Impact Analysis Statement

Summary IAS

Lead department	Department of Transport and Main Roads
Name of the proposal	Amend the Heavy Vehicle (Mass, Dimension and Loading) National Regulation to enable heavy vehicles that comply with a new Australian Design Rule for managing noxious emission standards to operate at increased mass limits.
Submission type	Summary Impact Analysis Statement (Summary IAS) with attached National Regulatory Impact Statement
Title of related legislative or regulatory instrument	Heavy Vehicle (Mass, Dimension and Loading) National Amendment Regulation 2024
Date of issue	August 2024

The proposal has significant impacts - assessed through a *Benefit-Cost Analysis of a proposed 500kg mass limit increase for new heavy vehicles meeting Euro VI standards* (see **Attachment 1**) prepared by the Federal Department of Infrastructure, Transport, Regional Development, Communications and the Arts.

What is the nature, size and scope of the problem? What are the objectives of government action?

Background

The overall age of the heavy vehicle fleet has an impact on safety and emissions as newer heavy vehicles have more safety features and are mandated to meet increasingly stringent emissions standards. The objective of government action is to increase the uptake of safer, cleaner heavy vehicles in Queensland and across Australia, leading to a lower average age of the heavy vehicle fleet.

Australian Design Rules (ADRs) implement national standards for road vehicle emissions, safety, and anti-theft. All new road vehicles manufactured in Australia, and imported new or second-hand vehicles, must comply with relevant ADRs when they are first supplied to the Australian market. ADRs are made under the *Road Vehicle Standards Act 2018* (Cth). Noxious emissions emanating from heavy passenger and commercial vehicles are regulated through specific ADRs.

When considering introducing more stringent noxious emissions standards, the Australian Government has a policy of harmonising Australia's vehicle standards, wherever possible, with the international standards established by the United Nations (UN) World Forum for the Harmonization of Vehicle Regulations. Harmonisation with UN regulations facilitates international trade and minimises compliance costs, while ensuring a high level of safety and environmental performance.

The current UN regulation for heavy vehicle noxious emissions (UN Regulation 49) is based on the Euro VI requirements adopted in the European Union. Equivalent standards have also been adopted in the United States, Canada, Europe, Japan, China, Korea, and India. These countries, which account for over 80 per cent of global new vehicle sales, also require heavy vehicle manufacturers to meet increasingly stringent safety and fuel efficiency standards.

Euro standards are updated regularly and are currently set at Euro V in Australia. The Australian Government has agreed to adopt Euro VI standards as the baseline.

New Australian Design Rule

On 13 October 2022, the Federal Minister for Infrastructure, Transport, Regional Development and Local Government, announced new Vehicle Standard (Australian Design Rule 80/04 – Emission Control for Heavy Vehicles) 2023 (ADR 80/04).

These new standards are mandatory for newly-approved heavy vehicle models supplied from 1 November 2024 and all heavy vehicles supplied to Australia from 1 November 2025. ADR 80/04 implements Euro VI, or equivalent, noxious emission standards for heavy vehicles.

However, the emission systems required to meet ADR 80/04 and the advanced safety systems packaged with these vehicles are expected to increase the unladen mass of a new heavy vehicle by up to 500kg. If existing mass limits remain unchanged, this will inhibit the uptake of newer, safer and cleaner heavy vehicles, as operators may not be able to legally carry the same amount of freight as older heavy vehicles. Vehicles that are not required to meet Euro VI standards could be up to 500kg lighter. It may also force manufacturers to change models supplied to the Australian market, which could reduce vehicle operability and/or safety.

An increasing number of heavy vehicle models sold or manufactured in Australia comply with United States or Japanese noxious emission standards that are equivalent to the Euro standard. Australian heavy vehicle manufacturers supported the mandating of Euro VI if additional reforms to mass were also implemented to offset the additional weight and space required by the additional emissions technology.

Currently, registered heavy vehicles operating under Euro V standards will not be affected by the new ADR and will not require retrofitting to remain on the road.

To ensure no productivity loss for ADR 80/04 compliant vehicles, on 3 May 2024 the Infrastructure and Transport Ministers' Meeting (ITMM), including the Queensland Minister for Transport and Main Roads and Minister for Digital Services, unanimously endorsed amendments to the Heavy Vehicle (Mass, Dimension and Loading) National Regulation, to provide a 500kg mass increase for eligible heavy vehicles (except buses and road trains) that comply with ADR 80/04.

The Bus Industry Confederation advised that buses do not require additional mass increases for ADR 80/04, as the majority of new buses already meet these emission standards and existing mass limits are sufficient.

Road trains fitted with wider tyres (375 mm or more) already have a 7.1 tonne steer axle mass limit and so a 500kg increase would result in a mass limit of 7.6 tonnes. *Heavy Vehicle National Law Act 2012* (the HVNL) participating jurisdictions that make use of road trains (predominantly Queensland and South Australia) did not support mass limit increases for ADR 80/04 compliant road trains until further work on the impacts of increased mass limits on roads and structures is complete. Accordingly, road trains were excluded from the new regulation.

The purpose of the legislative amendment is to ensure that the HVNL and supporting regulations align with ADR requirements for heavy vehicles. To ensure consistency of heavy vehicle mass dimensions in HVNL participating jurisdictions, amendments to the Heavy Vehicle (Mass, Dimension and Loading) National Regulation will commence on 1 November 2024 to coincide with the commencement of ADR 80/04.

As host jurisdiction, Queensland must first pass amendments to the HVNL or its supporting regulations before they can be applied nationally by other participating jurisdictions.

