

**Deloitte.**

# Road User Charges Review Group

Economic Advice in Respect of Road User Charges

February 2009



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# 1. Executive Summary

Each year Government faces a cost of around \$2bn to develop and maintain an accessible road network and this cost has increased steeply in recent years. How Government meets this cost and recovers it through charges to road users, particularly for heavy vehicles, has been a source of tension between Government and road transport interest groups.

Against this background the Government established the Road User Charges Review Group (“RUCRG”), an independent committee appointed by the Minister of Transport to undertake a review of the road user charges cost allocation model (“CAM”) and the method of collecting costs attributable to diesel vehicles.

The RUCRG has commissioned Deloitte to assist with the economic analysis of the possible alternatives to the existing road user charges (“RUC”) system. The options outlined in this report, and evaluation criteria adopted for this analysis, have been developed in conjunction with the Review Group.

The focus of the analysis outlined in this report has been the identification of the likely sources of economic costs and benefits associated with the adoption and implementation of each option.

Whilst a comparison has been made between the options, a number of the potential implementation costs and economic benefits will vary over time and may also be mitigated through design. Given this, the analysis does not draw definitive conclusions but rather provides a commentary on the effectiveness and efficiency impacts relative to the alternate options.

## The Current RUC System

The current system of Road User Charging involves three groups of vehicles paying RUC: all diesel powered vehicles, all other vehicles powered by a fuel not taxed at source<sup>1</sup>, regardless of weight, and all vehicles with a manufacturer’s gross laden weight of more than 3.5 tonnes regardless of the fuel used to power them.

RUC involves the use of distance RUC licences which are purchased in multiple units of 1,000 kilometres. In all cases the expected vehicle load should be added to the unladen weight to establish the RUC licence weight. This weight is then rounded up to the nearest tonne for the licence weight to be purchased.

Vehicle owners may increase the nominated maximum weight of a current distance RUC licence by purchasing either a new RUC licence at an increased weight to replace the existing licence or a supplementary RUC licence at an increased weight which supersedes a portion of the current distance RUC licence.

All vehicles that travel on roads must also pay an MVR license fee for the right to access those roads. This can be paid annually, 6-monthly or quarterly and is quite separate from the RUC distance licenses.

The following four options were developed for the purpose of this Economic Report.

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<sup>1</sup> Fuels that are taxed at source are petrol, compressed natural gas (“CNG”) and liquefied petroleum gas (“LPG”).

Characteristic	Option A	Option B	Option C	Option D
RUC (usage)?	Yes for vehicles over 3.5T	Yes for vehicles over 6T	No	Yes for all vehicles
Allowance for weight (Note 1)	RUC charges vary according to weight	RUC charges vary according to weight	MVR licence fees vary according to weight	RUC charges vary according to weight
Diesel excise?	No	Yes	Yes	No
MVR licence fees levied?	Higher rate for vehicles under 3.5T. Flat rate for all vehicles over 3.5T	Flat rate for all vehicles	Flat rate for all vehicles less than 6T, then scale for vehicles over 6T	Flat rate for all vehicles
Amount of MVR licence fee?	Vehicles < 3.5T set at rate equal to current average RUC paid by vehicles less than 3.5T. Other vehicles, retain current rate	Retain current rates	No change for vehicles less than 6T, scale for vehicles over 6T with each step equal to current average RUC paid, adjusted for diesel excise	Set to recover fixed costs not related to usage
Refunds?	No for vehicles less than 3.5T, yes for vehicles over 3.5T based on distance	Yes for heavy vehicles over 6T only, both with respect to diesel excise, and RUC. Also refunds for non-road use of diesel e.g. heating, marine etc	Yes for heavy vehicles over 6T only and with respect to diesel excise only. Also refunds for non-road use of diesel e.g. heating, marine etc	N/A. A feature of this option is that it charges for actual on-road use only.
Use of technology?	Incentives for vehicles over 3.5T to use OBUs to calculate distance for RUC	Incentives for vehicles over 6T to use OBUs to calculate distance for RUC and to calculate refunds for diesel excise	Limited incentives – low technology option	Significant – all vehicles currently paying RUC required to install OBUs

In assessing these options it is important to note that:

1. In all cases weight would be referenced against the maximum allowable on-road gross laden weight as recorded in the MVR at the time of vehicle registration.
2. These options relate to the system of collecting RUC, not to the method of determining the level of charges which is a function of the Cost Allocation Model ("CAM") and outside the scope of this report;
3. These options were developed in the context of completing a comparative economic analysis both between each of the options and against the status quo system;
4. Should the RUCRG make recommendations to change the current system, the recommendations made may or may not closely resemble one of these options – or indeed may represent a hybrid of these options;
5. For this Economic Report it was important to identify a range of options that were sufficiently different from each other to enable valid comparisons to be made. Inevitably, some simplifying assumptions had to be made and there are many variations to these options which could have been considered; and
6. The options have been developed in the context of the RUC system which is primarily concerned with recovery of costs relating to the maintenance and ongoing enhancement of the road network. It would clearly be possible to modify any of the options presented for other policy objectives – for example, creating discounts for specific categories of vehicle.

## Evaluation Conclusions

The four options which were developed have been assessed against economic criteria developed in collaboration with the RUCRG. The criteria were then prioritised and the performance of each option and the status quo assessed.

The following three criteria were considered to be the criteria of highest importance in assessing the economic impact of each option:

- **Effectiveness** – how effective the option was in collecting the cost of operating the road system from road users and how accurately costs were recovered from users imposing them;
- **Efficiency** – the likely productive and allocative efficiency impacts and cost effectiveness with which the collection processes could be expected to operate; and
- **Future proofing** – The ability of the option to accommodate future changes to vehicle technology and charging systems and potentially move to road charging using a price per kilometre.

In addition to the three primary assessment criteria the options were also assessed against the following:

- **Equity** - whether the option was equitable across different road users and vehicle types; and
- **Fit with broader policy objectives** – whether the option provided a fit with the wider government policy objectives and the incentives created to encourage user behaviour which is more consistent with governments long term aims.

These latter two criteria were considered of secondary importance on the grounds that inequities are always likely to exist through averaging of charges and costs across user groups. This can be tolerated as long as they are not excessive and manifestly unfair.

The fit with government policy is important, however RUC is not the only transport funding policy tool available to government. As long as the RUC system did not run directly contrary to Governments policy objectives, some divergence could be tolerated in a system that otherwise functioned efficiently.

## Option Evaluation

In carrying out this analysis the RUCRG requested that a conclusion was not reached as to a specific option to be implemented or used as a replacement for the existing RUC system. The purpose of the evaluation is to assess the relative merits of a range of potential alternatives to the current RUC system to help inform the recommendations of the RUCRG to Government on what, if any, changes should be made.

Both the current system and each of the options evaluated represents a trade off between competing objectives. On the one hand the current scheme has been conceived as a means of tying back charges as closely as possible to the costs each user imposes on the system.

On the other hand, for the system to be workable, it has to be sufficiently simple to be understandable to users and those charged with its enforcement and administration. This inevitably leads to averaging of charges across user groups and the associated inequities and cross subsidies this causes.

In developing the options for assessment we have taken a longer term view of what may be achievable

with developing technology. For example, Option D represents a possible initial step towards a “price per kilometre” charge for all road users using tracking and enforcement technology which is becoming more widely available.

We hold the view that road pricing has the potential to be a more effective, efficient and equitable road charging mechanism with higher costs offset by its much greater flexibility to charge based on location and time of day in the future making it a much more powerful tool for the implementation of Government’s policy aims and objectives. As such it was considered to be one of the high priority evaluation criteria.

## Option A

The best of the options evaluated, and an improvement on the status quo.

**Effectiveness** - This option is essentially a simplification of the existing RUC system but retains the principles of charging for road use on measured distance, vehicle weight and axle configuration. Simplifications make it more effective than the existing system as a result of using maximum gross laden weight/legal maximum weight as well as reducing opportunities for evasion.

**Efficiency** - This should significantly reduce the cost to Government and the compliance cost making it a more efficient and cost effective system than the status quo. It also incentivises operators to run vehicles at the maximum operating weight for as much of the time as possible as charges are based upon maximum gross laden weight, which is a stronger incentive than the status quo which enables RUC to be purchased at lower rates and then use supplementary licences.

**Equity** – This option does sacrifice equity in the interests of simplicity by averaging charges over larger groups, penalising heavy vehicles which are unable to run fully laden at all times and subsidising high mileage light vehicle users at the expense of low mileage users. Inequities between petrol and diesel light vehicles remain as the two groups of vehicles will still not be charged for road user on the similar basis.

**Policy fit** – The option creates a number of policy challenges which would need to be considered in any detailed design including the treatment of buses. It is also unclear on what incentives might be created by the increased MVR licence fee to move a higher proportion of the vehicle fleet to more efficient diesel vehicles although incentives are likely to be stronger for high mileage light vehicle road users.

**Future Proofing** - By retaining the principles of measured distance and encouraging the installation of OBUs it remains essentially a “per kilometre” charge which would make the transition to an electronic road pricing system easier in the future.

## Option B

The second most attractive option analysed but little improvement on the status quo long term.

**Effectiveness** – This option retains an element of RUC for heavy vehicles but replaces a proportion of mileage based charges with diesel excise as a proxy for mileage and weight. The light vehicle fee in option A is replaced completely with diesel excise. Whilst it is an effective way of recovering road costs, changes to vehicle technology and improving efficiency will compromise this over time.

Furthermore the necessity to refund diesel excise to a much larger number of diesel users for non-road related use opens up the opportunity for road users to fraudulently obtain “rebated” diesel.

**Efficiency** – The simplification should reduce compliance costs to users relative to the status quo however Government will incur establishment costs in implementing the new tax. Compliance costs will to some extent be transferred from road users to fuel suppliers and road users will still have to manage a RUC based system for heavy vehicles. The system for off road refunds will need to be redesigned to allow for refunds to non road users such as marine and other industrial or business activities – a group of businesses not currently caught in the RUC system, creating a significant new deadweight cost.

**Equity** – This option removes some of the inequities of Option A, particularly those between high and low mileage road users and makes some reduction in those for vehicles not running fully laden. It remains however more inequitable than the current system particularly in relation to distance for light vehicles.

**Policy fit** – The option retains many of the policy challenges of Option A whilst also introducing an entirely new tax alongside a simplification of the existing RUC system. It is not clear that road charging using this model materially progresses the Governments current policy goals.

**Future Proofing** – As with Option A the principles of charging based on weight and distance are retained but in a further diluted form. Whilst not precluding a move to a per kilometre based charge the diesel excise tax is arguably a step in the wrong direction. Incentives to install OBUs remain.



### Option C

The second weakest option analysed, and poorer than the status quo in the long term.

