions that have participated in heavy vehicle reform have fallen at a higher rate than Western Australia and Northern Territory, and the trends before

³³ Austroads, *Analysis of the Safety Benefits of Heavy Vehicle Accreditation Schemes*, 2008, p 23.

³⁴ Noting that it may be reasonable to believe that work completed by the NHVR in the safety area would also have flow on effects in Western Australian and the Northern Territory.

2014. Our analysis suggests that the decline is higher when compared to historical trends but more marginal when compared to trends suggested in Western Australia and the Northern Territory.

Figure 5-3: Trends in heavy vehicle fatality rates compared with relevant benchmarks (Fatalities per billion VKT)



A difference in differences comparison

We have also undertaken an analysis to examine if the difference in fatality trend is statistically significant, or a difference in differences analysis.³⁵ That is, we have examined whether heavy vehicle fatality trends are statistically lower in jurisdictions that have participated in heavy vehicle reform when compared to those jurisdictions that have not. Our analysis suggests that:

- the heavy vehicle fatal crash rate in 2018 is 1 fatality per billion VKT per year lower in jurisdictions that have participated in heavy vehicle reform relative trends in Western Australia and Northern Territory; and
- that the degree of confidence in this estimate is 65 per cent, ie, there is a 65 per cent probability that this is not due to ‘random noise’.³⁶

We note that the reduction in fatal crash rate would be higher when compared to trends in light vehicle safety outcomes or safety outcomes prior to 2014. We also expect that the degree of confidence would also be higher.

5.2.3 Estimated benefits

Although the analysis above shows that heavy vehicle safety outcomes have improved at a faster rate since the HVNL was introduced, it does not explain why this has occurred. Given this, we have adopted conservative assumptions to calculate safety benefits arising from the NHVR. Specifically, we have assumed that:

- the NHVR has delivered safety benefits by:

³⁵ A difference in differences analysis is a common used approach to evaluate how effective a reform or program has been at achieving improved outcomes.

³⁶ Based on a one sided t-test under the hypothesis that the coefficient β_3 is positive. Note that whilst the conventional threshold level of significance for hypothesis testing is 5-10 per cent, data limitations have limited our ability to obtain such robust results. Please refer to the appendix for further information.

- > reducing the number of heavy vehicles on the road, ie, the productivity gains discussed in section 4 has reduced the kilometres travelled by heavy vehicles; and
- > reducing the risk of a fatality and injury crash occurring, eg, implementing projects including the adoption of safety management systems and education about operator and driver safety responsibilities and obligations under the HVNL, including CoR .
- in the **low benefits case**, there is:
 - > no change fatality and injury crash rates from 2014 and 2018;
 - > reduced fatality and injury crash rates of 0.5 – 2.5 per cent from 2019 to 2023; and
 - > reduced fatality and injury crash rates of 2.5 per cent from 2023 onwards.
- in the **high benefits case**, there is:
 - > reduced fatality and injury crash rates by 0.5 – 2.5 per cent from 2014 and 2018;
 - > reduced fatality and injury crash rates by 2.5 – 5 per cent from 2019 to 2023; and
 - > reduced fatality and injury crash rates of 5 per cent from 2023 onwards.

Based on the assumptions above, we estimate that heavy vehicle reform has delivered between \$0.3 billion to and \$1.1 billion of safety benefits.



6. Red tape reduction benefits

Since its inception, the NHVR has undertaken several initiatives focused on reducing the regulatory burden placed on heavy vehicle operators – cutting ‘red tape’. This section discusses the effect of several key NHVR initiatives on operators, including:

- expected increase in the uptake of electronic work diaries;
- providing one point of contact for heavy vehicle operators, eg, providing:
 - > a dedicated call centre; and
 - > a dedicated website.
- the reduction in compliance burden associated with having one set of rules;
- reducing the cost of participating in the PBS scheme for operators;
- reducing the burden associated with applying for permits; and
- making it easier to manage the fleet through the creation of the NHVR Portal – Registration Module and NHVR Registration Checker App.

6.1 Effects of the NHVR

6.1.1 Promoting the implementation of EWDs

An electronic work diary (EWD) is an electronic device or system that monitors and records the work and rest times of a driver. EWDs are a voluntary alternative to written work diaries (WWDs) which are required for compliance purposes. EWDs are an attractive alternative to WWDs as they mitigate the need for manual recording of activities.

EWDs were considered a possible fatigue measure in the 2008 Heavy Vehicle Fatigue National Model Legislation. The specification and requirements related to EWDs were further developed and discussed by the Australian Transport Council (now the Transport and Infrastructure Council), Austroads, Transport Certification Australia and the National Transport Commission. In its 2011 report, *Performance Based Specification for Electronic Work Diary and Heavy Vehicle Speed Report*, Austroads identified issues related to EWDs that would could be resolved through an operational pilot.

In 2011, following the Austroads report, the NSW government committed more than \$5 million for the Operational Pilot of EWDs and Speed Monitoring Systems. The pilot, which was led by NSW Roads and Maritime Services (RMS) and conducted by Transport Certification Australia, was established to examine the feasibility of introducing EWDs on a national basis as a voluntary alternative to the written work diaries. The pilot found that EWDs are feasible and identified the optimal technical and operational environment.

In May 2013, the Standing Council on Transport and Infrastructure (now the Transport and Infrastructure Council) agreed that the next step for EWDs is for a national approach to implementation to be developed by the National Heavy Vehicle Regulator and the National Transport Commission. At present, the NHVR approves the standards for EWDs, which ensures that the necessary information to comply with work diary requirements is captured.

EWDs provide users and administrators with a number of potential time saving benefits. These include:

- allowing users to more easily review past work, allowing easier compliance with fatigue laws;
- simplifying the process of recording work and rest hours;

- reducing administrative burden through improved readability and formatting; and
- enabling operators to more easily monitor their business.

By adopting outcome-based standards for EWDs, the NHVR has significantly increased the number of potential providers of EWD services, which is likely to increase competition in the provision of EWDs, thereby reducing the cost faced by operators and increasing uptake of the program.