Aligning the HVNL with ADRs contributes to the application of nationally consistent heavy vehicle regulation. This means reduced red tape and regulatory burden for the heavy vehicle industry. It also reduces the cost of compliance with regulatory requirements for the heavy vehicle industry by applying nationally consistent regulations.

What options were considered?

Three options were analysed against the business-as-usual case (base case).

The base case emission projections were estimated using assumptions on current trends in major economic and demographic indicators, and likely future movements in freight sector performance and vehicle technology.

These assumptions included:

- Average fleet travel behaviour remaining roughly the same as now (with no major changes to freight modal shares, and growth in aggregate freight demand linked to Gross Domestic Product growth).
- Vehicle fleet fuel choice is also assumed to remain stable over the medium term. That is, for diesel to continue as the dominant fuel type for Australian heavy vehicles (allowance is made in the calculations for growing biodiesel consumption and the niche use of alternatives such as natural gas and electricity).
- There will be no change to current vehicle or fuel standards, beyond those adopted in ADR 80/04.

Option 1 is the base case, but with a 500kg mass increase allowed for ADR 80/04 compliant heavy vehicles, fitted with advanced emissions and safety features from 1 November 2024 (running standard tyres with a section width of 295mm).

Option 2 is the same as Option 1, except that the mass increase is also subject to the fitment of wider tyres with section widths of at least 315mm.

Option 3 is the same as Option 1, except that the mass increase is also subject to the fitment of wider tyres with section widths of at least 385mm.

What are the impacts?

Preliminary estimates by the Federal Department of Infrastructure, Transport, Regional Development, Communications and the Arts, suggest that the proposed 500kg mass limit increase for Euro VI heavy vehicles with advanced safety features, and the fitment of 315mm wide tyres (the recommended option), could increase national road wear and maintenance costs by $174 million over the period to 2050.

At a national level, costs are more than offset by enhanced productivity ($888 million) and reduced health costs ($7.4 billion, the benefits of which accrue to jurisdictions). Further, the long-term uptake of Euro VI standards will result in substantial social and economic benefits including reduced health costs, reduced fuel costs ($1.5 billion), and reduced greenhouse gas emissions (equivalent to $310 million) over the same period.

With Queensland responsible for approximately 23.5 per cent of total national tonne-kilometres travelled per year[1], Queensland's portion of enhanced productivity and reduced health costs through to 2050 are approximately $208.6 million and $1.73 billion, respectively. For fuel costs and reduced greenhouse gas emissions, the benefits to Queensland are approximately $352.5 million and $72.8 million, respectively.

The technology required to meet Euro VI will increase the cost of supplying a new heavy vehicle to Australia by three to five per cent, or $4,000-$6,000 per vehicle. Impacts on purchase prices will depend on exchange rates, supply chains, and other changes made as part of a model update. However, these costs are likely to be offset over the life of the vehicle as the adoption of Euro VI will also enable manufacturers to supply more fuel-efficient engines available in other markets with equivalent standards.

It is anticipated that there will be some increase in operating costs from mandating wider tyres as a condition for the proposed mass increase, but the preferred option would minimise costs. Annual tyre costs for new articulated heavy vehicles travelling 177,000km per year would increase by $84 for 315mm wide tyres, as opposed to $979 for 385mm wide tyres.

The Department of Transport and Main Roads considers that the costs and benefits detailed within the benefit-cost analysis are transferrable to Queensland, as ADRs apply consistently across all Australian jurisdictions. As a result, Queensland will not be disproportionately impacted by the changes and will also not accrue benefits over and above other jurisdictions.

Who was consulted?

A consultation process concerning a mass increase of 500kg for ADR 80/04 compliant vehicles was undertaken by the National Transport Commission in conjunction with the Federal Department of Infrastructure, Transport, Regional Development, Communications and the Arts to identify any potential barriers or impediments.

[1] https://www.abs.gov.au/statistics/industry/tourism-and-transport/survey-motor-vehicle-use-australia/12-months-ended-30-june-2020

Consultation was undertaken with jurisdictions, industry, the National Heavy Vehicle Regulator (NHVR), and the Australian Local Government Association through the HVNL Mass and Dimension Advisory Group, the HVNL Review Reform Advisory Committee (Reform Advisory Committee), and ITMM.

Industry membership of those groups included the Australian Trucking Association (ATA), Australian Livestock and Rural Transporters Association (ALRTA), Truck Industry Council (TIC), Bus Industry Confederation, and the Heavy Vehicle Industry Association.

ITMM conducted a rigorous discussion and approval process of the relevant regulation amendments, having regard to supporting documentation, financial and resource implications, and regulatory risks and sensitivities.

The Department of Transport and Main Roads was actively involved during consideration of the mass increase through membership of the HVNL Mass and Dimension Advisory Group, Reform Advisory Committee, and ITMM.

Industry associations that attend ITMM on behalf of their member associations include the ATA, TIC, and ALRTA. As members of these national associations, the Queensland Trucking Association and the Livestock and Rural Transporters Association of Queensland participate in the consultation process.

There was widespread support from all jurisdictions, the NHVR, and industry for increasing the mass of heavy freight vehicles by 500kg for ADR 80/04 compliant heavy vehicles.

What is the recommended option and why?

Option 2 is the recommended option.

Benefit-cost analysis (BCA) results for Option 2 show overall benefits are higher than costs, resulting in a net benefit of $813.5 million. The benefit-cost ratio (BCR) is estimated to be 11.95.

In comparison, BCA results for Option 1 show overall benefits are higher than costs, resulting in a net benefit of $691.8 million, with a BCR estimated to be 4.46.