**Effectiveness** – This option removes distance based charging completely and charges a weight based fee to heavy vehicles. This departure from the underlying principles of both Options A and B as well as the existing system reduces its effectiveness in linking charges to the factors creating cost. It remains a reasonably effective way of collecting charges but is subject to fraudulent use of rebated diesel. As with Option B effectiveness may be compromised over time, due to technological advancement in fuel efficiency and diversification of vehicle fuel types.

**Efficiency** – Option C is tax and fee based making compliance for road users much simpler and cheaper. There is however a cost to Government in establishing the new tax system and a transfer of ongoing compliance costs to fuel suppliers. Government is relieved of the cost of managing much of the complexity of the current RUC system as well as simplifying enforcement processes and reducing its cost. As with Option B the system for off road refunds will need to be re-designed to allow for refunds to non road users such as marine and other industrial or business activities, creating a significant new deadweight cost.

**Equity** – Diesel excise is generally more equitable for light vehicles than the fixed fees of Option A but less so than the status quo. As diesel excise is a proxy for a weight and distance charge, inequity across heavy vehicles is reduced but it remains less equitable than the status quo in this regard.

**Policy Fit** – The option reduces costs to Government but does not obviously assist with Government's wider

policy goals. In hindering the implementation of a system which could enable location and time based charging it arguably burdens government with greater infrastructure costs to meet increasing demand without access to a powerful tool to manage demand at key centres and times.

**Future Proofing** – Abandoning measured distance runs directly contrary to the potential future implementation of a price per kilometre system and there are no obvious incentives for the uptake of technology. Despite the fact that the tax and fee system could be dropped at some point in the future it would be necessary to re establish the charging principles as well as introducing a new technology to collect them. Such a situation is likely to be a hindrance to establishing road pricing rather than a help.

### Option D

The best option longer term and an improvement on the status quo. However, this option is not deemed cost-effective or economically viable in the short term due to the need make it mandatory across the entire diesel fleet.

**Effectiveness** – It is assumed that if an e-RUC system was introduced it would need to be at least as effective in collecting road user charges as the current system – i.e. have no greater prospect of revenue leakage or payment evasion.



**Efficiency** – The costs of introducing the system are likely to be considerable and will fall on both Government and road users through the need for a back office and OBUs respectively. Enforcement costs are also likely to be high. This needs to be considered against the background of costs, particularly infrastructure development, which may be avoided in the future as well as the ability to incentivise different behaviours and reduce the cost of externalities.

**Equity** – this option as it currently stands is the most equitable across road user groups as it enables a single regime to be implemented for all road users currently subject to RUC as well as being able to differentiate by weight or vehicle class. It also has the future potential to charge based on location and time of day for all vehicles to reflect the external costs road users create.

**Policy Fit** – This option enables the widest range of charging regimes and as such is potentially the most powerful tool available to government for the implementation of policy through road user charging regimes.

**Future Proofing** – Several countries are moving towards per kilometre based electronic road charging for parts of their vehicle fleet and certain specified routes. Others have implemented time, location and emissions based charges. Option D provides a platform for a system able to charge on any and all of these bases.

## 2. Introduction

Each year Government faces a cost of around \$2bn to maintain and expand New Zealand's road network and this cost has increased steeply in recent years. How Government meets this cost and recovers it through charges to road users goes to the very heart of issues of economic efficiency, cost allocation and fairness across different road user groups and between public and private transport.

The distribution of charges, particularly for diesel vehicles, has been a source of tension between Government and road transport interest groups and saw nationwide protests in the winter of 2008.

Against this background the Government established the Road User Charges Review Group ("RUCRG"), an independent committee, appointed by the Minister of Transport to undertake a review ("Review") of the Ministry's road user charges cost allocation model and the method of collecting the proportion of transport network costs attributable to diesel vehicles.

The Government and transport sector interest groups have agreed that a review of the cost allocation model and the method of collecting the diesel component of these costs should be undertaken, and that this should feed into a wider future review examining the way the land transport sector is funded from all funding sources.

The RUCRG requested economic advice in relation to possible alternatives to the existing road user charges system.

### Overall Review

In broad terms the overall Review is charged with ensuring that the cost allocation model and user charging mechanisms meet objectives in the following areas:

- Economic efficiency;
- Cost recovery; and
- Equity.

The scope of the Review is to examine the following areas and make recommendations for possible changes to policy, processes, or legislation. The Review will look at:

#### Alternative systems and implementation considerations

- What alternative approaches might be appropriate in substitution for the current road user charges system and cost allocation model and how might a transition to a new system best be implemented.

#### Process considerations

- The process for reviewing and adjusting charges, including consultation and notice of changes.

### Engineering considerations

- The appropriateness of the allocation of the various components of road costs including the relationship between vehicle use and government expenditure on roads; in particular, the power relationship between axle weight and road wear and the relationship between various axle configurations and road wear.

### Cost of collection considerations

- The nature and extent of the costs associated with the current systems for setting and administering road user charges (including matters relating to the impacts of the road user charges scale on the efficiency of vehicles, enforcement, avoidance and evasion, administrative and compliance costs) together with any improvements that might be made to reduce those costs; and
- The comparative costs associated with the current system against the costs associated with any alternative charging regime.

The RUCRG has commissioned a number of pieces of work in each of the areas above which have been made available to us to inform our economic analysis of the RUC system. The scope of the Review excludes matters relating to:

- Which activities are funded by the National Land Transport Programme (“NLTP”);
- The level of Financial Assistance rates for local authorities in respect of the land transport activities that they undertake;

- Alternatives to rating as a source of land transport funding for Local Authorities; and
- Other costs not currently charged for through the National Land Transport Fund (e.g. externalities such as emissions).

The Review is only looking at allocation of direct costs caused by the existence of a roading network and usage of that network by vehicles. It specifically excludes matters relating to other costs not currently charged for through the NLTP. However consideration is still required of:

- The extent to which the existing RUC system and cost allocation approach achieves transport efficiency goals and fair outcomes for users; and
- The advantages and disadvantages of different approaches to recovering costs from road users, in terms of economic efficiency, equity and cost recovery.

### Economic Report

The scope of work for this Economic Report is intended to help answer key questions that the RUCRG has regarding the current RUC charging mechanisms. These are a central part of the overall Review mandate. Specifically these questions are:

#### Options for alternative systems and implementation considerations

What alternative approaches might be appropriate in substitution for the current road user charges system (including 'hybrid' systems)?

- There are a range of options potentially available from diesel excise to sophisticated systems incorporating time and location factors which would probably require a GPS-based monitoring system, and hybrid arrangements.

What are the implications of a transition to an alternative system?

- Any change of system will have transitional implications which will have to be considered and the consequences understood, particularly their consistency with the longer term objectives for collecting costs from road users;
- In addition, should the Government seek to implement related policies in respect of road pricing in the form of congestion charging it will be critical to integrate the roll-out of the systems and not close off options which may be possible in the future as technology develops; and
- Regardless of any of these other policy decisions, timing of the roll-out of any proposed changes will require careful consideration – including consideration of the “tried and tested” nature of proposed replacement systems if these rely on high-tech monitoring and enforcement approaches (such as GPS).

### Economic assessment of the options

What are the advantages and disadvantages of the existing road user charges system and possible different approaches to recovering costs from road users, in terms of the objectives of economic efficiency, equity and cost recovery?

What are the financial effects of alternative options on different categories of diesel vehicle operators?

- The current system imposes costs on both road users and on the system used to collect the charges. Alternative systems would change the balance of costs and who bears those costs.

### Wider long-term considerations

Could alternative systems improve utilisation of the NZ roading network and accommodate the objectives of the NZ Transport Strategy and the Government Policy on Land Transport Funding?

What implications would future changes in technology including the impact of significantly improved fuel efficiency and use of alternative transport fuels have for any alternative charging system?

# 3. Methodology

The economic advice as requested by the RUCRG broadly involved five key phases of work:

1. Scoping;
2. Review of current system;
3. Option identification;
4. Option evaluation; and
5. Economic advisory and reporting.

These phases are laid out in further detail below.

## Scoping

The scoping phase involved:

- Reviewing the findings of the earlier work commissioned by the RUCRG and submissions made to the RUCRG by interested stakeholders; and
- Working with the RUCRG to identify the economic matters raised by the work commissioned to date and start to develop alternatives to the current RUC system.

## Current Model Review

The current Road User Charges model was examined to understand both its advantages and its limitations and problems. This understanding was gained through discussion with the RUCRG and review of submissions and related reports.

Through this process a number of issues were highlighted including:

- Costs of compliance and costs of collection relating to RUC (and by comparison to petrol excise), and related to this, opportunities for payment evasion;
- Fairness within and between different categories of vehicle and different groups of road users;
- Concerns about the increasing volumes of light vehicles under 3.5 tonnes who pay RUC relating to costs of compliance and the administrative burden created;
- Inconsistencies in relation to the use of averaging and in particular around attempting to charge based on actual vehicle laden weight;
- Speed of the refund system and the cumbersome nature for road users;
- The requirement to pay for RUC in advance placing strain on the cash flow of some road users;
- Concerns about hubodometers relating to their level of accuracy, their vulnerability, the cost of and downtime associated with replacing them; and
- Potential advantages of changing to GPS based technologies to introduce more fairness and accuracy into the RUC system along with the ability to measure loads accurately and automatically claim off-road refunds.

These issues shaped the formulation of the alternative options for evaluation and allowed the development of four distinct options designed to solve these problems and make different trade offs between the various matters.

## Option Identification

Four options were identified in conjunction with the RUCRG and refined in collaboration with the Group prior to commencing our evaluation. These are described in Section 5 below.

## Option Evaluation

The alternative charging options were then assessed against the criteria summarised below:

### Primary criteria

- 1) The *effectiveness* of the option in collecting road user charges, including the practical implementability of the proposed mechanisms.
- 2) The *efficiency* of the model – does it send appropriate price signals and what are the compliance and administrative costs of collection.
- 3) *Future proofing* - The extent to which the option allows for the progressive introduction of technology which will provide further enhancements in effectiveness and efficiency of the model.

### Secondary criteria

- 4) *Equity* - The degree to which those who benefit from the provision of the road network, pay for it.

Does the model accurately assign costs to different user groups (i.e. between different vehicle and fuel types)?

- 5) *Transport policy goals and objectives* - The degree to which the cost allocation achieves the aims of policy. For example, does the model provide incentives for the use of more fuel efficient vehicles?

The rationale for applying a higher ranking to the effectiveness and efficiency criteria than equity and other policy objectives is that there will always be inequities through averaging of charges and as long as neither the inequities or lack of fit with wider policy objectives are excessive they can be tolerated in a system which “works”.

Options have also been assessed for the extent to which the model aligns with the principles of cost recovery – for example whether it is easily understood, verifiable, etc. However, as these principles are essentially subsets of the efficiency and effectiveness criteria this assessment is not assigned a weighting in its own right.