We expect that in the absence of a national regulator, EWDs would have likely been introduced by road agencies later and potentially in an inconsistent manner (eg, it may not have been a national rollout). In other words, the NHVR has likely brought forward the introduction of EWDs to the industry as an alternative to WWDs. In addition, inconsistent standards and requirements would have likely increased red tape.

Estimating the economic benefits

As the EWD program is currently in its infancy, we have modelled two uptake scenarios going forward, these being a **high uptake** scenario and a **low uptake** scenario. Due to the enhanced benefits of EWDs for large operators through monitoring benefits and reduced overhead, we have assumed that larger operators are more likely to opt into the EWD program under both scenarios – Table 6-1. This reflects the methodology of RMS NSW in their 2013 EWD pilot program.³⁷

Table 6-1: EWD uptake scenarios by operator size

Fleet size	Low uptake	High uptake	Description
1 ~ 5	0%	30%	Assumed per cent of participating operators by fleet size ³⁸
6 ~ 15	3%	35%	
16 ~ 40	5%	50%	
41 ~ 99	10%	50%	
more than 100	15%	60%	

To estimate the effect of the NHVR on EWDs, we have assumed that state regulators would have eventually pursued similar EWD programs to the NHVR, but that their implementation and uptake would have been staggered.

To reflect this, we have constructed two counterfactual scenarios, a **low benefits** scenario and a **high benefits** scenario, with the former assuming that state regulators would have been on average 1 years slower than the NHVR in pursuing an EWD program, and the later 2 years – Figure 6-1 and Figure 6-2.

To quantify the benefits of the expedited EWD uptake due to the NHVR, we have relied on the work done by RMS in quantifying the costs associated with having an EWD system installed in a heavy vehicle, and have made assumptions around the time savings from using an EWD – Table 6-2.

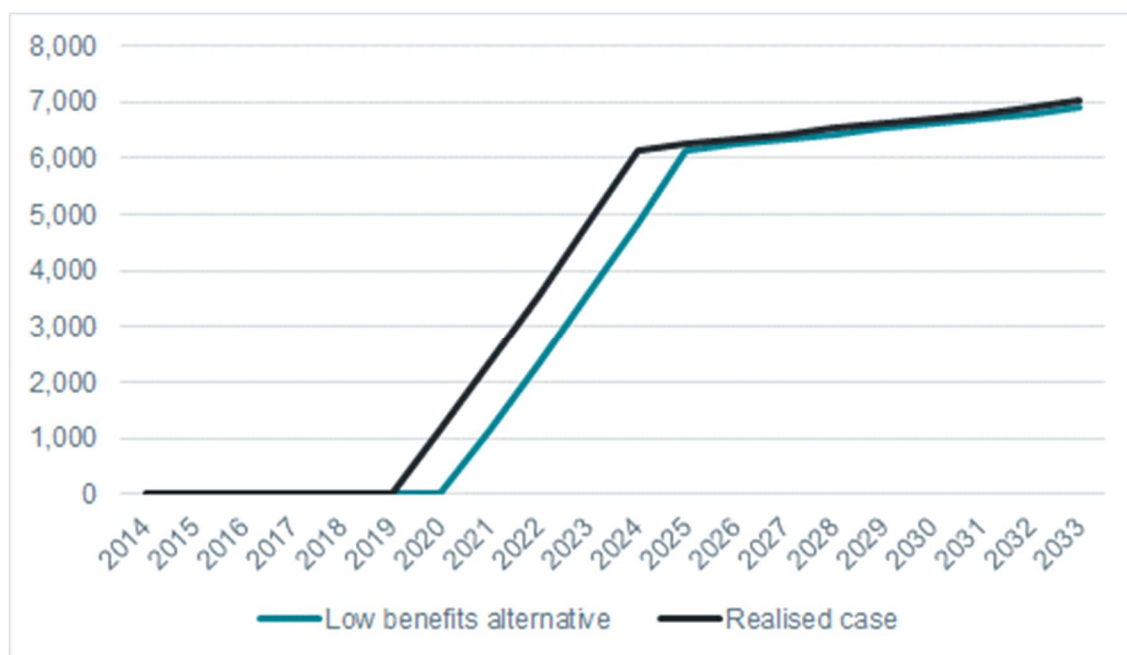
³⁷ RMS, *Operational Pilot of Electronic Work Diaries and Speed Monitoring Systems*, 2013, p 96.

³⁸ RMS, *Operational Pilot of Electronic Work Diaries and Speed Monitoring Systems*, 2013, p 96.

Table 6-2: EWD modelling assumptions

Assumption	Low benefits	High benefits	Description
EWD uptake speed increase	2 years	4 years	Assumed number of years that the NHVR has brought forward the rollout of EWD
Reduced time for drivers	25 hours per year	50 hours per year	Assume that drivers take 5-10 minutes every day to record working hours and a vehicle is used for 50 weeks per year
Reduced time for admin staff	25 hours per year	50 hours per year	Assume that admin staff take 5-10 minutes every day to audit and record working hours
Ongoing cost per year	\$240	\$0	Monthly monitoring assumed to cost \$20 per month, the RMS EWD pilot assumes the operator already has in-vehicle unit installed ³⁹
In-vehicle unit cost	\$1,700	\$0	In-vehicle units – \$1,200 plus \$500 installation ⁴⁰
Life of in-vehicle unit	5 years	5 years	Assumed life of in-vehicle unit
Annualised cost	\$627	\$0	Based on in-vehicle unit cost and life