For Option 3, overall costs are higher than benefits, resulting in a net cost of $143.6 million. The BCR is estimated to be 0.86.

Government compliance costs are expected to be absorbed within existing departmental budgets.

Impact assessment

All proposals –

	First full year	First 10 years**
Direct costs – *Compliance costs**	**$0**	**$0**
Direct costs – *Government costs*	**$1.45m**	**$16.06m**

Signed/Approved

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19 / 8 /2024

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24 / 8 /2024

Benefit–Cost Analysis of a proposed 500kg mass limit increase for new trucks meeting Euro VI Standards

Introduction

This study assessed the benefits and costs of a 500kg mass limit increase for Euro VI trucks fitted with advanced safety features. Three options were analysed reflecting variations on the tyres required to access the mass increase. Option 1 (S1) allows standard 295 tyres to access the mass increase. Option 2 (S2) requires wider 315 tyres to access the mass increase. Option 3 (S3) requires even wider 385 tyres to access the mass increase. Table 2 presents a more detailed description of the three options.

Table 1 Regulatory options

Scenario	Vehicle Group	Description of Scenario
S1	All ADR 80/04 compliant trucks over 15t.	500kg mass increase permitted with 295 tyres
S2	All ADR 80/04 compliant trucks over 15t.	500kg mass increase permitted with 315 tyres
S3	All ADR 80/04 compliant trucks over 15t.	500kg mass increase permitted with 385 tyres

The main quantifiable benefit identified was the productivity cost avoided due to the additional weight of the emission systems required to meet stricter noxious emission standards. The identified costs mainly relate to additional road wear from trucks operating at higher masses and increased operating costs, if wider tyres are required.

For the purpose of the benefit–cost analysis, the base and price year has been set to 2023 with the evaluation period extending to 2050, which allows for a 25-year analysis period. Following the recommendations in the *Australian Government Guide to Regulatory Impact Analysis*, the discount rate used to estimate the net present value is 7%, with sensitivity tests at 3 and 11%. The key indicators for economic viability are Net Present Value (NPV) and Benefit–Cost Ratio (BCR).

BAU case

The 'base case' or reference scenario emission projections used herein are estimated using primarily business-as-usual assumptions for the coming years. It is based on current trends in major economic and demographic indicators (with continuing growth in national population and average income levels, and only gradually increasing fuel prices) and likely future movements in freight sector performance and vehicle technology.

The following assumptions are made for the base case scenario.

- Average fleet travel behaviour remains roughly the same as now (with no major changes to freight modal shares, and growth in aggregate freight demand linked to GDP growth).
- Vehicle fleet fuel choice is also assumed to remain basically stable over the medium term – i.e. for diesel to continue as the dominant fuel type for Australian heavy vehicles (though allowance is made in the calculations for growing biodiesel consumption and the niche use of alternatives such as natural gas and electricity).
- There will be no change to current vehicle or fuel standards, beyond those adopted in ADR 80/04.

Scenarios

Three options are analysed against the business-as-usual (BAU) case. These three options differ mainly in the timing of introduction.

Scenario 1 (S1)

Scenario 1 is the same as the BAU case, but with a 500kg mass increase allowed for ADR 80/04 compliant trucks fitted with advanced safety features from 2024.

Scenario 2 (S2)

Scenario 2 is the same as for Scenario 1, except that the mass increase is also subject to the fitment of wider 315 tyres.

Scenario 3 (S3)

Scenario 3 is the same as for Scenario 1, except that the mass increase is also subject to the fitment of 385 tyres.

Productivity impacts from Euro VI (with no change in mass limits)

The available emission control technologies for diesel engines include, among other things,

- Exhaust Gas Recirculation (EGR);
- Diesel Particulate Filters (DPF) / Diesel Oxidation Catalyst (DOC);
- Selective Catalytic Reduction (SCR) using a Diesel Exhaust Fluid (DEF, a urea solution, also known as AdBlue); and
- On-board diagnostic (OBD) equipment.

For the current ADR 80/03 standards, most trucks use either EGR and DPF or SCR technology. To meet the more stringent ADR 80/04 standards, continuous efforts will be made in improving and integrating existing known emission control and diagnostic technologies. It has become apparent that most manufacturers will have to use integrated EGR and SCR systems with DPFs to achieve extremely low levels of emissions set out in the proposed ADR80/04 standards (Commercial Vehicle Engineer 2012). These improvements are likely to incur additional costs as well as adding mass to the vehicle.

The new emission control technologies required to meet ADR 80/04 will require additional emission systems to be fitted to heavy vehicles that add weight and/or take up space. For example, SCR requires a tank to be fitted to the truck to carry urea that is used in the reduction process, which will in turn add to the weight on the steer axle. More efficient and larger cooling systems may also be required for EGR (TIC 2013). It is considered that, on average, an extra 300kg will be added to the weight of a typical heavy vehicle as a result of the introduction of the new ADR (Table 3).

Table 2 Net increase in heavy vehicle weight (kg)

	Min	Max	Average
NC^2 Global Australia (2013)	250	300	275
TIC (2013)	250	450	350
BIC (2012)	300	350	325
Average	**267**	**367**	**317**
Modelled Scenarios	**250**	**350**	**300**

Source: NC^2 Global Australia (2013), TIC (2013) and BIC (2012).