Each of the options were rated against the criteria on both an absolute and comparative basis using a rating scale of 1 to 5 compared against the status quo current RUC system – where a 3 is neutral compared to the status quo and a 1 is poor performance and a 5 is good performance.

In addition to this qualitative analysis, an assessment was made as to the potential financial impacts of each option with regard to:

- Administrative cost to Government; and
- Financial impacts on different groups of diesel vehicle operators.

## 4. The Current RUC System

The current system of Road User Charging (“RUC”) in New Zealand involves two groups of vehicles paying RUC. All diesel powered vehicles and other vehicles powered by a fuel not taxed at source, regardless of weight, must pay RUC.

All vehicles that travel on roads must also pay an MVR license fee for the right to access those roads. This can be paid annually, 6-monthly or quarterly and is quite separate from the RUC distance licenses.

Fuels that are taxed at source are petrol, compressed natural gas (“CNG”) and liquefied petroleum gas (“LPG”). Vehicles with a manufacturer’s gross laden weight of more than 3.5 tonnes must also pay RUC regardless of the fuel used to power them.

RUC involves the use of distance RUC licences which are purchased in units of 1,000 kilometres or multiples thereof. Vehicles must be RUC licensed for a continuous distance so that when the finish distance is reached, a new RUC licence is required.

Distance RUC licensed vehicles are classified according to:

- Whether the vehicle is powered or unpowered;
- The number of axles on the vehicle; and
- The number of tyres per axle, either single tyred or twin tyred.

Axles are considered ‘close’ if there is less than 2.4 metres from the nearest adjacent axle otherwise axles are considered ‘spaced’.

In all cases the expected vehicle load should be added to the unladen weight to establish the RUC licence weight. This weight is then rounded up to the nearest tonne for the licence weight to be purchased.

Operators may increase the nominated maximum weight of a current distance RUC licence by purchasing either:

- A new distance RUC licence at an increased total weight to replace the existing licence; or
- A supplementary RUC licence at an increased total weight which will supersede a portion of the current distance RUC licence.

In both cases the operator receives an automatic credit at the time of purchase for the unused portion of the original distance RUC licence.

Supplementary RUC licences provide for an increase in the weight limit of a RUC licence to allow for the occasional carrying of heavier loads. They are more expensive than ordinary distance RUC licences, but may be bought in multiples of 50 kilometres.

Only specific vehicles are entitled to display time licences. These vehicles include trailer scrapers, road rollers, forestry chippers, bulldozers and mobile cranes. Time licences are purchased in periods of 1 month, with a minimum of 1 month and a maximum of 12 months.



All vehicles that operate with distance RUC licences must be fitted with a distance recorder that is of a type and accuracy sufficient to provide a reliable record of distance travelled. Every motor vehicle requiring a distance RUC licence where the manufacturer's gross laden weight is more than 3.5 tonnes must be fitted with an approved hubodometer.

The cost of distance RUC licences increase as the weight of the vehicle increases and decrease as the number of axles on the vehicle increases.

The attributes which determine distance RUC licence charges are:

- Whether the vehicle has a driver, i.e. is a powered vehicle;
- The effective space requirements of a vehicle, measured in terms of passenger car equivalents;
- The operating gross weight of the vehicle; and
- The wear effects of the vehicle, measured in terms of equivalent single axles.

This system has been in place for some time and although charge levels have been adjusted, the cost allocation model and RUC system has remained largely unchanged.

The current system has the following benefits:

- It is relatively easy to understand and simple to administer (albeit probably more expensive in terms of collection costs than, say, a diesel tax);

- It takes into account the precise distance travelled (where a diesel tax provides only a proxy in terms of fuel used);
- It does not impose administrative costs in respect of refunds of excise duty for off-road use of diesel land-based vehicles or non vehicle use such as marine, power generation, heating etc; and
- It allows for differential charging across different vehicle types and weights, providing a proxy for the level of costs imposed on the system by use of the roads with heavier/bigger vehicles tending to cause more damage.

However it does not take account of location or time or road type, and arguably has not kept up with changes in technology – both in terms of the vehicles to which the charges apply, and the possible systems for information collection and cost allocation.

It is also anomalous for lighter vehicles where the majority of the light vehicle fleet are petrol powered and pay a fuel excise duty but a minority are caught under the RUC system.

Internationally there has been much interest in moving towards systems for charging which more appropriately match the method of charging with the costs, both direct and indirect, caused by different types of vehicles in order to achieve greater economic efficiency.

The focus to date has been on schemes emphasising congestion reduction in urban areas and/or schemes restricted to charging heavier goods vehicles.

## 5. Alternative Charging Options

Four options were developed for the purpose of this economic analysis to help inform the RUCRG in making any recommendations for changes to the current RUC system. It is important to note that:

- These options relate to the system of collecting RUC, not to the method of determining the level of charges which is a function of the Cost Allocation Model (“CAM”) and outside the scope of this analysis;
- These options were developed in the context of completing a comparative economic analysis both between each of the options and against the status quo system;
- Should the RUCRG make recommendations to change the current system, the recommendations made may or may not closely resemble one of these options – or indeed may represent a hybrid of these options;
- For this Economic Report it was important to identify a range of options that were sufficiently different from each other to enable valid comparisons to be made. Inevitably, some simplifying assumptions had to be made and there are many potential variations to these options which could have been considered; and
- The options have been developed in the context of the RUC system which is primarily concerned with recovery of costs relating to the maintenance and ongoing enhancement of the road network. It

would clearly be possible to modify any of the options presented for other policy objectives – for example, creating discounts for specific categories of vehicle.

As noted above, a number of assumptions have been made in the development of these options. Key assumptions include:

- That it would be feasible to implement a system for collection of diesel excise duties;
- That technology will be readily available within the short-medium term to enable charging in the manner envisaged by each of the options and this technology will be auditable and acceptable to the Government as a basis for verifying charges levied;
- That should elements of the current RUC system be retained it should be possible to reduce compliance costs and enhance user friendliness to vehicle operators;
- That in any of the options, some degree of averaging will remain inevitable both within and across categories of vehicles but also across different aspects of road use (e.g. location – urban/rural – or time of day/week); and
- That it is desirable to encourage adoption of technology which allows for future implementation of more sophisticated road pricing policies in the future.

## Summary of Four Options

Characteristic	Option A	Option B	Option C	Option D
RUC based on usage	Yes for vehicles over 3.5T	Yes for vehicles over 6T	No	Yes for all vehicles
Allowance for weight <sup>2</sup>	RUC charges vary according to weight	RUC charges vary according to weight	MVR licence fees vary according to weight	RUC charges vary according to weight
Diesel excise?	No	Yes	Yes	No
MVR licence fees levied?	Higher rate for vehicles under 3.5T. Flat rate for all vehicles over 3.5T	Flat rate for all vehicles	Flat rate for all vehicles less than 6T, then scale for vehicles over 6T	Flat rate for all vehicles
Amount of MVR licence fee?	Vehicles < 3.5T set at rate equal to current average RUC paid by vehicles less than 3.5T. Other vehicles, retain current rate	Retain current rates	No change for vehicles less than 6T, scale for vehicles over 6T with each step equal to current average RUC paid, adjusted for diesel excise	Set to recover fixed costs not related to usage
Refunds?	No for vehicles less than 3.5T, yes for vehicles over 3.5T based on distance	Yes for heavy vehicles over 6T only, both with respect to diesel excise, and RUC. Also refunds for non-road use of diesel e.g. heating, marine etc	Yes for heavy vehicles over 6T only and with respect to diesel excise only. Also refunds for non-road use of diesel e.g. heating, marine etc	N/A. A feature of this option is that it charges for actual on-road use only.

<sup>2</sup> In all cases weight would be referenced against the maximum allowable on-road gross laden weight as recorded in the MVR at the time of vehicle registration.

Characteristic	Option A	Option B	Option C	Option D
Use of technology?	Incentives for vehicles over 3.5T to use OBUs to calculate distance for RUC	Incentives for vehicles over 6T to use OBUs to calculate distance for RUC and to calculate refunds for diesel excise	Limited incentives – low technology option	Significant – all vehicles currently paying RUC required to install OBUs

**Note: refer to Glossary at start of document for definitions of key terms**

**Option A: RUC for vehicles over 3.5 tonnes only, with option of technology enabled measurement of on-road distance. License fees only for vehicles under 3.5 tonnes**

#### Key underlying principles

- Light vehicles (under 3.5 tonnes maximum gross laden weight) excluded from RUC system, but with no new excise duty levied on diesel. The key principle here is to keep it simple for light vehicles;
- Significant emphasis therefore on MVR license fees for these vehicles;
- Vehicles over 3.5 tonnes, including HGVs and buses, remain in a modified version of the current RUC system, which is adapted to be future-proofed for technology enhancements and at the same time simpler to administer; and
- Refunds for off-road use restricted to vehicles over 3.5 tonnes.

Option A establishes two basic systems of payment of charges by vehicles which do not pay petrol excise duty:

All vehicles would be required to pay an annual MVR license fee, probably using the same payment facilities that are available now for the payment of MVR license fees (e.g. on-line, through agents, etc).

Light vehicles under 3.5 tonnes would only pay this MVR license fee and incur no further charges – recognising that these vehicles would not pay any RUC.

As this MVR license fee would comprise the total amount of road use charges payable by these light vehicles, the current MVR license fee payable by owners of this category of vehicles would need to be substantially increased. This would likely necessitate implementation of a system to spread payment, and may also require more stringent measures to be implemented to disincentivise evasion through non-payment.

Further, as this charge would have no usage component, it would not be feasible to allow for refunds for off-road use of these vehicles.

All vehicles over 3.5 tonnes gross laden weight would in addition to payment of an MVR license fee pay a distance and weight based RUC charge for road usage. To encourage greater use of technology as a means of “future-proofing” this option, operators would be encouraged to install OBUs into the vehicles which would record actual on-road distance travelled based on GPS measurements.

The incentive for installing OBUs would be to allow these operators to pay the usage charges “on account and in arrears”, rather than the current pre-purchase system. It is anticipated that this should reduce compliance costs and enable streamlining of payment processes as it eliminates the need for refunds for off-road usage.

The actual amount of usage payments made by operators of vehicles over 3.5 tonnes would be based on a combination of:

- Distance travelled on-road;
- Weight of the vehicle. This would be based on the lower of maximum gross laden weight or maximum legal weight, eliminating the need for supplementary RUC distance licenses; and
- Axle configuration.

For vehicles without OBUs able to accurately measure on-road distance travelled, the current system of pre-paid RUC for blocks of kilometres would continue to operate, however the charges per kilometre would be based on maximum gross laden weight.

For these vehicles it would remain necessary to retain a system for refunds of that portion of the pre-paid RUC usage charges which were subsequently travelled off-road.