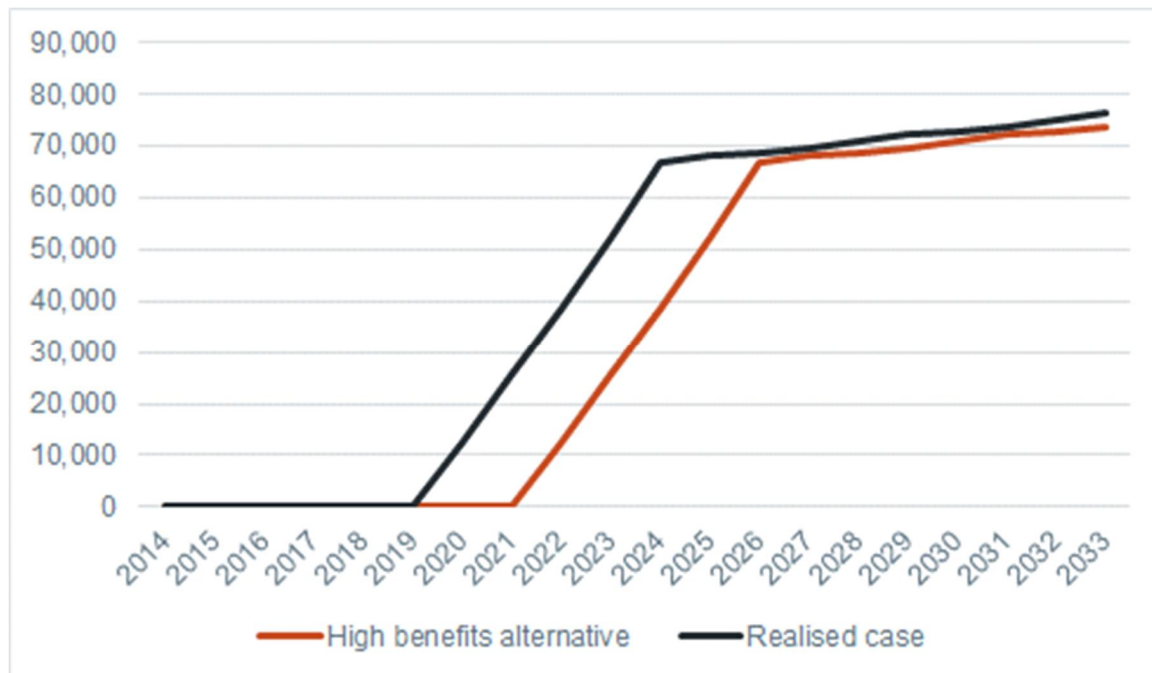
Figure 6-1: Number of vehicles using EWDs under the low benefits low uptake scenario



³⁹ RMS, *Operational Pilot of Electronic Work Diaries and Speed Monitoring Systems*, 2013, p 95.

⁴⁰ RMS, *Operational Pilot of Electronic Work Diaries and Speed Monitoring Systems*, 2013, p 95.

Figure 6-2: Number of vehicles using EWDs under the high benefits high uptake scenario



We estimate that the benefits associated with the earlier introduction of EWDs range from \$4 million to \$258 million in present value terms over the 22 year period. The large range reflects uncertainty regarding future uptake of EWDs and whether road agencies would have introduced EWD even if heavy vehicle reform did not occur.

6.1.2 One point of contact

The NHVR has established a dedicated call centre and a centralised website for heavy vehicle operators to handle any heavy vehicle enquiries. This allows operators to have access to consistent and up to date information available from a 'one-stop-shop', thus reducing search cost.

Dedicated call centre

The use of a single call centre, as compared to multiple jurisdictional call centres, means that heavy vehicle operators are likely to be receiving better advice, and therefore require less administrative time, to find out essential information relating to the HVNL and their compliance obligations. This in turn delivers cost savings to operators through reducing the time required to obtain responses to queries.

Dedicated website

By combining the information previously held on the websites of various jurisdictional heavy vehicle regulators, the NHVR's dedicated website provides consistent information applicable to vehicles operating in any HVNL state. This is particularly valuable for inter-state operators, who save time by not having to visit multiple websites, and interpret information formatted inconsistently.

Estimating the economic benefits

Due to the difficulty of quantifying the benefits of the NHVR's unified call centre and website without a complex survey, we have made the conservative assumption that each website visit, and each call to the NHVR would have taken one minute longer in the **low benefits** case, and two minutes longer in the **high benefits** one. We have then applied these to a projection for the annual number of visits to the NHVR's website, and the number of calls it receives per year respectively.

Based on these assumptions, we estimate that, in PV terms, the economic benefits associated with having:

- a dedicated call centre ranges from \$0.3 to \$0.6 million; and
- a dedicated website ranges from \$7 to \$14 million

6.1.3 Reduced compliance burden from consolidation of rules towards a single set

The RIS identified that having only one set of rules rather than multiple jurisdictional based rules, would significantly reduce the compliance burden on industry, thereby delivering significant economic benefits. We expect that it is interstate operators that will benefit from having one set of rules.

Estimating the economic benefits

Although it is intuitively easy to see how ensuring compliance with a single set of rules is likely to be less time consuming than complying with several overlapping sets of rules, there is limited information on what the likely savings are. There is also limited information on the number of operators that operate in multiple jurisdictions. Additionally, benefits are received by training providers, auditors (NHVAS) and other third party service providers who are not operators and who must account for heavy vehicle legislation.

To estimate the benefits, we have adopted the assumptions in table 6-3. We have assumed that operators with a smaller fleet receive less benefits because they are less likely to operate interstate. We understand that the NHVR intends to undertake an industry survey to validate the assumptions that we have made to calculate this benefit.

Table 6-3: Compliance time savings per year by fleet size

Fleet size	Low benefits	High benefits	Description
1 ~ 5	1 hour	5 hours	Time saved per operator each year
6 ~ 15	10 hours	20 hours	
16 ~ 40	25 hours	50 hours	
41 ~ 99	50 hours	100 hours	
more than 100	100 hours	200 hours	

We estimate that the benefits associated with the having one set of national rules range from \$302 million to \$990 million in PV terms over the 22 year period.

6.1.4 Reducing the cost of participating in the PBS scheme

To operate under the PBS scheme, a vehicle must undergo a rigorous review process which establishes that it is both safe and does not cause significant damage to road infrastructure. This includes getting the vehicle design approved by a PBS expert review panel, and getting the vehicle assessed and later certified once it has been built.

Before the NHVR, participation in the PBS scheme required significant time, technical expertise and costs before an operator could get a design and vehicle approved.

The NHVR has made participation in the PBS scheme simpler and less costly for heavy vehicle operators. This has been done through increasing the transparency of the process to operators, thus making it easier for them to make an informed decision. For instance, the NHVR:

- reduced the difficulty of finding a design assessor by providing their details on the NHVR website; and

- provided unified maps of PBS approved routes throughout participating jurisdictions; and
- has simplified the PBS Design and Vehicle Approval process, by introducing a “pre-advised” process for a range of heavy vehicle combinations.