The general industry view is that the Euro VI technology and equipment will lead to a loss in productivity in the form of reduced payload for trucks. Since the Euro IV mass concession was adopted in 2007, a number of additional technologies affect have also been incorporated into trucks. These included:

Table 3 Net increase in heavy vehicle weight of additional technologies included in Euro VI trucks (kg)

Technology	*Min impact (kg)*	*Max impact (kg)*	*Average impact (kg)*
Euro V emission systems, (mandated for all new trucks since 2011)	40	60	50
SRS airbag systems	20	30	25
Antilock Braking Systems (ABS) (mandated for all new trucks since 2014)	25	35	30
Stage 3 Cab Strength (mandated in Europe)	60	80	70
Electronic Stability Control (mandated for all new trucks from 2025)	5	10	7.5
Advanced Emergency Braking Systems (mandated for all new trucks from 2025)	5	10	7.5

Reverse technology systems (proposed to be mandated for all new trucks from 2027)	15	25	20
Total mass impact of technologies	165	245	210

TIC Estimates (2023)

For the purposes of this analysis productivity losses were estimated from the expected reduction in legal payload for trucks, in the event the current mass limit is unchanged. This was based on the estimated revenue loss associated with the reduction in payload.

To estimate the lost revenue per truck per year the following assumptions were made:

- Loss of payload will occur only when the vehicle is fully laden. According to ARTSA (2012), 5-10% of heavy vehicles intercepted were found to be overweight, so it is assumed that about 10% of heavy vehicles are fully loaded. Sensitivity testing of based on 20% of heavy vehicles operating at full legal mass was also conducted.
- Lost revenues were calculated on the basis of the trucking costs, rather than the cartage rate paid by the end user, as the latter includes freight forwarding or logistic costs as well. Based on BITRE's unpublished research at the time of the Euro VI RIS, the freight rate was estimated to be 13 cents per tonne-kilometre.
- On average, it was estimated each new Euro VI compliant truck would lose an average payload of 500kg (relative to a Euro IV/V truck).
- A typical new articulated truck or B-double is assumed to have a useful lifespan of 5 years travelling 200,000km per year. After five years, the truck is likely to do a much less demanding job in terms of both weight and distance, so impacts of higher vehicle mass on payload after the first 5 years are reduced. Table 1 specifies the vehicle usage factors based on vehicle age).

Table 4 – Assumed vehicle use factors by vehicle age

Vehicle Age	Vehicle use factor
0	1
1	1
2	1
3	1
4	1
5	0.60
6	0.54
7	0.46
8	0.39
9	0.31
10	0.25
11	0.20

12	0.16
13	0.13
14	0.10
15	0.08
16	0.07
17	0.05
18	0.04
19	0.03
20	0.03

DITRDCA Estimates (2023)

Based on the above assumptions, the estimated loss in revenue per truck per year from the anticipated 500kg increase attributable to Euro VI and additional safety features adopted since 2007 was calculated as follows:

Revenue loss ($/truck/year) = 10% * $0.13 * 200,000 km * 0.5 tonne = $1,300

To estimate the total loss of revenue for new vehicles in each year, it was assumed that the loss of payload would only affect vehicles with a GVM over 15 tonnes. These vehicles were estimated to account for around 40% of total new truck sales.[1]

Total lost revenues ($/year) =
New truck sales *0.4 *(10%*$0.13*200,000 km*0.5 tonne)*(vehicle use factor)

Note the estimated productivity loss for trucks are highly dependent on whether the assumed weight increase is eventuated. Lower levels of weight increase are likely in future as a result of technological advances. This will offset to some extent the under-estimation caused by omitting costs for other years. In this modelling, this impact was assumed to decrease by 3%per annum.

Productivity impacts avoided (if a 500kg change in mass limits is implemented)

To offset the estimated productivity impacts, a 500kg mass increase for Euro VI trucks fitted with advanced safety features has been proposed.

As the impacts of these technologies will vary from vehicle to vehicle, it was estimated that 1% of vehicles would still be forced to reduce payloads by 200kg, even if the 500kg mass increase was adopted.

For the wider tyre scenarios (Options 2 and 3), the estimated weight impacts were increased by 20kg (for 315 tyres and rims) and 70 kg (for 385 tyres and rims), based data supplied by the Truck Industry Council (2022).

[1] For the first year (2024) and second year (2025), this was reduced by 50% and 25% respectively due to a lower requirement for compliance.

Based on the above assumptions, the estimated avoided loss in revenue per truck per year from the anticipated 500kg increase attributable to Euro VI was calculated as follows:

S1 - Avoided Revenue loss ($/year) (295 tyres) =

Baseline lost revenues ($/year) =
Truck sales *0.4*(10%*$0.13*200,000 km*0.5 tonne)*(vehicle use factor)

minus

Updated lost revenues =
New truck sales *0.4*(1%*$0.13*200,000 km*0.2 tonne)*(vehicle use factor)

S2 - Avoided Revenue loss ($/year) (315 tyres) =

Baseline lost revenues ($/year) =
Truck sales *0.4*(10%*$0.13*200,000 km*0.5 tonne)*(vehicle use factor)

minus

Updated lost revenues =
Truck sales *0.4*(1%*$0.13*200,000 km*0.22 tonne)*(vehicle use factor)

S3 - Avoided Revenue loss ($/year) (385 tyres) =

Baseline lost revenues ($/year) =
Truck sales *0.4*(10%*$0.13*200,000 km*0.3 tonne)*(vehicle use factor)

minus

Updated lost revenues =
Truck sales *0.4*(1%*$0.13*200,000 km*0.27 tonne)*(vehicle use factor)

Table 5 shows the estimated revenue losses avoided under the three options:

Table 5 – Estimated avoided productivity impacts (7% DR)