### Key Assumptions

- All vehicles over 3.5 tonnes would pay a single flat rate of MVR license fee regardless of weight;
- Vehicles weighing over 3.5 tonnes would pay the MVR license fee, but in addition would pay road usage charges determined by reference to a combination of kilometres of on-road travel, weight and axle configuration; and
- Vehicles under 3.5 tonnes would pay a higher rate of MVR license fee and the actual amount of the fee would be determined, by reference to the average RUC amounts currently paid by light vehicles under 3.5 tonnes (since this would comprise the total amount of RUC paid by this category of vehicles) allowing for any modifications to the CAM proposed elsewhere by the RUCRG.

Note that consideration was given to the option of allowing any operator who is able to accurately collect data on actual weight at the time of travel in conjunction with the collection of data on distance using OBUs, be charged for the actual weight rather than the maximum laden weight (i.e. charged in arrears for actual distance and actual weight).

This has the benefit of further encouraging the use of technology where it improves the accuracy of the charges levied (i.e. reduces the amount of averaging).

This option was not included as part of the analysis as it was considered to be overly complicated and beyond the capability of current proven technology but nonetheless remains a refinement which could be considered in future.

## Option B: Excise duty on diesel. Additional RUC for heavy vehicles

### Key underlying principles

- Option B includes the introduction of excise duty on diesel. This provides a proxy charge for distance for light vehicles under 6 tonnes (which is completely absent from Option A in respect of light vehicles under 3.5 tonnes);
- Introducing a diesel excise duty adds some complications such as the need for refunds on the diesel excise duty for off-road use and for non road users of diesel (for at least some categories of vehicle/diesel use);
- Option B reduces the emphasis for light vehicles under 3.5 tonnes on the MVR license fees, which would be lower than Option A to reflect the excise duty collected;
- With the introduction of diesel excise, Option B proposes to restrict the requirement to pay a usage based RUC solely to HGVs (i.e. to vehicles over 6 tonnes gross laden weight, raised from 3.5 tonnes under Option A); and
- This “raising the bar” will reduce compliance costs for “medium weight” vehicles in the 3.5 to 6 tonne category compared against Option A.

Option B introduces excise duty on diesel purchases, bringing them into closer alignment with petrol-powered vehicles.

All vehicles would continue to pay annual MVR license fees, and the amount of this MVR license fee may not be significantly different to that currently paid.

Light vehicles (under 6 tonnes) would only pay the diesel excise plus MVR license fee and incur no further charges. Non-compliance with payment of MVR license fees would therefore be no higher than currently, and evasion of payment of the diesel duty would be virtually impossible – therefore overall payment compliance would improve relative to the current situation.

Similar to Option A HGVs would, in addition to payment of an MVR license fee (and diesel excise), pay a separate charge for road usage. However the number of vehicles required to pay a road usage charge would be smaller than under Option A as “medium weight” vehicles are excluded under Option B.

To encourage greater use of technology as a means of “future-proofing” this option, HGV operators would be encouraged to install OBUs into the vehicles which would record actual on-road distance travelled based on GPS measurements.

The incentive for installing OBUs would be to allow HGV operators to pay the usage charges “on account and in arrears”, rather than the current pre-purchase system. It is anticipated that this should reduce compliance costs and enable streamlining of payment processes as it avoids the need for refunds of usage charges for off-road usage.

Off-road and non road use of diesel (on which the diesel excise would already have been paid) would be eligible for refund of the excise duty in a similar way to petrol excise currently.



However this option proposes to restrict eligibility for refunds of diesel excise for off-road use to heavy vehicles over 6 tonnes, i.e. those vehicles in the RUC system for whom the same distance data used to calculate RUC could also be used to calculate the diesel excise refund. All non road related use of diesel would also be eligible for a refund of excise.

For HGVs with OBUs installed, this would be relatively straightforward to administer. However there would likely be a significant volume of “paper based” refund applications by vehicle operators without OBUs. Consequently it would be necessary to improve the automation of the “paper based” refund process.

For HGVs over 6 tonnes maximum laden weight, the actual amount of usage charges payable would be based on a combination of:

- Distance travelled on-road;
- Weight of the vehicle. This would be based on the maximum gross laden weight, eliminating the need for supplementary RUC distance licenses; and
- Axle configuration.

For HGVs without OBUs able to accurately measure on-road distance travelled, the current system of pre-paid RUC for blocks of kilometres would continue to operate, however the charges per kilometre would be based on maximum gross laden weight in all cases.

For these vehicles it would remain necessary to retain a system for refunds of that portion of the pre-paid RUC usage charges which were subsequently travelled off-road. Ideally this should be integrated into the system for refunds of diesel excise duty.

## Key Assumptions

- The rate of diesel excise duty levied would most likely be determined by reference to average levels of RUC paid by light vehicles under 3.5 tonnes or 6 tonnes so that on average these vehicles paid the same in diesel excise as they currently pay in RUC (and recognising that there would be no refunds for off-road use). However, some cognisance of the level of petrol excise may also be required;
- All vehicles would pay a single flat rate of MVR license fee, most likely unchanged from current MVR license fee rates;
- Vehicles over 6 tonnes would pay the same MVR license fee, but in addition would pay road usage charges determined by reference to a combination of kilometres of on-road travel, weight and axle configuration; and
- To the extent that the combination of diesel excise plus MVR license fees for vehicles over 6 tonnes is higher than current charges, this may result in reductions to the usage based RUC charges for vehicles over 6 tonnes.

## Option C: Excise duty on diesel. No RUC. Scale of MVR license fees differentiated by weight for all vehicles

### Key underlying principles

- Option C removes RUC and introduces excise duty on diesel. This is the option most often promoted by freight operators and most similar to overseas models;
- Option C is most similar to Option B but without RUC. Option C is identical to Option B for light vehicles but significantly different for HGVs over 6 tonnes;
- The emphasis moves to excise duty on diesel as the proxy for distance based charging on all vehicles, with the weight component now largely captured through the graduated MVR license fees for all vehicles; and
- Like Option B this option necessitates refunds on the diesel excise duty for off-road and non road use. Refunds for off-road use would be restricted to diesel excise as there would be no usage basis for determining refunds of MVR license fees.

Option C is a “low-tech” alternative which should be relatively simple to administer with lower transaction and compliance costs than the other options and reduced opportunities for evasion. Option C would retain the current notion of pre-payment.

Option C is similar to Option B in its introduction of diesel excise duty which would align diesel powered vehicles with petrol-powered vehicles.

Also like Option B all vehicles would continue to pay annual MVR license fees, and for vehicles up to 6 tonnes the amount of this MVR license fee may not be significantly different to that which they currently pay. The amount payable by the operator would be determined by reference to the maximum gross laden weight of the vehicle.

The key difference is that unlike Option A or B the system of usage-based RUC payments would be abolished completely so that the sole basis for distinguishing the level of RUC charges as between different categories of vehicles would be the MVR license fee.

As for Option B payment compliance (non-evasion) for light vehicles would likely to be higher than currently. For HGVs over 6 tonnes non-compliance with payment of MVR license fees could become a more significant issue but possibly no more significant than current issues relating to evasion of RUC, and evasion of payment of the diesel duty would be virtually impossible – therefore overall payment compliance would improve relative to the current situation. This could change however if untaxed diesel were made available for non road diesel users, which could be fraudulent if used for road vehicles.

Off-road use of diesel (on which the diesel excise would already have been paid) would be eligible for refund of the excise duty. Like Option B it is proposed to restrict refunds to heavy vehicles over 6 tonnes. Unlike Option B however heavy vehicles will not be collecting distance data to inform RUC payments and therefore the refund system will need to operate in a similar way to refunds of petrol excise currently. Some HGV operators may choose to install OBUs to provide proof of off-road kilometres travelled and for these vehicles refunds would be relatively straightforward to administer.

However there would be no other incentive for the installation of OBUs and therefore it is probable that the vast majority of refund applications would be “paper based”. Consequently it would be necessary to improve the automation of the “paper based” refund process.

For all vehicles MVR license fees levied would be payable based on the maximum gross laden weight, with a flat rate for vehicles up to 6 tonnes. For vehicles over 6 tonnes, the MVR license fee calculation would also incorporate reference to axle configuration.

Hubodometers would likely also still be required for verification purposes in respect of refunds for off-road use of diesel.

### Key Assumptions

- The rate of diesel excise duty levied would most likely be determined by reference to average levels of RUC paid by light vehicles under 3.5 tonnes so that on average these vehicles paid the same in diesel excise as they currently pay in RUC (recognising that there would be no refunds for off-road use of diesel). However, some cognisance of the level of petrol excise may also be required;
- Light vehicles under 6 tonnes would pay a single flat rate of MVR license fee;
- Vehicles over 6 tonnes would pay higher MVR license fees, probably with a scale of charges increasing by the tonne, and with reference to axle configurations; and
- The actual amount of these MVR license fees would be determined by reference to the rate of diesel excise duty levied and the average RUC amounts currently paid by these categories of vehicles, allowing for any modifications to the CAM proposed elsewhere by the RUCRG.

## Option D: Electronic Road User Charges (“e-RUC”) for all vehicles currently in the RUC system.

### Key underlying principles

- Option D contemplates the implementation of electronic road user charging (e-RUC) in place of the current paper-based system;
- Option D has similarities to Option A with the key differences being that RUC would continue to apply to light vehicles, and that vehicles would be obliged to install OBUs using (amongst other things) GPS technology to measure distance and location (on/off road) rather than this being a voluntary arrangement;
- Option D would therefore aim to convert the current RUC system to a fully electronic RUC system for all vehicles who currently pay RUC, with the logical next step being to progressively roll out the same system to the petrol vehicle fleet;
- Option D potentially simplifies payment of RUC (payment would be on account), allows for payment in arrears based on actual on-road usage (thus avoiding the need for refunds), and avoids the introduction of a diesel excise duty;
- It is assumed that Option D would only be introduced if it could be clearly demonstrated that the costs (both to Government to administer an e-RUC system, and to vehicle operators to install and maintain the OBUs and make RUC payments

based on OBU data) would not be disproportionate to the benefits.

A long term objective of Option D would be to charge all vehicles, whether powered by petrol or diesel or some other fuel, and regardless of weight using the same underlying system.

It is likely that all vehicles would continue to pay annual MVR license fees as a contribution to the fixed costs of maintaining an accessible network (e.g. to cover costs not related to usage such as weather-related damage to roads).

It is assumed that this option would be implemented in such a way as at least maintain current levels of effectiveness in the raising of revenues (i.e. that there would be no greater opportunities for evasion and non-compliance than is currently the case).

This may require relatively higher initial capital outlay to establish appropriate enforcement measures, together with more extensive enforcement on an ongoing basis to avoid excessive revenue leakage.

For example, installation of ANPR (number plate recognition) technology in urban situations or tag and beacon technology along motorways might serve as a useful means of cross-verifying data collected through OBUs.

Option D would ultimately allow for post-payment by all vehicle operators although there may need to be allowance for pre-payment in certain circumstances (e.g. rental cars).