Estimating the economic benefits

To quantify this, we have assumed that the cost required to participate in the PBS scheme (eg, the process of designing a PBS vehicle, having it assessed and approved) is reduced by \$1,000 to \$2,000 per PBS vehicle, or around one to two weeks of staff time savings. Based on these assumptions, the economic benefit ranges from \$6.7 to \$7.4 million in PV terms over the 22 year period.

6.1.5 Improvements to access permit regime

Prior to the NHVR, an operator would need to obtain a permit from the relevant jurisdictional road agency, which would involve multiple permits for interstate trips. Each jurisdictional road authority separately administered their own permit application process, and so operators had to navigate multiple information sources, permit application systems and gazette notices (for vehicles that were not already on existing notices).

The NHVR has undertaken several initiatives to reduce the administrative costs for heavy vehicles accessing the road network, including:

- establishing and continuing to enhance the NHVR Portal – customer module, which is a ‘one-stop-shop’ for access permit applications for operators when dealing with road managers; and
- developing a ‘smart’ map, which would help operators plan their journey when a new route is involved.

We note that the NHVR is working with road managers to increase the road network that is available on national notices, thereby reducing the need for permits. The NHVR envisages that in the long run, the national notices will cover most routes required by the industry, and so access permits are only needed on a ‘exception’ basis. We understand that this is expected to significantly reduce the number of permit applications in the long run.

Estimating the economic benefits

To estimate the time savings attributable to the NHVR, we have assumed a time saving of between a half to one hour per permit application going forward for the **low benefits** and **high benefits** scenarios respectively. We have also assumed that it takes an operator between a half and one hour less to plan a route under the unified access permit application process of the NHVR than it would have taken otherwise – Table 6-4.

We can then estimate the value of time savings attributable to the NHVR by assuming that between 10 per cent and 20 per cent of trips involve a new route for the average operator, and applying these assumptions to the projected number of permit applications with and without the NHVR, taking into account the NHVR’s goal of significantly reducing the number of permits required in the long run.

Table 6-4: Access permit regime modelling assumptions⁴¹

Assumption	Low benefits	High benefits
Operator time savings per permit application	0.5 hours	1 hours
Operator time to plan a new route	0.5 hours	1 hours
Percentage of trips that involve a new route for the operator	10%	20%

⁴¹ Different application types may require vastly different times, eg, dairy vs b-double permits.

We estimate that the benefits associated with improved access permit regime range from \$9 to \$18 million in present value terms over the 22 year period.

6.1.6 Improvements to fleet management from introducing the NHVR portal – registration module

The NHVR has recently introduced its registration module into its NHVR portal and the Registration Checker App.

The registration module and Registration Checker App allow registered operators to review the status of their fleet online, eg, when registration for a vehicle expires and eventually, whether there is a defect notice attached to a vehicle. This replaces the previous paper-based system where operators were sent a renewal notice via mail.

The registration module also allows operators to demonstrate and share the status of their vehicles with other interested parties as required, eg, when a company requires an operator to demonstrate that their vehicles can legally drive on the road network. Under previous arrangements, operators would need to scan registration details to do this.

Estimating the economic benefits

Since the registration module has only just been released, there is limited information on how operators will benefit from it. For the purposes of estimating the likely economic benefits, we have assumed that operators will save between 5 and 10 minutes per vehicle in the **low benefits** and **high benefits** scenarios respectively. Similarly, we estimate that between 25% and 75% of operators will use the registration module—Table 6-5.

Table 6-5: Fleet management and registration assumptions

Assumption	Low benefits	High benefits
Savings per vehicle	5 minutes	10 minutes
Number of operators who register	25%	75%

We estimate that the fleet management benefits operators receive from the registration module range from \$2.3 to \$14 million in present value terms over the 22 year period.

7. Regulatory cost savings

7.1 Moving towards national delivery of services has delivered cost savings

The commencement of the HVNL and NHVR has meant that there is increasingly a national approach to delivering regulatory services to industry. The NHVR already undertakes certain activities in-house, eg, administration of the PBS scheme, the NHVAS and vehicle standards. Further, the NHVR has a national services transition (NST) program, which aims to transition services that are currently undertaken by jurisdictional road agencies to be directly delivered by the NHVR. Noting that South Australia and Tasmania have already been transitioned.

A national approach is expected to lead to cost efficiencies because it would remove duplication of effort. That is, a national approach would mean maintaining one set of rules instead of multiple jurisdictional based rules. Examples include:

- having a national set of penalties removes the need for separate jurisdictional penalties;
- no longer having to maintain guidelines and policies on access decision making and vehicle standards;
- reduce the need to maintain multiple jurisdictional systems; and
- the establishment of national policies and procedures for regulatory activities.

A national approach also creates economies of scale, thereby allowing the NHVR to deliver better services to industry at a lower cost. For example, the number of calls received by the NHVR means it makes sense to create a dedicated call centre to answer calls from industry. This saves time for industry and will also save staff time involved with answering phone calls.

Having a national regulator focused only on heavy vehicle regulatory activities has also created increased transparency of costs. Prior to the reform, there were limited details around the costs involved with undertaking heavy vehicle regulatory activities. This means that there is limited understanding on what is driving changes in costs and whether these costs are efficient or effective. The increased transparency also means there would be more attention from industry regarding the cost of undertaking regulatory activities.

The reform has also likely increased the focus on ensuring heavy vehicle regulatory costs are efficient. The NHVR is required to put forward its three year forward budget, which is then subject to approval by the Transport and Infrastructure Council (TIC). The need to be approved by COAG, and so multiple governments, likely increases the scrutiny on costs when compared to previous arrangements.

7.2 Estimated regulatory costs with and without reform

To understand the change in regulatory costs, we have compared:

- the estimated costs of undertaking regulatory activities if the reform did not occur; with
- the costs that have occurred since 2012.