Year	S1	S2	S3
2024	7.6	7.6	7.5
2025	17.5	17.4	17.3
2026	29.1	29.0	28.6
2027	38.8	38.6	38.2
2028	46.8	46.6	46.1
2029	51.2	51.0	50.4
2030	53.3	53.1	52.5
2031	53.4	53.2	52.6
2032	52.6	52.3	51.8
2033	50.9	50.7	50.2
2034	48.7	48.5	48.0
2035	46.1	45.9	45.4
2036	43.3	43.1	42.7
2037	40.4	40.3	39.8
2038	37.6	37.4	37.0
2039	34.8	34.6	34.3
2040	32.1	32.0	31.6
2041	29.6	29.5	29.2
2042	27.2	27.1	26.8
2043	25.0	24.9	24.7
2044	23.0	22.9	22.7
2045	21.1	21.0	20.8
2046	19.3	19.2	19.0
2047	17.7	17.6	17.4
2048	16.2	16.1	15.9
2049	14.8	14.7	14.6
2050	13.5	13.5	13.3
Total	**891.5**	**887.7**	**878.5**

DITRDCA Estimates (2023)

Road damage costs

Baseline scenario (no mass increase)

In the Regulation Impact Statement 'Heavy Vehicle Emission Standards for Cleaner Air' additional road wear impacts were anticipated even if the current mass limits remained unchanged, as vehicles that were not mass constrained would be heavier than they otherwise would be if Euro VI was not mandated.

ARRB research for the NTC in 2006 found a 500kg increase in the front axle mass would between $791 and $4,432 per truck per year. Based on the proportion of sales by vehicle type this was estimated be $2,100 per truck per year for a 500kg mass increase.

Table 6 Road damage costs ($/truck/year)

	Standard tyres (295/80R22.5)		
	3-axle rigid truck, average fully laden travelling average 29,000km per year (50% of new vehicles)	6-axle artic travelling average 94,000km per year (30% of new vehicles)	B-double travelling average 177,000km per year (20% of new vehicles)
Additional road damage 500kg mass increase	**791**	**2,354**	**4,432**

Source: NTC (2006).

For the baseline scenario (Euro VI with no mass increase) the estimated road wear impacts of a 500kg increase in mass for the 90% of trucks that were not mass constrained was calculated as follows:

Baseline road wear = Truck sales *0.4*(90%*$2,100)

For a 500kg mass increase, the additional road wear impacts from the 10% of trucks that are mass constrained was calculated as follows:

Annual Additional road wear S1 (295 tyres) =
(Truck sales *0.4*(10%*$2,100)*(vehicle use factor)

If wider (315) were required to operate at the higher mass limit, this was expected to reduce additional road wear impacts by 13% (TIC 2022). If 385 tyres were required, this was estimated to reduce road wear impacts by 19%.

Additional road wear S2 (315 tyres) =
((New truck sales *0.4*(10%*$2,100*0.87)*(Vehicle use factor)

Additional road wear S3 (385 tyres) =
(New truck sales *0.4*(10%*$2,100*0.81)*(Vehicle use factor)

Table 7 provides a summary of the road wear costs for each of the three options considered.

Table 7 – Estimated road wear impacts (7% DR, 2023 dollars)

Year	S1 ($m)	S2 ($m)	S3 ($m)
2024	1.32	1.14	1.07
2025	3.09	2.69	2.51
2026	5.23	4.55	4.24
2027	7.09	6.17	5.75
2028	8.70	7.57	7.05
2029	9.70	8.44	7.86
2030	10.31	8.97	8.35
2031	10.54	9.17	8.54
2032	10.60	9.22	8.58
2033	10.49	9.13	8.50
2034	10.27	8.93	8.32
2035	9.95	8.66	8.06
2036	9.58	8.34	7.76
2037	9.17	7.98	7.43
2038	8.75	7.61	7.09
2039	8.32	7.23	6.74
2040	7.89	6.86	6.39
2041	7.48	6.50	6.05
2042	7.08	6.16	5.73
2043	6.69	5.82	5.42
2044	6.33	5.51	5.13
2045	5.98	5.20	4.84
2046	5.64	4.91	4.57
2047	5.32	4.63	4.31
2048	5.02	4.36	4.06
2049	4.74	4.12	3.84
2050	4.43	3.89	3.62
Total	199.7	173.8	161.8

DITRDCA Estimates (2023) -

Additional tyre costs

It is anticipated that there will be some increase in operating costs if wider tyres are mandated as a condition for the proposed mass increase.

Data from the Truck Industry Council estimates the fitment of wider tyres would increase the upfront cost of a new vehicle by $400 for 315 rims and $741 for 385 rims.

Annual tyre costs for new rigid trucks travelling 70,000km per year would increase by $63 for 315 tyres and $1270 for 385 tyres.

Annual tyre costs for new articulated trucks travelling 177,000 km per year would increase by $84 for 315 tyres and $979 for 385 tyres.

Assuming only the 10 per cent of vehicles that are mass constrained will utilise this mass concession, the estimated impacts of tyre costs for new vehicles were calculated as follows

First year Additional tyre costs (315 tyres) = New Rigid Truck Sales over 15t*0.18($63+741) + New Articulated Trucks Sales*0.1*($84+741)

Subsequent year additional tyre costs (315 tyres) = (((New Rigid Truck Sales over 15t*0.1($63) + New Articulated Trucks Sales*($84))*(vehicle use factor)

Additional tyre costs (385 tyres) = New Rigid Truck Sales over 15t*0.1*($1280+741) + New Articulated Trucks Sales*0.1*($979+741)

Subsequent year additional tyre costs (315 tyres) = (((New Rigid Truck Sales over 15t*($63)*0.1 + New Articulated Trucks Sales*0.1*($84))(vehicle use factor))

Table 8 provides a summary of the tyre costs for each of the three options considered.