It is anticipated that this should reduce compliance costs and enable streamlining of payment processes as it avoids the need for refunds of usage charges for off-road usage.

Under Option D, the actual amount of road usage charges payable would be based on a combination of:

- Distance travelled on-road;
- Weight of the vehicle. It is proposed that under e-RUC this continue to be based on the maximum gross laden weight. For light vehicles under 3.5 tonnes a flat rate would apply; and
- For HGVs, axle configuration.

Hubodometers could be phased out.

### Key Assumptions

- The average rate per kilometre charged through e-RUC would most likely initially be determined by reference to current RUC rates, allowing for any modifications to the CAM proposed elsewhere by the RUCRG;
- Vehicles under 3.5 tonnes would pay a flat rate per KM (on-road) regardless of location, time of day etc.;
- Vehicles over 3.5 tonnes would pay a higher rate per KM (on-road) according to weight and axle configuration but still with no differentiation for location or time of day etc.; and

- All vehicles regardless of weight would pay a single flat rate of MVR license fee, however discounts or exemptions could be possible to advance other policy objectives, e.g. electric vehicles.

### Option D and road pricing

Option D also provides a potential path to the implementation of a road pricing model over the longer term which is inherently based on the concept of charging all vehicles nationwide for usage of the road network on a “price per kilometre” basis. However, whilst this potential exists Option D does not assume that this would occur.

This long term view offers a great deal of flexibility in its ability to differentially price not only per kilometre but also according to whether the kilometres travelled are on roads suited to the category of vehicle concerned, or are on congested roads or are in fact toll roads (where the toll would substitute the road pricing rate as a means of funding a new piece of infrastructure).

For example it would ultimately be possible to disincentivise “rat running” by HGVs by charging very high rates for HGVs while at the same time charging minimal rates to light vehicles for the same road.

It is worth noting that the long term view of road pricing would likely see the progressive phase-out of petrol excise as petrol vehicles also adopt the technology. It also envisages the ability to cost individual networks and potentially individual roads. However this introduces many complexities which will need time to work through.

For these and other reasons it may not be feasible to implement road pricing for some years. However, it is noteworthy that other countries are investigating the feasibility of progressing down this track (most notably the Netherlands) within a 3-7 year time horizon.

Over time, if road pricing was adopted this would see the charging system being enhanced to include:

- Weight of vehicle;
- Location of roads travelled on;
- Time of travel;
- Combinations of above to allow for congestion charging; and
- Potentially other factors such as fuel efficiency of vehicle, emissions etc.

## 6. Option Evaluation

The sections below present a summary of the economic evaluation of each of the options. In assessing Option A there are a number of concepts that are developed and explained in some detail that are then drawn upon in the assessment of the other options, rather than repeating the discussion.

**Option A: RUC for vehicles over 3.5 tonnes only, with option of technology enabled measurement of on-road distance. License fees only for vehicles under 3.5 tonnes**

### Overall

Option A is the best of the options examined and is an improvement on the status quo. The simplified approach to weight categorisation for heavy vehicles and reduced ability of light vehicles to evade charges improves the effectiveness of charge recovery whilst reducing the administrative and enforcement cost to Government and users.

Inequities are however created in some areas, notably amongst light vehicle users although this is partially offset by the reduction in evasion. This option also retains the principles of distance and weight for charging as well as providing for voluntary installation of OBUs which provide the basis of a future road pricing regime.

### Effectiveness

#### *Vehicles over 3.5 tonnes*

A key problem identified with the existing RUC system is the non-compliance rate, and hence high enforcement costs.

The existing RUC system is essentially an “honesty based” system. Purchasing a RUC license requires a vehicle owner/operator to be honest when selecting the appropriate weight classification. This provides a relatively easy opportunity for non-compliance, as fixed weigh stations are required in determining non-compliance. Outside of these weigh stations, it is difficult to determine whether a vehicle is exceeding its weight limit.

Furthermore, the supplementary licensing system, and payment options available for these (such as via the internet) provide an opportunity for non-compliers to avoid detection.

By implementing a system which bases RUC charges upon the maximum gross laden weight for a vehicle (subject to the legal road limit), Option A removes the opportunity for systematic non-compliance with the weight based aspects of the RUC system.



This will reduce the costs of enforcement and improve the overall effectiveness of the system. However, this option does not address the issue of non-compliance with distance based charging. For instance, it does not address the issue of hubodometer tampering.

#### *Vehicles up to 3.5 tonnes*

For vehicles under 3.5 tonnes, this option significantly simplifies the basis for charging. Because it does not have a variable distance based element for these vehicles, it simply uses an average.

This simplification removes the opportunity for non-compliance through tampering with odometers. It also removes the need for enforcement of the distance based element of RUC charges.

Across the light vehicle fleet this will enhance the effectiveness of revenue collection from this category of vehicles since it is not expected that the adoption of an average distance travelled across the light vehicle fleet will impact upon the ability to recover total costs.

#### *Temporal considerations*

The above analysis has focused on the effectiveness of the option in a static sense, that is, it has not considered whether costs and benefits may change over time. It is therefore important to consider the effectiveness of the option in a temporal sense to evaluate whether the option has the capability for new technologies to be adopted and that it does not present barriers to longer term objectives.

A key issue for the consideration for reform to the RUC system is the emerging array of vehicle types and vehicle technologies. Within the automotive industry, there is substantial effort to improve fuel efficiency and reduce carbon dioxide emissions.

This effort is resulting in the development of new vehicle technologies, such as the hybrid technology and electric vehicles amongst others. In the case of electric vehicles, this is already an important issue for New Zealand because of policy objectives around electric vehicle take up and existing trolley buses (though they currently only represent a small portion of the fleet). A potential advantage of Option A is that it has the ability to accommodate new vehicle technologies given it is independent of vehicle fuel type.

In relation to longer term objectives, globally there is a move towards more advanced road user charging systems, particularly in Europe. These systems are attempting to charge road users for distance, weight, location and time (not necessarily all within the one system though), and are really options for full road pricing.

Given the rate of technological development that is occurring, particularly in relation to positioning systems, full road pricing may be practical to implement in the foreseeable future. Therefore, it would be prudent to ensure that any reform to the RUC system does not reduce the flexibility to adopt full road pricing in the future. Option A does not appear to present a barrier to a future move towards full road pricing.

## Efficiency

The dual charging system of this option (i.e. vehicles up to 3.5 tonnes are removed from the RUC system) means that it is necessary to consider the efficiency aspects separately for these two groups.

### *Vehicles over 3.5 tonnes*

It would be expected that the option would result in lower RUC costs to diesel vehicles over 3.5 tonnes relative to the status quo, all else being equal. This would be because of the:

- Reduction in business costs associated with complying with existing RUC licensing arrangements. In particular, reduced costs around complying with the weight aspect of the current system through removal of the supplementary license system;
- Lower expected total costs to be recovered – it is expected that overall Option A would result in a reduction in the administrative cost to government:
  - The simplification of the RUC system, through removal of the supplementary licensing system, would be expected to reduce the administrative cost borne by Government;
  - The removal of light vehicles under 3.5 tonnes from the RUC system would also reduce administrative costs to Government, however this would likely be partially offset by higher costs to process and enforce payment of license fees for these light vehicles due to the substantial increase in the license fee value;

- By reducing the opportunities for non-compliance, particularly in regards to the purchasing of a license with the incorrect weight, it would be expected that there would be a lower cost of enforcement; and
- Lower government administrative costs and lower enforcement costs would lower the overall cost to be recovered under the RUC system. Therefore, with lower overall costs to be recovered, all else equal, it is expected that the total amount to be recovered would fall, and hence result in lower RUC rates.
- Spreading of costs over a larger number of compliant users. The basic underlying principle of the CAM and RUC are to recover the total costs of providing the road network – those users that currently comply with the RUC system are subsidising non-complying users. The reduced opportunities for non-compliance (and hence lower overall non-compliance) essentially means that the total recoverable costs are allocated across a larger number of users reducing per unit costs, which would be expected to translate to lower RUC charges.

Lower RUC charges could be expected to translate into lower overall costs of the New Zealand supply chain, as market forces would ensure that RUC related savings to transport operators are passed on to customers. This would result in greater productivity within the economy, and enable investment in more productive assets. It would also be expected to improve the competitiveness of the New Zealand exports that utilise road transport services.

At a transport operator level, the proposed option is expected to promote more efficient investment decisions. The option provides the incentive to operate at, or as close as possible, to the maximum gross laden weight of the vehicle (subject to the maximum legal road limit). This would mean the investment decisions would need to place a greater focus on the expected future task. It may also lead to greater specialisation of firms, and hence the greater economies of scale that it offers.

In addition, the option's mechanism which enables operators to voluntarily install OBUs to measure distances travelled and claim refunds for off-road use is expected to improve business efficiency. The option enables RUC payments to be made periodically in arrears, rather than in advance, improving business cash flow management.

However, operators will experience costs associated with converting OBU data into distance travelled on-road. It is assumed that operators would only take up the option if it, overall, resulted in a saving. Therefore, it could be expected that the OBU option would further lower transport costs.

On the other hand, the simplification of the weight based charging aspect of the option the removal of charging based on actual laden weight, with supplementary licenses will create an inequity around the ability of some operators to achieve higher average laden weights. This inequity has efficiency impacts within certain sectors of the economy, where the product type and supply chain does not provide opportunities for back loading.

The inequity is most likely to disadvantage industries where there are special requirements for transportation of a commodity/product which means that vehicles are unable to be utilised for other commodities or products. It may also arise when there are risks around cross contamination.

For instance, in the forestry industry, logging trucks do not have the ability to transport other commodities. The 'cradle' nature of the trailer means that there are virtually no other logistic tasks that these can be used for. Liquids are also likely to be another example due to cross contamination risks.

The inequity could also impact upon 'distribution' or 'collection' freight tasks, such as where there are multiple sites to pick up or drop off freight, and maximum load weights are only achieved for part of the journey.

#### *Vehicles up to 3.5 tonnes*

There are already significant distortions within the market for vehicles up to 3.5 tonnes. For instance, the inclusion of diesel vehicles up to 3.5 tonnes in the existing RUC system creates a distortion between petrol and diesel vehicles in this weight classification. These distortions can affect the purchasing decisions of consumers, impacting upon the resource allocations within the economy and productivity.

All other things being equal this option would likely lead to light vehicle operators who travel long distances purchasing a diesel powered vehicle and operators who are more likely to travel smaller distances to purchase a petrol powered vehicle.

As this option removes any incentives around the distances driven, this may result in sub-optimal decisions around how far drivers travel in their vehicles. On the other hand, the distortion could actually drive efficiency amongst high use vehicle owners.

For an otherwise equivalent vehicle, diesel vehicles tend to have greater fuel efficiency. Therefore, incentives that drive the uptake of diesel vehicles are also likely to improve efficiency, particularly in light of the impending carbon emissions trading scheme.