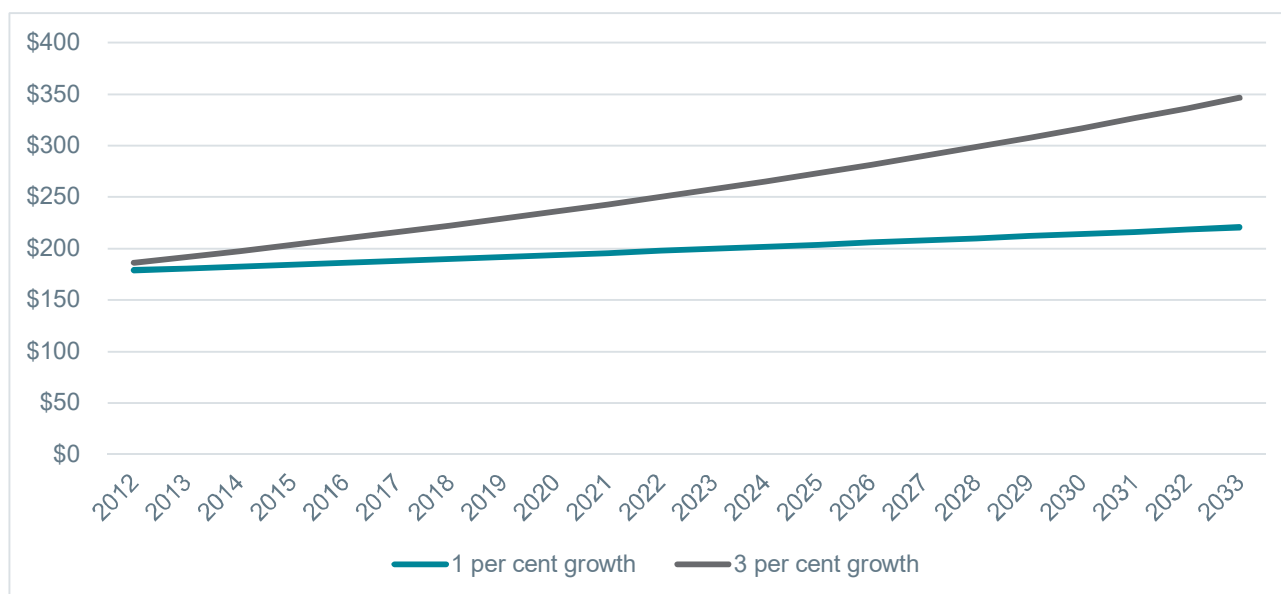
This comparison allows us to understand the regulatory cost savings that the reform has delivered over the evaluation period.

7.2.1 The estimated costs of undertaking regulatory activities if the reform did not occur

KMPG estimated that the ongoing costs of undertaking heavy vehicle regulatory activities were \$171 million dollars in 2010.⁴² This covered the ongoing regulatory activities that were envisaged to be covered by the HVNL, and so the NHVR. Some of these costs are related to providing registration services and the costs of undertaking activities in Western Australia and Northern Territory. The costs of undertaking regulatory activities are \$145 million (or \$176 million in 2019 dollars) once these costs are excluded.

It is uncertain how regulatory costs would have increased over time. However, it is likely that these costs would increase in real terms as the heavy vehicle task is growing over time. For the purposes of this cost benefit analysis, we have assumed that costs would have increased by one to three per cent in real terms if heavy vehicle reform did not occur – Figure 7-1. This would result in a total cost of \$2.4 billion to 2.9 billion in present value terms over the 22 year period.

Figure 7-1: Estimated costs, in millions (\$2019), of undertaking heavy vehicle regulatory activities if reform did not occur (2012-2033)



7.2.2 The estimated costs of undertaking heavy vehicle regulatory activities under the HVNL

Road agencies (via service level agreements) and the NHVR are both responsible for delivering heavy vehicle regulatory activities under the HVNL. In addition, road agencies have also incurred development and implementation costs to support and enable heavy vehicle reform. These costs are discussed in further detail below.

The transitional costs incurred by road agencies

KPMG investigated what the expected transitional development and transitional implementation costs would be for road agencies to support and enable the reform envisaged in the RIS. KPMG estimated total transitional costs to be \$84 million in 2010, comprising \$61 million in implementation costs and \$23 million in development costs.⁴³

A significant proportion of transitional costs are related to registration services, which has not been enacted, and the costs that would have been incurred by Northern Territory and Western Australian governments,

⁴² KPMG, *Jurisdictional Costs to Regulate Heavy Vehicles Stage 3 Revised Report*, November 2010, p 7.

⁴³ KPMG, *Jurisdictional Costs to Regulate Heavy Vehicles Stage 3 Revised Report*, November 2010, p 3 and 5.

which did not take part in the heavy vehicle reform. The transitional costs are \$47 million (or \$57 million in 2019 dollars) once these costs have been excluded.

Ongoing costs of undertaking heavy vehicle regulatory activities under the HVNL

The estimated costs of undertaking regulatory activities have remained relatively stable from 2012 to 2019 in nominal terms, increasing from \$150 million in 2012 to \$168 million in 2019 – Table 7-1. In real terms, the cost of undertaking regulatory activities has decreased over time.

Road agency costs has declined significantly from 2012 to 2019, going from around \$160 million in 2012 to \$95 million in 2019 in nominal terms. The decline in 2014 reflects the commencement of the HVNL, where some of the regulatory activities undertaken by jurisdictions were transferred to the NHVR. The decline from 2014 onwards reflects the fact that more services were transitioned back to the NHVR.

NHVR costs have increased over time, going from \$9 million in 2013 to \$73 million in 2019. The increase in cost is because more and more services have been being delivered by the NHVR directly.

Table 7-1: Estimated costs of undertaking heavy vehicle regulatory activities (nominal)

Costs	2012	2013	2014	2015	2016	2017	2018	2019
Road agency costs ⁴⁴	157-163	162-171	104	108	111	105	100	95
NHVR costs ⁴⁵	0	9	30	30	35	43	52	73
Total ongoing costs	148-154	158-168	134	138	146	148	152	168

Total costs of heavy vehicle regulatory activities under the HVNL

Figure 7-2 below shows the total costs of heavy vehicle regulatory activities under the HVNL over time in real terms. This includes the transitional costs incurred by road agencies and the costs of undertaking ongoing regulatory activities.

Costs in 2012 and 2013 are significantly higher than costs in later years because transitional costs to support the reform were incurred by road agencies and cost savings from reform were not yet realised. Overall, we estimate the total cost of undertaking heavy vehicle regulatory activities to range from around \$2.4 billion to \$2.9 billion in present value terms over the 22 year period.

