The IRTENZ 19th International Conference

MOVING NEW ZEALAND FORWARD

The Future of Heavy Vehicles

RUCs and the Cost Allocation Model

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USER PAYS APPROACH

- Funding of the NZ Road Transport System is based on “User Pays”
- Who are the users that pay?
  - State Highways

    Most of the vehicles that use the road
  - Local Roads

    50% by most vehicles that use the road,

    50% by ratepayers

NATIONAL LAND TRANSPORT FUND

Vehicle Registration Fees

Fuel Excise Duty

- Payable on petrol and LPG
- Currently 77.404c per litre on petrol
- Refundable for most off-road vehicles and RUC vehicles

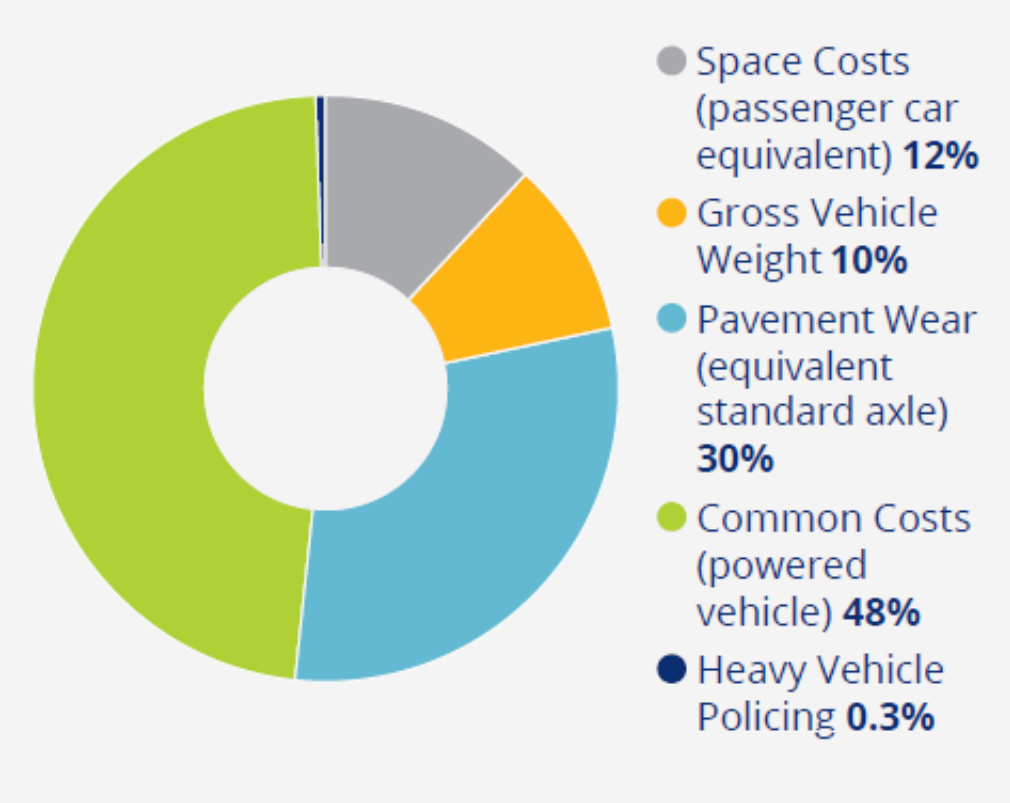
Road User Charges

- Payable by light vehicles not powered by petrol or LPG, currently at $7.60/100km equivalent to 9.82 l/100km petrol consumption
- Payable by all heavy vehicles