Therefore, the market distortion created in the light vehicle market under this RUC option could actually drive greater overall efficiency through encouraging the adoption of a more efficient vehicle type and the flow on reductions in operating costs.

Another efficiency consideration is that light vehicles would not be able to claim any refund for off-road use. This will tend to reduce the licence cost per vehicle across the entire light vehicle fleet (under 3.5 tonnes) which will further emphasise the advantage of purchasing a diesel powered vehicle where longer travel distances are anticipated.

### Equity

Inequities will arise in any cost recovery process when there is a degree of averaging involved. Given the two tiered nature of the proposed option (i.e. one approach for heavy vehicles and one for light vehicles), the inequities are considered separately for these two groupings.

### *Vehicles over 3.5 tonnes*

Adopting a RUC system which charges heavy vehicles on their maximum gross laden weight (subject to maximum legal road limit) will mean that a greater degree of averaging will occur within the CAM. Those vehicles that operate at close to maximum gross laden weight will be subsidised by those that operate at less than this.

By charging based on maximum gross laden weight, an incentive is created to try and always carry the maximum gross laden weight (subject to legal limit). However, for some transport operators, this is simply not possible given the nature of the task.

As was identified above, freight tasks which have a distribution or collection type function will lose out, as will operators with specialised trailers not amenable for carrying other freight tasks (such as in logging). These operators will be subsidising freight tasks which are more typical of a line haul.

Across the entire vehicle fleet the inequities created are not likely to be significant in most cases – however for specific categories of operator the inequities could be quite material.

### *Vehicles up to 3.5 tonnes*

An annual licensing system for the collection of RUC from vehicles up to 3.5 tonnes results in a simple averaging of distance amongst all light diesel vehicles within the CAM. Therefore, low distance diesel vehicle users up to 3.5 tonnes will be subsidising high distance diesel vehicle users up to 3.5 tonnes.

The averaging over distance may become a particular issue if high distance users are more associated with commercial operations, such as couriers, and low volume users are typically private vehicles. Such a situation would see commercial operations being subsidised by private vehicle owners.

There is also an equity issue around off road use, as this option does not provide vehicles up to 3.5 tonnes with the ability to claim a refund for this activity. This inequity only arises to the extent that a vehicle which travels off-road may be a low (on road) user, who subsidises high on road users. Existing inequities between light petrol and diesel vehicles would not be addressed by this option.

### Cost recovery principles

The option clearly results in a simplification of the road user charging system. For heavy vehicles this is evident through weight based charges being based upon the maximum gross laden weight (subject to legal road limits). These simplifications are likely to avoid costs (as discussed above) and remove potential for confusion around the supplementary licensing system.

For light vehicles, there is simply an annual licence that removes the need for the purchase of 'kilometres'.

The simplification of the charging structures is also likely to improve transparency. This is because of the fewer weight based charges and removal of the supplementary licensing structure, which is likely to mean that the allocation of costs across the fleet will be more easily understood.

Whilst the system will still recover costs from those who benefit, as discussed under 'Equity' above, the simplification of weight based charges will mean that the allocation of costs across the fleet will not be as accurate as currently. This is a trade-off that arises between simplicity and ease of understanding and with accuracy of charges. The current system adopts an 'accuracy over simplicity' approach, but, this is believed to place a greater cost on the economy than the proposed Option A. Detailed modelling would be required in order to confirm this.

Making a judgement on whether the costs recovered through road user charges are efficient costs or not is difficult. This is because of the nature of costs associated with the road network (capacity expansions, strength, recurrent, compliance, enforcement, administration, etc). At one level, given that the construction of maintenance and new roads is typically undertaken by private contractors (with contracts awarded through competitive tenders) it is reasonable to believe that these are efficient costs.

At another level, it must be taken on advice from expert engineers that the road design (capacity and strength) is the most efficient design.

However, given the expected cost savings around enforcement and compliance that are expected from the simplification of the charging structure, it could be concluded that Option A will need to recover fewer costs, which could be viewed as an improvement in efficiency, but it is difficult to conclude whether the costs recovered under Option A are *efficient* per se.

## Broader policy objectives

### *Vehicles over 3.5 tonnes*

By charging heavy vehicles based upon maximum gross laden weight, (rather than actual gross laden weight) this could impact upon achieving public transport policy objectives.

Buses used to supply public transport services are essentially a distribution type service, picking up passengers along its route, and are therefore likely to operate most of the time at less than maximum load. Therefore, providing public transport services may be more expensive to operate than under the status quo.

### *Vehicles up to 3.5 tonnes*

The incentive created by the option to adopt diesel light vehicles for high distance users could help achieve environmental objectives, particularly around climate change and carbon dioxide emissions. With diesel vehicles typically being more fuel efficient than an equivalent petrol vehicle, and diesel itself typically having a higher energy content per litre than petrol.

Diesel vehicles tend to have lower carbon dioxide emissions per kilometre than petrol vehicles, and therefore incentivising the uptake of diesel may help achieve other environmental outcomes including objectives around carbon dioxide emissions.

## Future proofing

In considering potential new RUC options, it is important that the emerging vehicle technological landscape is taken into consideration. A key focus for automotive manufacturers at present is fuel efficiency and the development and roll out of alternative fuel types.

The emerging picture is that over the next decade there is likely to be a much wider array of vehicle motive (engine) technologies that achieve greater fuel efficiency levels than currently. Indeed some of these are already emerging, including continued emergence of diesel vehicles, hybrid vehicles and electric vehicles. There are also longer term technologies such as hydrogen. Any road user charging system must therefore be able to accommodate those vehicles that do not lend themselves to a fuel tax – electric vehicles being the most obvious. The option would be able to accommodate the emerging vehicle technologies, both for heavy vehicles and light vehicles, with relative ease.

In terms of the emerging road user charging and collection technologies that are available and being used internationally (typically some form of on board unit), the option does not present a barrier to the adoption of these technologies.

Its voluntary option to adopt such technologies is likely to facilitate the uptake of these technologies, particularly when businesses already adopt these for other business purposes (such as logistics planning, customer invoicing). Indeed, the option provides some incentives for the uptake of this technology, for instance the ability to pay RUC in arrears.



## Option B: Excise duty on diesel. Additional RUC for heavy vehicles

### Overall

Option B is the second best option overall but little better than the status quo. Whilst it is a simple and effective way of collecting charges the addition of a tax to what is essentially a modification of the existing system adds an administrative burden to Government as well as significant set up costs.

This will be offset by savings to administrative costs associated with simplifying the system of weight categories but, as with Option A, simplification is achieved at the expense of equity between users to some extent. The incentive to install OBUs remains but is weaker and the move to a partial tax based system is arguably a step in the wrong direction if road pricing is the eventual goal as well as introducing the complexity of refunds to a large group of non road diesel users.

### Effectiveness

For vehicle operators typically purchasing diesel for on road use the introduction of diesel excise would virtually eliminate opportunities for payment evasion.

However the ability for a large group of non road diesel fuel users (potentially up to 50% of diesel fuel purchases) to apply for refunds of diesel excise on the basis that the diesel was not being used for on-road vehicle operation (e.g. for heating, marine, aviation and other industrial and commercial purposes) will inevitably open up opportunities for the fraudulent use of this “rebated” fuel.

A fuel excise duty is also likely to be more complex to implement than some of the other options. It is likely to require legislation in order to introduce the tax and the rules and systems around the refund system will be complicated similar to some of the issues which have been faced in respect to the implementation of regional fuel taxes.

### *Vehicles over 6 tonnes*

As with Option A, the simplification of the weight based charging regime such that it is based upon the maximum gross laden weight removes opportunities for non-compliance, improving the effectiveness of the system.

Furthermore, the implementation of a fuel excise regime also reduces the opportunities for non-compliance in relation to distance based charging. Whilst the hubodometer system will still be used to capture a portion of the road user charges, in particular the distance based element, because fuel consumption is linked to distance travelled, the avoided cost from tampering with hubodometers will be less than both Option A and the status quo (decreasing the payoff from non-compliance).

However, the fuel excise duty does present a challenge for recovering the full costs from some vehicle types, such as electric vehicles (and other vehicles for which there would be no fuel tax element). Therefore, the option may require the addition of differentiated MVR license fees for these types of vehicle.

### *Vehicles under 6 tonnes*

A fuel excise regime (supplemented by an annual license) is likely to be highly effective in recovering the costs from vehicles under 6 tonnes. On the whole, there are likely to be few opportunities for vehicle owners to avoid the excise duty (other than by accessing rebated diesel as discussed above).

### *Temporal considerations*

A key consideration for the effectiveness of the option is the potential temporal impacts. As was discussed under the evaluation of Option A, two important temporal considerations are the emerging vehicle technology landscape and the longer term objective of full road pricing.

The introduction of a diesel fuel tax would actually limit the ability of some emerging vehicle technologies to be captured within the proposed RUC system. For instance, the expected emergence of electric vehicles will mean that some other RUC-type system would need to be introduced for these vehicles. Whilst these vehicles could still be charged an annual license and the 'additional RUC', they would avoid the fuel excise duty and this could introduce a new category of vehicle charges..

To the extent that Option B encourages the adoption of OBUs, it provides a pathway to full road pricing, particularly for heavy vehicles. However, the incentives for the uptake of OBUs are weaker than that for Option A.

Furthermore, it is likely to be a higher cost pathway as it involves implementing a fuel excise tax in the short

term, and then removing this when the change to full road pricing is pursued though the impact of this will be less the further into the future that road pricing is adopted.

### *Efficiency*

Option B uses three forms of charging. The introduction of an additional charging mechanism without the removal of another creates an additional layer of administrative cost for Government relative to the status quo. This additional administrative cost together with the cost of refunds would need to be fully recovered through the RUC system (and allocated using the CAM).

This creates a deadweight loss in the economy because it introduces an additional cost which will reduce the level of road based activity, and would also, all else equal, reduce the overall efficiency and productivity of the economy.

The use of a fuel excise will also give rise for the need to redesign the current system of refunds of RUC and petrol excise duty to allow for refunds of diesel excise to not only transport operators (limited to vehicles over 6 tonnes), but also non road diesel users such as marine and other industrial or business activities.

This category of diesel users are not currently captured within the RUC system, and therefore this option will create a significant dead-weight cost for managing both rebates to these users and enforcing the legitimacy of refund applications (i.e. to prevent industrial users applying for refunds on diesel which is actually used by road vehicles).



Introducing a diesel excise will also create a new administrative cost for the private sector. The diesel excise would be applied at a point in the fuel supply chain. These firms would need to ensure that they comply with the collection and payment (to government) of the excise. Relative to the status quo, this additional administrative cost creates a further deadweight loss.

The introduction of a diesel excise duty will increase the price of fuel relative to the status quo, however the working assumption is that this would not have an inflationary impact as the diesel fuel excise would offset the RUC charges.