Table 8 – Estimated tyre cost impacts (7% DR)

Year	S1	S2	S3
2024	0.0	0.3	1.2
2025	0.0	0.5	2.3
2026	0.0	0.6	3.7
2027	0.0	0.7	4.6
2028	0.0	0.7	5.4
2029	0.0	0.7	5.9
2030	0.0	0.7	6.2
2031	0.0	0.7	6.3
2032	0.0	0.7	6.3
2033	0.0	0.7	6.2
2034	0.0	0.6	6.1
2035	0.0	0.6	5.9
2036	0.0	0.6	5.6
2037	0.0	0.5	5.4
2038	0.0	0.5	5.1
2039	0.0	0.5	4.9
2040	0.0	0.5	4.6
2041	0.0	0.4	4.4
2042	0.0	0.4	4.1
2043	0.0	0.4	3.9
2044	0.0	0.4	3.7
2045	0.0	0.3	3.5
2046	0.0	0.3	3.3
2047	0.0	0.3	3.1
2048	0.0	0.3	2.9
2049	0.0	0.3	2.8

2050	0.0	0.3	2.6
Total	0.0	13.4	120.2

DITRDCA Estimates (2023)

Net economic benefits and BCR

Table 9a reports the BCA results for S1. Overall benefits are higher than costs resulting in a net benefit of $691.8m. The BCR is estimated to be 4.46.

Table 9b reports the BCA results for S2. Overall benefits are higher than costs resulting in a net benefit of $813.5m. The BCR is estimated to be 11.95

Table 9c reports the BCA results for S3. Overall costs are higher than benefits, resulting in a net cost of $143.6m. The BCR is estimated to be 0.86.

Table 9a Summary of costs and benefits (S1)

	Undiscounted cash flow						Discounted cash flow @ 7%				
	Costs ($m)						Costs ($m)				
Financial year	Additional Road Wear	Tyres	Total	Benefits ($m) (Producitvity costs avoided)	Net benefit ($m)	Discounting factor @ 7%	Road Wear	Tyres	Total	Benefits ($m) (Prod costs avoided)	Net benefit/cost ($m)
2023	0.0	0.0	0.0	0.0	0.0	1	0.00	0	0.00	0.0	0.0
2024	1.4	0.0	1.4	-8.1	-6.7	0.9346	1.32	0.0	1.32	-7.6	-6.3
2025	3.5	0.0	3.5	-20.0	-16.5	0.8734	3.09	0.0	3.09	-17.5	-14.4
2026	6.4	0.0	6.4	-35.6	-29.2	0.8163	5.23	0.0	5.23	-29.1	-23.8
2027	9.3	0.0	9.3	-50.8	-41.5	0.7629	7.09	0.0	7.09	-38.8	-31.7
2028	12.2	0.0	12.2	-65.6	-53.4	0.7130	8.70	0.0	8.70	-46.8	-38.1
2029	14.6	0.0	14.6	-76.8	-62.2	0.6663	9.70	0.0	9.70	-51.2	-41.5
2030	16.6	0.0	16.6	-85.6	-69.1	0.6227	10.31	0.0	10.31	-53.3	-43.0
2031	18.1	0.0	18.1	-91.8	-73.7	0.5820	10.54	0.0	10.54	-53.4	-42.9
2032	19.5	0.0	19.5	-96.6	-77.2	0.5439	10.60	0.0	10.60	-52.6	-42.0
2033	20.6	0.0	20.6	-100.2	-79.5	0.5083	10.49	0.0	10.49	-50.9	-40.4
2034	21.6	0.0	21.6	-102.5	-80.9	0.4751	10.27	0.0	10.27	-48.7	-38.4
2035	22.4	0.0	22.4	-103.8	-81.4	0.4440	9.95	0.0	9.95	-46.1	-36.1
2036	23.1	0.0	23.1	-104.3	-81.3	0.4150	9.58	0.0	9.58	-43.3	-33.7
2037	23.7	0.0	23.7	-104.2	-80.6	0.3878	9.17	0.0	9.17	-40.4	-31.2
2038	24.1	0.0	24.1	-103.6	-79.5	0.3624	8.75	0.0	8.75	-37.6	-28.8
2039	24.5	0.0	24.5	-102.6	-78.1	0.3387	8.32	0.0	8.32	-34.8	-26.5
2040	24.9	0.0	24.9	-101.4	-76.5	0.3166	7.89	0.0	7.89	-32.1	-24.2
2041	25.3	0.0	25.3	-100.0	-74.8	0.2959	7.48	0.0	7.48	-29.6	-22.1
2042	25.6	0.0	25.6	-98.5	-72.9	0.2765	7.08	0.0	7.08	-27.2	-20.2
2043	25.9	0.0	25.9	-96.9	-71.0	0.2584	6.69	0.0	6.69	-25.0	-18.4
2044	26.2	0.0	26.2	-95.3	-69.1	0.2415	6.33	0.0	6.33	-23.0	-16.7
2045	26.5	0.0	26.5	-93.4	-66.9	0.2257	5.98	0.0	5.98	-21.1	-15.1
2046	26.7	0.0	26.7	-91.5	-64.8	0.2109	5.64	0.0	5.64	-19.3	-13.7
2047	27.0	0.0	27.0	-89.6	-62.6	0.1971	5.32	0.0	5.32	-17.7	-12.3
2048	27.2	0.0	27.2	-87.7	-60.4	0.1842	5.02	0.0	5.02	-16.2	-11.1
2049	27.5	0.0	27.5	-85.9	-58.4	0.1722	4.74	0.0	4.74	-14.8	-10.1
2050	27.5	0.0	27.5	-84.1	-56.6	0.1609	4.43	0.0	4.43	-13.5	-9.1
Total	**552.0**	**0.0**	**552.0**	**-2,276.6**	**-1,724.7**	**13.0**	**199.7**	**0.0**	**199.69**	**-891.5**	**-691.8**

Benefit-Cost Ratio = 4.46

DITRDCA estimates (2023). Note negative values imply reduction in cost (i.e. benefit).