⁴⁴ Road agency costs for the years 2012 and 2013 are assumed to be the same as if the reform did not occur. That is, we have assumed that \$145 million incurred in 2010 would increase by one to three per cent in real terms (or around three to five per cent in nominal terms) each year to estimate road agency costs in 2012 and 2013. Costs in 2014, 2016 and 2017 have been provided by the NHVR. 2015 values are based on an average of figures from 2014 and 2016. We have assumed that changes in road agency costs are correlated to changes in service level agreement payments to estimate costs in 2018 and 2019.

⁴⁵ NHVR costs are calculated as total costs of NHVR minus service level agreement payments to road agencies.

Figure 7-2: Costs, in millions (\$2019), of undertaking heavy vehicle regulatory activities under the HVNL (2012-2019)⁴⁶



7.2.3 Estimated cost savings from heavy vehicle reform

To estimate the likely regulatory cost savings from heavy vehicle reform, we have considered two expenditure scenarios going forward:

- a low benefits scenario, where:
 - > realised costs increase by one per cent per year from 2020 onwards; and
 - > costs without reform increase by one per cent from 2010 onwards;
- a high benefits scenario, where:
 - > realised costs increase by three per cent per year from 2020 onwards; and
 - > costs without reform increase by three per cent from 2010 onwards.

Costs without reform and realised costs for the low benefits scenario and high benefits scenario are shown in Figure 7-3 and Figure 7-4, respectively.

In both scenarios, the realised costs are initially higher than the costs without reform because of the transitional costs incurred by road agencies. However, the realised costs is lower than costs without reform from 2014 onwards as the NHVR begins to deliver cost efficiencies. Overall, the estimated cost savings range from \$0.3 billion to \$0.7 billion in net present value terms (NPV) over the 22 year period.

⁴⁶ We have assumed that from 2019 onwards, regulatory costs would increase by one to three per cent in real terms

Figure 7-3 – Total regulatory costs, in millions (\$2019), under low benefits scenario (one per cent growth in costs)

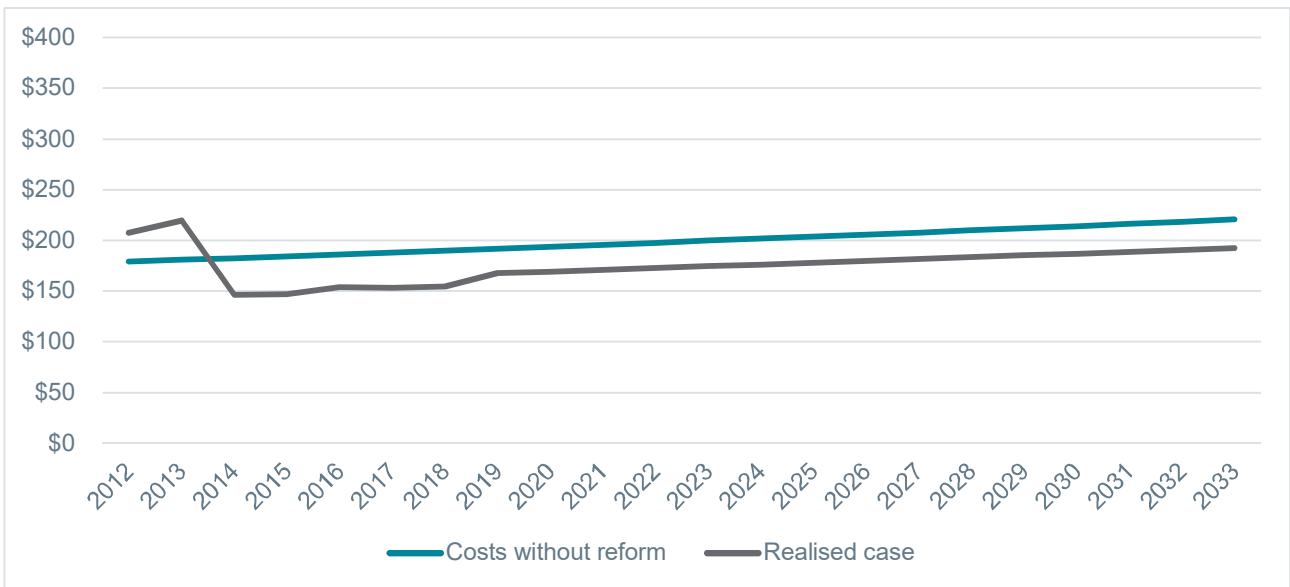


Figure 7-4 – Total regulatory costs (in millions, \$2019) under the high benefits scenario (three per cent growth in costs)



8. Overall economic results

We estimate that the benefits of heavy vehicle reform range from \$5.4 billion to \$12.4 billion in net present value terms (NPV) over the 22 year period – Table 8.1.

Productivity benefits are where most of the estimated benefits have been achieved, ranging from \$4.5 billion to \$9.3 billion in NPV terms over the 22 year period.

The NVHR has made it easier for industry to realise the benefits of participating in the PBS scheme and the NHVAS mass management module. This has led to increased uptake of these two productivity initiatives, thereby leading to significant economic benefits.

There is also evidence to suggest that the new evidence-based decision-making framework for RAVs has led to productivity gains for the national fleet. ABS SMVU data suggests that average load per truck has been stable from 2010 to 2016 but has grown since 2016.

Red tape reduction benefits are the second largest benefit category, ranging from \$0.3 billion to \$1.3 billion in NPV terms over the evaluation period. We expect that the main benefit is from having one set of rules to replace multiple jurisdictional based rules. The estimated benefits from this range from \$0.3 billion to 1 billion in NPV terms over 22 years.

Another key initiative that is expected to reduce red tape is the introduction of EWDs that can be used to replace WWDs for compliance purposes. The estimated benefits from EWDs are expected to range from \$4 million to \$258 million in NPV terms over the evaluation period. The large range reflects uncertainty regarding future uptake of EWDs and whether road agencies would have introduced EWDs even if heavy vehicle reform did not occur.

The NHVR has also undertaken several other activities that are expected to reduce the compliance burden of operators (estimated to range from \$24 million to 54 million). Examples include having a dedicated website and call centre, and the introduction of user-friendly web portals.