There may be some impacts on efficiency, particularly for private vehicle users who could be more likely to respond to the immediacy of the price signals and in turn this could drive the uptake of vehicles with higher fuel efficiency.

There are also efficiency impacts for the different vehicle classes, as discussed below.

#### *Vehicles over 6 tonnes*

From the perspective of operators of vehicles over 6 tonnes (most likely predominantly commercial operations) it is not clear whether the option would be expected to lower or raise RUC costs relative to the status quo, all else being equal. Factors working to lower the costs include the:

- Reduction in transport operator costs associated with complying with the more complex system in the status quo (i.e. supplementary licensing system);

- Reduction in opportunities for non-compliance, particularly in regards to the purchasing of licenses with the incorrect weight, because a portion is recovered through fuel, which is more difficult to avoid; and
- Spreading of costs over a larger number of compliant users (through reduced opportunities for non-compliance from the simplification of the weight based charging and the difficulties of avoiding a fuel excise duty).

Factors acting to raise the RUC costs include:

- Greater overall government administrative costs to be recovered from a three tier system;
- Costs associated with processing refunds of diesel excise duty for off-road use; and
- Greater administrative costs in the upstream fuel supply market.

Given the uncertainty over what the potential impact of the option on RUC licenses would be, it is difficult to assess the potential flow impacts to the economy more broadly from the potential change in the level of RUC.

At a transport operator level, the proposed option is expected to encourage more efficient investment decisions, as with Option A. Operators would be incentivised to operate at, or as close as possible, to the maximum gross laden weight of the vehicle (subject to the maximum legal road limit), and encourage investment decisions to place a greater focus on the expected future task. This is likely to encourage higher utilisation of vehicles, increasing productivity within the economy.

Allowing the voluntary installation and use of OBUs to measure distances travelled and claim refunds for off-road use is expected to improve business efficiency, as operators are assumed to only take up such an option if it, overall, resulted in a saving for that company. Therefore, it could be expected that the OBU option would act to reduce transport costs, with associated productivity benefits for the economy more broadly.

As with Option A, the simplification of the weight based charging mechanisms will create an inequity around the ability of some operators to achieve higher average laden weights (as will be discussed further below) and negatively impact certain sectors of the economy.

The inequity is most likely to disadvantage industries where there are special requirements for transportation of the commodity/product which means that vehicles are unable to be utilised for other commodities or products. It may also arise when there are risks around cross contamination.

#### *Vehicles up to 6 tonnes*

The proposed option has the capability to remove the distortions between light petrol vehicles and light diesel vehicles that currently exists (as petrol vehicles currently pay a fuel excise whilst diesel vehicles fall under the current RUC system). The option aligns the mechanisms used to recover the costs of the road network – both light petrol and diesel vehicles would be charged an annual license and a fuel excise.

However, whether there is complete alignment between the petrol light vehicles and diesel light vehicles will depend upon the relative rates of fuel excise and the rates of annual licenses. One could reasonably expect that the annual licenses would be the same.

In terms of the absolute level of the excise rates in cents per litre, one would need to consider the inherently greater fuel efficiency of a diesel vehicle relative to an equivalent petrol vehicle. Therefore, the level of diesel excise may actually be higher than for petrol in order to recover the same amount on a per kilometre basis.

Eliminating the market distortions between petrol (and other taxed fuel vehicles, such as LPG, CNG) and diesel vehicles would promote greater efficiency within the vehicle market. Investment decisions would not be distorted by different systems around the collection of road user charges.

Under this option, if alignment between petrol and light vehicles is made, there would be no incentives (or disincentives) to purchase one vehicle fuel type over another.

#### *Application of cost recovery principles*

Introducing a fuel (diesel) excise duty simplifies the charging of light vehicles for road user charges. However, for heavier vehicles which are still required to purchase distance based charges, there is not the same simplification, though heavier vehicles would face a simplification around RUC weight charges.

Whilst it appears that Option B would be a simplification for most road users, it potentially introduces complexities for road users with significant off-road use, non-road diesel users and/or companies in the fuel supply chain (depending on the point in the supply chain that the duty is applied).

The use of an excise duty and distance based licences for heavy vehicles means that road user charges will be based upon three variables (weight, distance and fuel consumption) rather than the two (weight and distance) under the status quo. This will make the cost allocation process and determination of fee structures more complex and less transparent.

Option B is also expected to trade off some of the accuracy of charges in the status quo in order for greater simplicity for road users particularly light vehicles. But this is offset by complications for other parties, as the system may not simply charge road users, creating a need for systems to ensure that non-road users are either refunded or exempt. Overall, it is not clear whether the trade-offs will actually deliver any net cost savings to the economy.

As with Option A determining whether the costs recovered are efficient or not is difficult. It is also not clear whether the costs recovered under Option B will be any more efficient than under the status quo.

## Equity

A fuel excise tax will capture both a weight based charging element as well as a distance based element – as weight and distance increase, fuel consumption increases and hence the level of RUC increases. Whilst

this is appealing, an additional consideration is that it introduces averaging around fuel consumption rates.

Averaging over fuel consumption creates both horizontal and vertical inequities.<sup>3</sup> To illustrate the horizontal inequity created, consider two vehicles of the same model, one five years older than the other. Typically, the older vehicle will have higher fuel consumption.

This means that otherwise equivalent vehicles will essentially be taxed at a different rate (though this could be a positive for other policy objectives and overall efficiency). This may not be such an issue for businesses, however for individuals it raises vertical equity impacts. For instance, consider a high income worker and a low income worker. A high income worker will typically be able to afford to purchase newer vehicles, with the latest fuel efficiency technologies (such as hybrid vehicles).

However, a low income worker will have less ability to purchase these higher cost technologies. Therefore, to the extent that high income workers are able to purchase more advanced fuel efficient vehicles, a low income worker will actually subsidise a high income worker under the diesel excise regime.

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<sup>3</sup> Horizontal equity refers to the concept that people with a similar ability to pay taxes should pay similar amounts. Vertical equity refers to the concept that people with a greater ability to pay taxes should pay more – if there is vertical inequity, everyone pays the same irrespective of their ability to pay.

These considerations around the equity impacts around fuel efficiency are particularly important, as the CAM will be basing charges on average fuel consumption rates.

Electric vehicles, and other vehicles not powered by a fuel taxed at source (petrol, CNG, LPG and under this option diesel) would likely be subsidised by those vehicles that are taxed.

#### *Vehicles over 6 tonnes*

Adopting a RUC system which charges heavy vehicles on their maximum gross laden weight (subject to maximum legal road limit) will mean that a greater degree of averaging will occur within the CAM. Those vehicles that operate at close to maximum gross laden weight will be subsidised by those that operate at less than this.

However, because a portion of the road user charges will be recovered through a fuel excise, the averaging around actual laden weight will be muted. As the actual laden weight increases, fuel consumption will increase. Therefore, vehicles with a higher actual laden weight will tend to pay more RUC than those with a lower laden weight (all else equal).

#### *Vehicles up to 6 tonnes*

As noted above, the option could be set such that it removes inequities in the market for vehicles. However, an inequity would still arise around off road and on road use. The option does not propose to allow diesel vehicles under 6 tonnes to claim a refund for off road use. Therefore, vehicles which have significant off-road

use are likely to subsidise vehicles which are predominantly used on-road (though it may depend upon the point at which diesel is taxed in the fuel supply chain).

#### *Broader policy objectives*

The actual level of the diesel excise rate could be used to create a market signal to achieve other broader policy objectives. For instance, diesel vehicles produce fewer greenhouse gas emissions on a per kilometre basis than petrol vehicles (for an equivalent vehicle). Therefore, the excise rate could be set such that it promotes the uptake of diesel vehicles to achieve climate change objectives (though noting that diesel vehicles tend to have higher per kilometre emissions of other air pollutants).

Although the option creates inequities around the averaging of fuel consumption, this could act to promote the uptake of more efficient vehicles. The inability of the option to easily incorporate emerging vehicles in the market could contribute to the achievement of other policy objectives, such as the uptake of electric vehicles.

#### *Future Proofing*

Option B does not make significant advances towards an eventual transition to road pricing.

Whilst it allows for the voluntary installation of OBUs into HGVs the incentives implicit within this Option for this to happen are weaker than in Option A as the RUC charges will be lower to account for the diesel excise collected.

In fact, the introduction of diesel excise could potentially create barriers for a transition to road pricing and the move to a fuel excise regime is not likely to be easily amenable to the inclusion of emerging vehicles fuel types (such as electric vehicles).

Furthermore, the advancements in fuel efficiency, and the continual reduction in fuel consumption rates, is likely to create escalating equity issues, as some users may not be able to afford to adopt the latest fuel efficiency technologies, and they would therefore be subsidising those who could under a fuel excise regime.

## Option C: Excise duty on diesel. No RUC. Scale of MVR license fees differentiated by weight for all vehicles

### Overall

Option C is a less attractive option than A or B and scores more poorly than the status quo. It is an effective means of collecting revenue but incurs the costs of establishing a new taxation system and transfers some of the administrative cost burden from road users to fuel suppliers and the Government. It is also much weaker in terms of recovering costs from those who create them.

It also creates complication in refund systems for off road use and raises question on how to deal with non road use of diesel fuel in a cost effective way whilst not creating opportunities for evasion.

Implementing Option C is also likely to be a significant hindrance to moving to a road pricing system as it largely abandons the principles of measured distance and weight whilst providing weak incentives for OBU installation upon which a road pricing system would be based.

### Effectiveness

The proposed fuel excise duty would remove opportunities for non-compliance around both weight and distance. Weight is simply based upon the maximum gross laden weight, whilst distance is proxied by fuel consumption – there would be no ability to tamper with hubodometers.

As with Option B for vehicle operators typically purchasing diesel for on road use the introduction of diesel excise would virtually eliminate opportunities for payment evasion.

However here again the ability for some diesel fuel users (potentially up to 50% of diesel fuel purchases) to apply for refunds of diesel excise on the basis that the diesel was not being used for on-road vehicle operation (e.g. for heating, marine, aviation and other industrial and commercial purposes) will inevitably open up opportunities for the fraudulent use of this “rebated” fuel

As discussed under Option B, a fuel excise based RUC system would not accommodate emerging vehicle fuel types and technologies, such as electric vehicles.

Furthermore, whilst Option B provides a pathway to full road pricing, Option C does not, as there is no distance based charging whereas Option B included an element similar to the existing RUC system.

### Efficiency

Adopting a fuel excise regime in place of the existing RUC licensing system, on the face of it, appears to result in a simplification of the administrative burden on Government – there are likely to be fewer parties with which the government needs to transact, and the enforcement burden is likely to fall as there are not the reduced opportunities for non-compliance.