Table 9b - Summary of costs and benefits (S2)

Financial year	Undiscounted cash flow					Discounting factor @ 7%	Discounted cash flow @ 7%				
	Costs ($m)			Benefits ($m) (Producitvity costs avoided)	Net benefit ($m)		Costs ($m)			Benefits ($m) (Prod costs avoided)	Net benefit/cost ($m)
	Additional Road Wear	Tyres	Total				Road Wear	Tyres	Total		
2023	0.0	0.0	0.0	0.0	0.0	1	0.00	0.0	0.00	0.0	0.0
2024	1.2	0.3	1.5	-8.1	-6.5	0.9346	1.14	0.3	1.44	-7.6	-6.1
2025	3.1	0.5	3.6	-20.0	-16.3	0.8734	2.69	0.5	3.15	-17.4	-14.3
2026	5.6	0.8	6.3	-35.5	-29.1	0.8163	4.55	0.6	5.18	-29.0	-23.8
2027	8.1	0.9	9.0	-50.6	-41.6	0.7629	6.17	0.7	6.84	-38.6	-31.8
2028	10.6	1.0	11.6	-65.3	-53.7	0.7130	7.57	0.7	8.26	-46.6	-38.3
2029	12.7	1.1	13.7	-76.5	-62.8	0.6663	8.44	0.7	9.14	-51.0	-41.8
2030	14.4	1.1	15.5	-85.3	-69.7	0.6227	8.97	0.7	9.67	-53.1	-43.4
2031	15.8	1.2	16.9	-91.4	-74.4	0.5820	9.17	0.7	9.86	-53.2	-43.3
2032	16.9	1.2	18.2	-96.2	-78.0	0.5439	9.22	0.7	9.89	-52.3	-42.4
2033	18.0	1.3	19.2	-99.7	-80.5	0.5083	9.13	0.7	9.78	-50.7	-40.9
2034	18.8	1.3	20.1	-102.1	-82.0	0.4751	8.93	0.6	9.56	-48.5	-38.9
2035	19.5	1.4	20.9	-103.4	-82.5	0.4440	8.66	0.6	9.26	-45.9	-36.6
2036	20.1	1.4	21.5	-103.9	-82.4	0.4150	8.34	0.6	8.91	-43.1	-34.2
2037	20.6	1.4	22.0	-103.8	-81.8	0.3878	7.98	0.5	8.52	-40.3	-31.7
2038	21.0	1.4	22.4	-103.2	-80.8	0.3624	7.61	0.5	8.13	-37.4	-29.3
2039	21.4	1.4	22.8	-102.2	-79.4	0.3387	7.23	0.5	7.72	-34.6	-26.9
2040	21.7	1.5	23.1	-101.0	-77.9	0.3166	6.86	0.5	7.33	-32.0	-24.6
2041	22.0	1.5	23.5	-99.6	-76.1	0.2959	6.50	0.4	6.94	-29.5	-22.5
2042	22.3	1.5	23.8	-98.1	-74.3	0.2765	6.16	0.4	6.57	-27.1	-20.6
2043	22.5	1.5	24.0	-96.5	-72.5	0.2584	5.82	0.4	6.21	-24.9	-18.7
2044	22.8	1.5	24.3	-94.9	-70.5	0.2415	5.51	0.4	5.88	-22.9	-17.0
2045	23.0	1.5	24.6	-93.0	-68.5	0.2257	5.20	0.3	5.55	-21.0	-15.5
2046	23.3	1.6	24.8	-91.1	-66.3	0.2109	4.91	0.3	5.23	-19.2	-14.0
2047	23.5	1.6	25.0	-89.2	-64.1	0.1971	4.63	0.3	4.94	-17.6	-12.6
2048	23.7	1.6	25.3	-87.3	-62.0	0.1842	4.36	0.3	4.66	-16.1	-11.4
2049	23.9	1.6	25.5	-85.5	-60.0	0.1722	4.12	0.3	4.40	-14.7	-10.3
2050	24.2	1.6	25.8	-83.8	-58.0	0.1609	3.89	0.3	4.15	-13.5	-9.3
Total	**480.4**	**34.7**	**515.1**	**-2,267.2**	**-1,752.1**	**13.0**	**173.8**	**13.4**	**187.17**	**-887.7**	**-700.6**

Benefit-Cost Ratio = 4.74

DITRDCA estimates (2023). Note negative values imply reduction in cost (i.e. benefit).