Improving **safety outcomes** has been a key focus of the NHVR since inception. The NHVR has undertaken key initiatives that are expected to have improved road safety outcomes, including:

- improving the monitoring and sharing of information across borders, eg, the rollout of the National Safety Camera Network and the National Compliance Information System;
- developing and collecting a nationally consistent dataset to inform decision making, eg, undertaking the first National Roadworthiness Baseline Survey; and
- encouraging operators to adopt good practice safety systems to facilitate compliance with the law through targeted guidance and education, eg launching the 'Tell a mate' Social Media Safety Campaign, releasing material on safety management systems and opening the Heavy Vehicle Confidential Reporting Line.

It is difficult to estimate the exact number of crashes that have been avoided because of heavy vehicle reform. That said, there is strong evidence to suggest that reform has reduced heavy vehicle related crashes resulting in fatalities or serious injuries. The increased uptake of productivity initiatives has reduced the number of heavy vehicles on the road, and so the chance that a crash occurs.

There is also evidence to suggest that the NHVR has reduced the risk of a fatality and injury crash occurring on a per kilometre basis – that is, the risk of a fatality or injury crash occurring for a given trip has decreased. The fatality rate per kilometre for heavy vehicles has declined at a higher rate than light vehicles and the rates suggested by literature.

We have conservatively estimated the safety benefits achieved by heavy vehicle reform to range from \$0.3 billion to \$1.1 billion in NPV terms over the 22 year period.

Heavy vehicle reform has also delivered significant **regulatory cost savings**. To examine the estimated cost savings from heavy vehicle reform, we have:

- examined the costs of undertaking ongoing heavy vehicle regulatory activities prior to reform; and
- reviewed the costs that have been incurred to implement reform and undertake ongoing regulatory activities.

Overall, we estimate that heavy vehicle reform will deliver \$0.3 billion to \$0.7 billion in cost savings in NPV terms over the 22 year period.

Table 8-1: Estimated total benefits of heavy vehicle reform – \$m in NPV terms

Initiative	Low benefits scenario	High benefits scenario
Productivity benefits		
- Additional uptake of PBS	\$1,974	\$4,040
- Additional uptake of NHVAS mass management module	\$529	\$1,234
- New access decision making framework	\$1,974	\$4,040
Total productivity benefits	\$4,477	\$9,314
Safety benefits		
- reduced fatalities and serious injuries	\$341	\$1,128
Total safety benefits	\$341	\$1,128
Red tape reduction benefits		
- Compliance cost savings from having one set of rules	\$302	\$990
- Savings from Electronic work diaries (EWD)	\$4	\$258
- Savings from having dedicated call centre	\$0	\$1
- Savings from having dedicated website	\$7	\$14
- Reduced cost of participating in PBS	\$7	\$7
- Fleet management benefits from registration portal	\$2	\$14
- Reduced burden of obtaining access permits	\$9	\$18
Total red tape benefits	\$331	\$1,302
Regulatory cost savings		
- reduced cost of undertaking regulatory activities	\$260	\$680
Total regulatory cost savings	\$260	\$680
Total benefits	\$5,408	\$12,435

A1. Detailed assumptions underpinning the economic assessment

This appendix provides further details on the assumptions we have used to calculate the benefits and costs associated with heavy vehicle reform.

A1.1 Overall parameters and assumptions

To assess the economic costs and benefits associated with heavy vehicle reform, we assumed an evaluation period of 22 years. This is comprised of the two years taken to implement reform (2012 and 2013) and 20 years following the commencement of the HVNL. In addition, we have used a seven per cent discount rate, which is consistent with Infrastructure Australia guidelines. The analysis has been undertaken in 2019 dollars.

We have sourced vehicle kilometre travelled (VKT) data from the ABS's Survey of Motor Vehicle Use. This data provides VKT data vehicle type (eg, buses, articulated vehicles, rigid vehicles and light vehicles).

A1.2 Productivity related assumptions

A1.2.1 Overview of our approach

We have identified two key ways in which heavy vehicle reform has delivered productivity benefits, by:

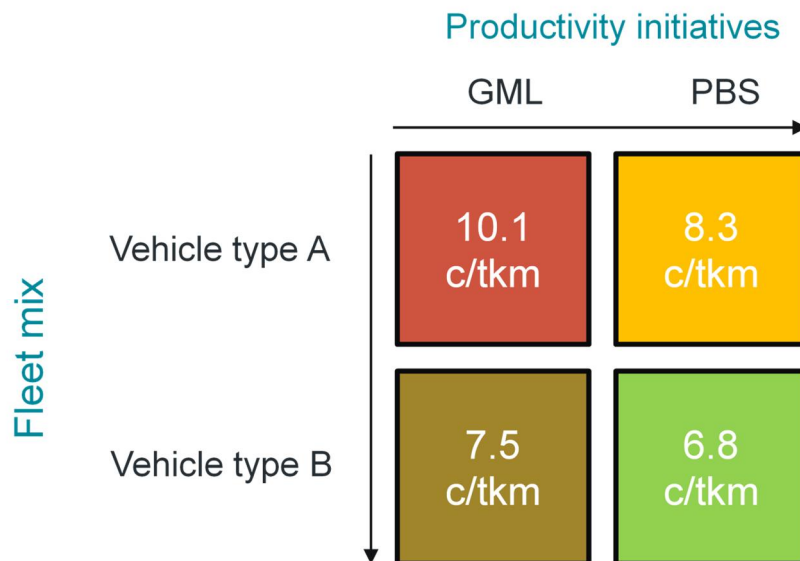
- increasing the use of more productive vehicles; and
- increasing the uptake of productivity initiatives.

Both of the above reduce the cost of undertaking a given freight task by allowing operators to carry more per trip, thereby saving on fixed costs, such as labour costs.

To estimate the potential productivity gains from using more productive vehicles and increased uptake of productivity initiatives, we have estimated the cost of completing the freight task on a per tonne kilometre (tkm) basis under general mass limits (GML) and a range of productivity schemes (eg, PBS scheme or CML) for different vehicle types. Breaking down costs by productivity scheme and vehicle type allows us to understand the cost savings that are achieved when an operator switches vehicle type, enrolls in a productivity scheme, or both.