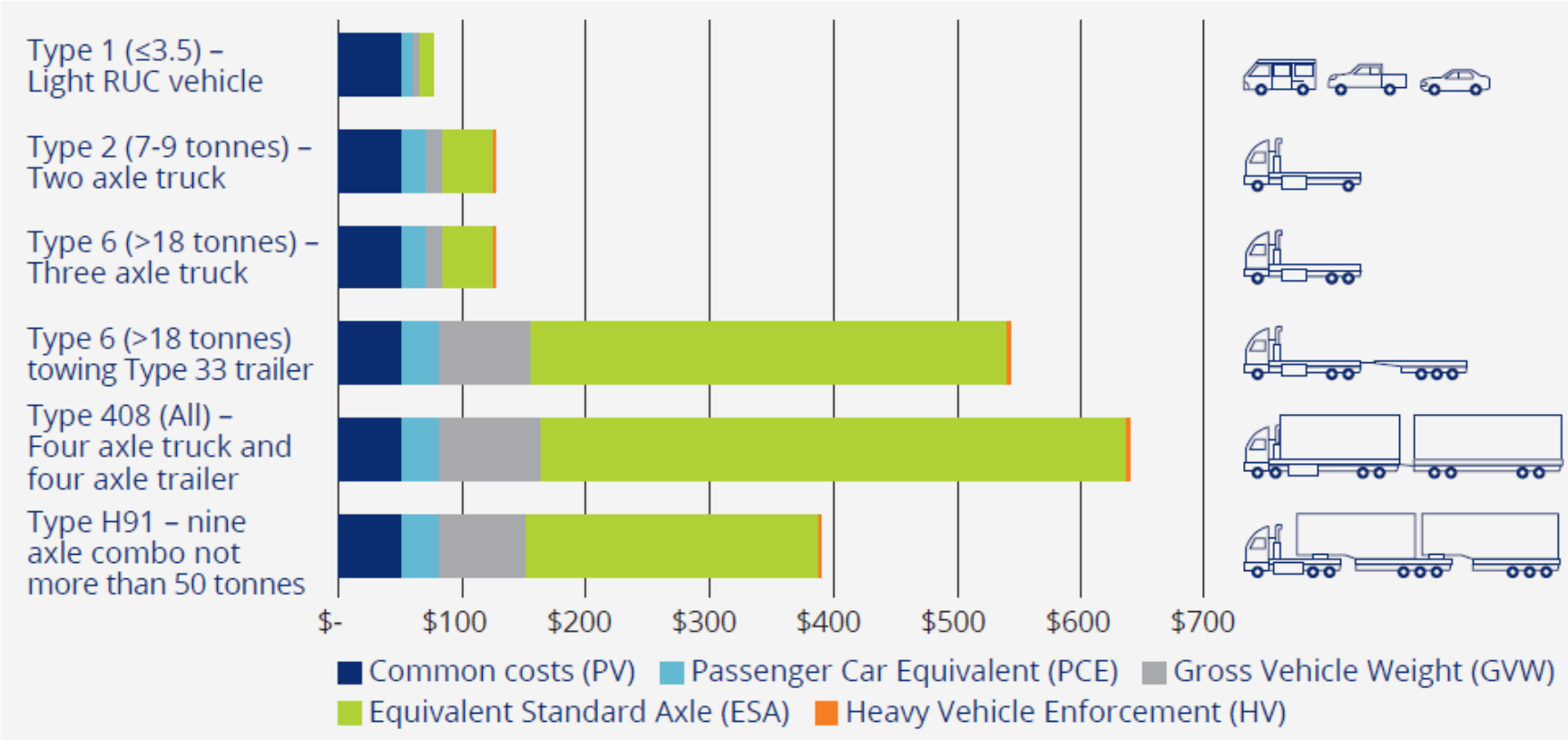
ROAD USER CHARGES

Powered vehicle-kms	• Signage, road marking, driver aids
Passenger Car Equivalent (PCE)-kms	• Road space usage
Gross Vehicle Weight (GVW)-kms	• Structural capacity
Equivalent Standard Axle (ESA)-kms	• Pavement wear

2019/20 NLTP Expenditure



Proportional Contributions to NLTP



PAVEMENT WEAR MODEL

- Fourth power rule based on AASHO Road test conducted in USA in late 1950s

$$ESA = \left(\frac{Axle\ load}{Reference\ load}\right)^4$$

- RUCs assume vehicle is fully laden for half the distance and empty for the other half
- Changing the power exponent would change the proportion paid by different vehicles but the total collected has to be unchanged

EQUIVALENT STANDARD AXLES (ESA)

Axle Configuration	Load (kN)
Single Axle Single Wheels	53
Single axle Dual Wheels	80
Tandem Axle Single Wheels	90
Tandem Axle Dual Wheels	135
Triaxle	181
Quad axle	221

EXAMPLE VEHICLES

Vehicle	Weight	ESA	RUCs/1000km
2-axle truck	Up to 12000kg	1.30	$172
3-axle truck	Up to 12000kg	0.31	$110
R12T22	Up to 45000kg	3.44	$434+$238 = $672
R22T22	Up to 46000kg	2.89	$401+$238 = $639
R22T23	Up to 50000kg	2.80	$435+$179 = $614
B1222	Up to 45000kg	3.44	$434+$101+$139 = $674
B1232	Up to 46000kg	2.64	$356+ $67+$139 = $562
B1233	Up to 50000kg	2.71	$346+ $67+$186 = $599

Truck and Trailer Combinations

	Standard	50Max	HPMV
No of Axles	4-4	4-5	4-5
GCW (tonnes)	46	50	58
Approx Payload (tonnes)	30	33	41
OAL (m)	20	23	23
Approx Deck Length (m)	16	19	19
Relative Payload Weight	100%	110%	140%
Relative Payload Volume	100%	115%	115%
RUCs /1000km	$639	$614	$867
ESA	2.89	2.80	5.29
RUCs/1000kms/Payload tonne	$21.30	$18.61	$21.15

B-train Combinations

	Standard	50Max	HPMV
No of Axles	1232	1233	1233
GCW (tonnes)	46	50	58
Approx Payload (tonnes)	27	30	38
OAL (m)	20	23	23
Approx Deck Length (m)	16	19	19
Relative Payload Weight	100%	111%	141%
Relative Payload Volume	100%	115%	115%
RUCs /1000km	$562	$599	$867
ESA	2.64	2.71	5.16
RUCs/1000kms/Payload tonne	$20.81	$19.97	$22.82

Effects of RUCs for Operators

- Encourages minimising system costs
  - More axles result in lower RUCs. Operators decide whether the additional cost is worthwhile over the vehicle life.
  - 50MAX vehicles increase productivity without increasing pavement wear, i.e. RUCs
  - Higher axle weights (HPMVs) generate more pavement wear but incur higher RUCs to pay for it.

Effects of RUCs for Pavement Managers

Cost of additional pavement wear from higher axle weights is paid for by the vehicles but:-

- Roads and maintenance intervals are designed for an expected traffic loading. A sudden increase in loading will cause timing issues with the availability of the required funds
- Local roads are only 50% funded from vehicle levies. Local RCAs will be reluctant to approve HPMV routes unless they have significant benefits for local ratepayers

Conclusions

NZ's use of the Cost Allocation Model to determine Road User Charges is World leading

To the extent that the CAM is accurate, correlating vehicle RUCs with the costs that they impose on the network incentivises an optimal solution for the road transport system