Table 9c - Summary of costs and benefits (S3)

Financial year	Undiscounted cash flow					Discounting factor @ 7%	Discounted cash flow @ 7%				
	Costs ($m)						Costs ($m)				
	Additional Road Wear	Tyres	Total	Benefits ($m) (Producitvity costs avoided)	Net benefit ($m)		Road Wear	Tyres	Total	Benefits ($m) (Prod costs avoided)	Net benefit/cost ($m)
2023	0.0	0.0	0.0	0.0	0.0	1	0.00	0.0	0.00	0.0	0.0
2024	1.1	1.3	2.4	-8.0	-5.6	0.9346	1.07	1.2	2.24	-7.5	-5.2
2025	2.9	2.7	5.5	-19.8	-14.2	0.8734	2.51	2.3	4.84	-17.3	-12.4
2026	5.2	4.5	9.7	-35.1	-25.4	0.8163	4.24	3.7	7.91	-28.6	-20.7
2027	7.5	6.1	13.6	-50.1	-36.5	0.7629	5.75	4.6	10.37	-38.2	-27.8
2028	9.9	7.6	17.5	-64.7	-47.1	0.7130	7.05	5.4	12.49	-46.1	-33.6
2029	11.8	8.9	20.7	-75.7	-55.0	0.6663	7.86	5.9	13.80	-50.4	-36.6
2030	13.4	10.0	23.4	-84.4	-61.0	0.6227	8.35	6.2	14.58	-52.5	-38.0
2031	14.7	10.9	25.5	-90.4	-64.9	0.5820	8.54	6.3	14.86	-52.6	-37.8
2032	15.8	11.6	27.4	-95.2	-67.8	0.5439	8.58	6.3	14.89	-51.8	-36.9
2033	16.7	12.2	29.0	-98.7	-69.7	0.5083	8.50	6.2	14.72	-50.2	-35.5
2034	17.5	12.8	30.3	-101.0	-70.7	0.4751	8.32	6.1	14.38	-48.0	-33.6
2035	18.2	13.2	31.4	-102.3	-70.9	0.4440	8.06	5.9	13.93	-45.4	-31.5
2036	18.7	13.6	32.3	-102.8	-70.5	0.4150	7.76	5.6	13.39	-42.7	-29.3
2037	19.2	13.9	33.0	-102.7	-69.7	0.3878	7.43	5.4	12.82	-39.8	-27.0
2038	19.5	14.1	33.7	-102.1	-68.4	0.3624	7.09	5.1	12.21	-37.0	-24.8
2039	19.9	14.4	34.3	-101.1	-66.9	0.3387	6.74	4.9	11.60	-34.3	-22.7
2040	20.2	14.6	34.8	-99.9	-65.2	0.3166	6.39	4.6	11.01	-31.6	-20.6
2041	20.5	14.8	35.2	-98.6	-63.3	0.2959	6.05	4.4	10.43	-29.2	-18.7
2042	20.7	15.0	35.7	-97.1	-61.4	0.2765	5.73	4.1	9.87	-26.8	-17.0
2043	21.0	15.1	36.1	-95.5	-59.4	0.2584	5.42	3.9	9.34	-24.7	-15.3
2044	21.2	15.3	36.5	-93.9	-57.3	0.2415	5.13	3.7	8.83	-22.7	-13.8
2045	21.4	15.5	36.9	-92.1	-55.1	0.2257	4.84	3.5	8.33	-20.8	-12.4
2046	21.6	15.6	37.3	-90.2	-52.9	0.2109	4.57	3.3	7.86	-19.0	-11.2
2047	21.8	15.8	37.6	-88.2	-50.6	0.1971	4.31	3.1	7.42	-17.4	-10.0
2048	22.1	15.9	38.0	-86.4	-48.4	0.1842	4.06	2.9	7.00	-15.9	-8.9
2049	22.3	16.1	38.3	-84.6	-46.3	0.1722	3.84	2.8	6.60	-14.6	-8.0
2050	22.5	16.2	38.7	-82.9	-44.2	0.1609	3.62	2.6	6.23	-13.3	-7.1
Total	447.3	327.6	774.9	-2,243.4	-1,468.5	13.0	161.8	120.2	281.95	-878.5	-596.5

Benefit-Cost Ratio = 3.12

DITRDCA estimates (2023). Note negative values imply reduction in cost (i.e. benefit)

Sensitivity tests

Changes to proportion of vehicles operating at legal mass limits

There are uncertainties in the assumed proportion of vehicles likely to be operating at legal mass. A sensitivity test was undertaken on each of options to consider the possible impacts if Euro VI heavy vehicles were assumed to operate at the full legal mass limits 20% of the time.

Tables 10 shows the impacts of this revised assumption on each of the three scenarios.

Option	(1) Avoided productivity loss ($m)	(2) Road wear impacts ($m)	(3) Additional tyre costs ($m)	Net Present Value (1-2-3) ($m)	Benefit-Cost Ratio
1 (500kg mass increase with 295 tyres at 900kPa)	1,040.0	399.5	0	640.6	2.60
2 (500kg mass increase with 315 tyres)	1,032.6	347.5	26.8	671.7	2.76
3 (500kg mass increase with 385 tyres)	1,014.0	323.5	240.4	450.1	1.80

Changes to discount rates

The results of sensitivity testing in relation to discount rates are shown in Tables 11a, 11b and 11c. The results show the net benefit increases at the lower discount rate but with lower benefit cost ratio and at the higher discount rate, the net benefit decreases, but with a higher benefit cost ratio.

Table 11a Changes to discount rates S1 (295 tyres at higher tyre pressure)

S1	Net Present Values ($m)	Benefit–Cost Ratio
Mean (7%)	691.8	4.46
Low (3%)	1,128.5	4.27
High (11%)	456.8	4.64

Table 11b Changes to discount rates S2 (315 tyres)

S2	Net Present Values ($m)	Benefit–Cost Ratio
Mean (7%)	700.6	4.74
Low (3%)	1,144.9	4.55
High (11%)	461.8	4.91

Table 11c Changes to discount rates S3 (385 tyres)

S3	Net Present Values ($m)	Benefit–Cost Ratio
Mean (7%)	596.5	3.12
Low (3%)	966.7	2.99
High (11%)	395.8	3.22

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