Figure 12 provides an illustrative example of how we have calculated productivity benefits, eg, moving from vehicle type A to vehicle type B will mean lowering the cost of conducting the relevant freight task from 10.1 cents per tkm to 7.5 cents per tkm. If the vehicle also goes from operating under GML to operating under the PBS scheme, then costs would go down further, from 7.5 cents per tkm to 6.8 cents per tkm.

Figure A-1: Illustrative example of how we have calculated the cost savings from vehicle switching and use of productivity schemes



A1.2.2 Estimating the unit costs of completing a freight task

The costs that we have captured in our productivity benefits calculation include:

- vehicle operating costs (eg, fuel, maintenance and repair, capital costs, insurance costs etc);
- labour costs;
- road damage; and
- externalities.

We note that improved heavy vehicle productivity will also improve road safety outcomes since it reduces the kilometres travelled by heavy vehicles. We have accounted for these safety benefits separately in the safety benefits calculation.

To estimate to costs of completing the freight task, including:

- Australian Transport Assessment and Planning (ATAP) guidelines for labour, repair and maintenance, vehicle fuel costs, and externality costs;
- operating cost calculators available at Freight metric for insurance and other costs;⁴⁷
- mass limits for different vehicle types under different GML and productivity initiatives from the NHVR's website; and
- tare weights of different vehicle types from Australian Trucking Association's truck impact chart.⁴⁸

⁴⁷ For more information, please go to the following link <http://www.freightmetrics.com.au/>, accessed on 16 May 2019.

⁴⁸ Australian Trucking Association, *Truck Impact Chart*, March 2018.

ATAP guidelines suggest that fuel consumption depends on the speed of the vehicle, the roughness of the road and the gross vehicle mass.⁴⁹ For the purposes of estimating fuel costs, we have made the following assumptions:

- an average speed of 50 km/hr and an IRI of 3.5 for local roads; and
- an average speed of 80 km/hr and an IRI of 2.5 for arterial roads/highways.

We have also assumed that 90 per cent of distance travelled will be on arterial roads.

To estimate road damage costs, we calculated equivalent standard axles (ESA) per km of different vehicle types using the power of four rule. The power of four rule suggests that the damage a vehicle causes to road pavement is a function of its configuration (eg, number of axle groups and type of axle groups) and the load on each axle group.

The formula for calculating the ESA for an axle group is as follows:

$$ESA_i = \prod_j \left(\frac{Load_j}{Reference Load_j} \right)^4$$

Where j is the type of the axle grouping, load is the mass on that axle group.⁵⁰ We have assumed that unit cost of an ESA is \$0.02 per ESA-kilometre.⁵¹

A1.3 Safety related assumptions

A1.3.1 The cost of a fatal or injury crash

We have sourced the costs per fatal and injury crash from ATAP. We have used average crash costs across jurisdictions, urban and rural, and adjusted to 2019 dollar.⁵² We note that these crash costs include vehicle and other general costs (eg, vehicle towing, emergency services and administrative costs).

A1.3.2 Estimating the trend in fatal and injury crashes

We have sourced historical fatal crash rates from BITRE.⁵³ To forecast the trend in fatalities in future periods (\hat{y}), we have used the following equation:

$$\hat{y} = e^{t\hat{\beta}} + \hat{y}^T$$

where $\hat{\beta}$ is estimated using ordinary least squares and a log-linear regression equation:

$$\ln(y - y^T) = t\beta + \varepsilon.$$

with base fatality rate, \hat{y}^T , selected as five deaths per billion kilometres travelled for heavy rigid trucks and seven for heavy articulated trucks, reflecting BITRE's belief that the pace of safety improvement is slowing. Fitting the data to the model specified above yields the fatal rate forecast shown in Figure 5-1.⁵⁴

⁴⁹ Transport and Infrastructure Council, *Australian Transport Assessment and Planning Guidelines – PV2 Road Parameter Values*, August 2016, p 43.

⁵⁰ Further information on how to calculate ESA is available at the following report Austroads, *Reassessment of the Benefits and Impacts of the Use of High Productivity Vehicles on Australian Highway Pavements*, April 2017

⁵¹ *ibid*

⁵² ATAP guidelines, PV2 Road Parameter Values, 2016, p 30, https://atap.gov.au/parameter-values/road-transport/files/pv2_road_parameter_values.pdf

⁵³ BITRE, *Australian Road Deaths Database*, 2019, https://bitre.gov.au/statistics/safety/fatal_road_crash_database.aspx

⁵⁴ DoIRDC, *Modelling road safety in Australian states and territories*, 2018, https://bitre.gov.au/publications/2018/is_94.aspx

To obtain the trend in serious injuries resulting from heavy vehicle crash, we use BITRE data which suggests that on average there are approximately 21 injuries per fatality for a heavy rigid truck, and approximately nine injuries per fatality for a heavy articulated truck.⁵⁵

A1.3.3 How we have undertaken the difference in difference analysis

To test the validity of our safety trend analysis, we have undertaken a difference-in-differences analysis. By creating dummy variables x_1 and x_2 to indicate whether the observation occurs under the jurisdiction of the NHVR, and whether the observation occurs in a year in which the NHVR is active respectively, we can specify the standard difference-in-difference model as:

$$y = \beta_0 + \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + \beta_3 \cdot (x_1 \cdot x_2) + \varepsilon.$$

This yields a linear approximation for the effect of the heavy vehicle reform:

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 \cdot x_1 + \hat{\beta}_2 \cdot x_2 + \hat{\beta}_3 \cdot (x_1 \cdot x_2).$$

where:

$$X = [1 \ x_1 \ x_2 \ (x_1 \cdot x_2)],$$

and

$$\hat{\beta} = (X'X)^{-1}X'y,$$

A1.4 Red tape related assumptions

Red tape savings are largely related to time savings that accrue to operators. To quantify the economic benefits related to time savings, we have assumed that the yearly salary of:

- an admin staff is \$40,000;
- a driver is \$50,000; and
- compliance officer is \$70,000.

⁵⁵ BITRE, *Heavy truck safety: crash analysis and trends*, Information sheet 78, 2016, p 6



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