As with Option B however, the use of a fuel excise diesel will also give rise for the need to redesign the current system of refunds of RUC and petrol excise duty to allow for refunds of diesel excise to not only transport operators (limited to vehicles over 6 tonnes),

but also non road diesel users such as marine and other industrial or business activities. This will create a significant dead-weight cost for managing both rebates to these users and enforcing the legitimacy of refund applications (i.e. to prevent industrial users applying for refunds on diesel which is actually used by road vehicles).

Introducing a diesel excise will also create a new administrative burden for the private sector the cost of which depends upon what the excise would be applied. These firms would need to ensure compliance in the collection and payment (to government) of the excise collected. Relative to the status quo, this additional administrative burden creates a deadweight loss in the economy.

In general diesel usage as a proxy for distance and weight will tend to be less efficient as a means of sending price signals – notwithstanding the license fee “top-up” for HGVs based on weight. There are also efficiency impacts for the different vehicle classes, as discussed below.

#### *Vehicles over 6 tonnes*

It would be expected that the option would result in lower RUC costs to diesel vehicles over 6 tonnes relative to the status quo, all else being equal. This would be because of the:

- Reduction in business costs associated with complying with existing RUC licensing arrangements;
- A lower administrative cost on government; and
- Spreading of costs over a larger number of compliant users.

As discussed under Option A, lower RUC charges would be expected to contribute to lower overall costs of the New Zealand supply chain, improving productivity within the economy and the competitiveness of New Zealand exports. It would also be expected to promote more efficient investment decisions.

However, the incentives for the uptake of OBUs are not as strong as under Option A. Because of the pay-as-you-go nature of a fuel excise regime, the main incentive for the uptake of OBUs would be the measurement of off road use.

Unlike Option A, Option C would not experience the same degree of inequity around basing the weight based charge on the maximum gross laden weight because fuel consumption is dependent upon the actual laden weight (although fuel consumption is not directly proportionate to weight). Therefore, distortions between different sectors of the economy which have different freight task characteristics (such as in the transportation of liquid products) will be muted.

#### *Application of cost recovery principles*

Charging all vehicle types only through a fuel excise duty only (plus the annual MVR licence) simplifies the structure of road user charges for all vehicles. But it does create complexities for road users with significant off-road use, non-road diesel-users and/or companies in the fuel supply chain (depending on the point in the supply chain that the duty is applied).



The use of a diesel excise duty will improve transparency through charging based only through one variable fuel consumption rather than the two under the status quo (plus an element of weight within the MVR license fee).

Option C clearly makes a trade off between accuracy of charges in the status quo in order for greater simplicity for road users. But this means that the link between damage caused by an individual vehicle and the charges it faces is weakened. It also means that complications are also introduced for other parties, as the system may not simply charge road users.

As with the other options, determining whether the costs recovered are efficient or not is difficult. It is also not clear whether the costs recovered under Option C will be any more efficient than under the status quo.

In addition the use of MVR license fees to differentiate payment amongst vehicles over 6 tonnes creates a further averaging effect which overall results in a weaker link between those road users that cause damage and those that pay for it.

### Equity

A fuel excise tax acts as a proxy for both weight and distance. However, it is reliant upon the underlying efficiency of vehicle engine technologies, which tend to improve over time. But a fuel excise tax introduces averaging around the fuel consumption of vehicles. This averaging can create inequities.

As discussed under Option B, averaging over fuel consumption creates both horizontal and vertical inequities. This averaging will typically result in older vehicles subsidising newer vehicles. It could also lead to lower income workers subsidising higher income workers, as higher income workers have a greater financial ability to adopt the latest technologies such as hybrid vehicles.

However complete replacement of RUC with a combination of diesel excise and license fees substantially increases the use of averages and proxies and inevitably this introduces inequities. For HGVs this will mostly relate to distance, for light vehicles to fuel efficiency.

#### *Vehicles over 6 tonnes*

The inequities associated with the simplification of the weight based charging (as discussed in Option A) would be muted by a fuel consumption based RUC system. As fuel consumption proxies both weight and distance, higher laden vehicles will consume more fuel, and hence pay more road user charges than a vehicle with a lower actual laden weight.

#### *Vehicles up to 6 tonnes*

The main inequity which would arise for vehicles up to 6 tonnes would be that around off-road use. The option does not propose a refund system for off-road use by these vehicles. Therefore, vehicles which have significant off-road use are likely to subsidise vehicles which are predominantly used on-road.



### Broader policy objectives

The actual level of the diesel excise rate could be used to create a price signal to achieve other broader policy objectives. For instance, diesel vehicles produce fewer greenhouse gas emissions on a per kilometre basis than petrol vehicles for an equivalent vehicle. Therefore, the excise rate could be set such that it promotes the uptake of diesel vehicles to achieve climate change objectives though noting that diesel vehicles tend to have higher per kilometre emissions of other air pollutants.

Although the option creates inequities around the averaging of fuel consumption, this could act to promote the uptake of more efficient vehicles. The inability of the option to easily incorporate emerging vehicles in the market could contribute to the achievement of other policy objectives, such as the uptake of electric vehicles.

### Future Proofing

Under Option C, there are few incentives to install on board units (unless there is significant off-road use). Therefore, it is not expected that this option would provide a pathway to full road pricing and it therefore scores the lowest overall against this criteria.

Furthermore, like Option B the simple fact that diesel excise has been introduced could of itself create barriers for a transition to road pricing.

Furthermore, it does not easily accommodate the developments in alternative vehicle fuel technologies. It will also face the same inequity issues around fuel efficiency as discussed under Option B (some users may not be able to afford to adopt the latest fuel efficiency technologies, and they would therefore be subsidising those who could under a fuel excise regime).

## Option D: Electronic Road User Charges (“e-RUC”) for all vehicles.

### Overall

Option D in the form developed for evaluation is essentially an electronic distance based charge designed to replace the current paper-based RUC system.

Whilst there are some promising signs that the cost of implementing such a system could be (from a Government perspective) significant lower than earlier studies suggested, this would have to be confirmed by further feasibility assessments before proceeding to implementation.

The lower cost of implementation would be as a function of the significant investment already being made by private sector providers of OBUs and distance tracking systems (for non-pricing purposes), with the assumption being that these could be cost-effectively adapted for use in the collection of RUC.

The key factors yet to be fully tested are whether such OBUs and systems could be relied upon for the comprehensive collection of road user charges across the entire country and the entire fleet of diesel vehicles without significant additional investment in supplementary monitoring and enforcement systems and/or expenditure on systems integration (e.g. with the MVR records of weight or with tollroad systems) or on systems specifically suited to the light vehicle fleet.

Assuming that such a system can be implemented both efficiently (at relatively low cost) and effectively (so that revenue collection rates are high and there is minimal

capacity for evasion), Option D is the most equitable of all the options and furthermore the most effective in applying cost recovery principles as it has the least averaging.

It is also unencumbered by temporal issues such as increasing fuel efficiency and has the advantage that, should Government decide to further investigate road pricing it is able to accommodate far more sophisticated charging systems based on time and location in the future. In the longer term as technology develops this is the most attractive of the options analysed and a significant improvement on the current system.

### Effectiveness

The adoption of charges based upon maximum gross laden weight increases the effectiveness of the weight based charging aspect of this option, relative to the status quo.

This option essentially replaces the use of hubodometers and odometers in diesel vehicles for the measurement of distance with OBUs. Over time it would also be possible to mandate the installation of OBUs in petrol vehicles so that all vehicles pay road user charges on the same basis – which could allow for the eventual phasing out of petrol excise duty.

Whilst this seems simple enough, it does present some major challenges for implementation, compliance and reliability. On their own, OBUs probably provide more opportunities for non-compliance, as the signals are easily blocked. This requires the installation of a number of devices (as in different distance measuring devices) which can then be used to verify data collected through the OBU.

Another compliance related issue is the reliability of the tracking technology. OBUs require signals to be transmitted to satellites, or other positioning infrastructure. Currently, GPS systems suffer from loss of signals in cities (due to buildings), in tunnels and other covered areas. It is not clear the extent to which supplementary systems might be required in order to ensure the reliability of the OBUs or for enforcement purposes.

In transitioning to this option, there would also be an issue of enforcing the uptake and installation of the required technologies given the size of the fleet to be covered.

### Efficiency

Depending on the outcome of further research into the feasibility and costs of implementing Option D it is likely that there would be a significant cost associated with implementation of Option D to a standard acceptable for what is effectively a tax collection mechanism.

It may also be necessary to invest in new infrastructure in order to ensure complete coverage of the New Zealand road network and achieve the required level of reliability. At this stage of the analysis it is not clear what the total costs of the system would be.

Whilst the ongoing administrative cost to Government may be reduced, this may be essentially shifted to the vehicles operators required to install OBUs and pay monthly fees to private back office operators charged with collecting the road user charges and remitting the revenues to Government.

In essence Option D as currently contemplated only really replaces one distance measuring device with another. However there are some key benefits to the road user who pays RUC as the technology allows for post-payment based on actual on-road usage (avoiding the need for refunds for off-road travel). These benefits are most likely to be appreciated by heavy RUC payers and in fact for light vehicles an electronic system may in fact carry a heavier compliance cost.

It is clear however that this option also provides the foundation for a move to full road pricing, should this be contemplated in future. The costs associated with implementing Option D now should therefore also be considered in the context of reducing the future investment which would be required to realise the benefits of full road pricing.

As discussed below under Future Proofing a move in the longer term to road pricing has the potential to significantly enhance overall economic efficiency.

### Application of cost recovery principles

The option is very similar to Option A in terms of charging, except that distance is measured through an on board unit rather than a hubometer (or odometer in the case of light vehicles). It is expected that this option will simplify the structure of charges (particularly around weight). It also simplifies the method of charging through the use of a 'billing' type system (but relies on new back office functions within government. It may also create the need for internal analysis or outsourcing of OBU data analysis).

The simplification of the charging structures is also likely to improve transparency. This is because of the fewer weight based charges and removal of the supplementary licensing structure, which is likely to mean that the allocation of costs across the fleet will be more easily understood.

However, the use of a technology based solution may mean that overall transparency is reduced. The concept of charging on maximum gross laden weight and distance is simple enough. However, given distance will be measured through electronic tracking (as opposed to mechanical in the case of hubometers), and special data analysis is required in order to convert OBU signals to distance, the measurement of distance may be viewed as becoming a bit of a 'black box' (i.e. less transparent).

As with Option A, the allocation of costs across the fleet under Option D will not be as accurate as in the status quo due to the simplification in charging for weight. This is a trade-off that arises between simplicity and ease of understanding and with accuracy of charges. However, it is not clear whether Option D would impose greater costs on the economy or not. It will incur a number of sunk costs from the establishment of necessary infrastructure, the roll out of OBUs and the interpretation of OBU data, but over the longer term the benefits may outweigh the costs.

As with the other options, it is not clear whether the costs recovered under Option D will be efficient or not.

However Option D requires the least amount of averaging of all the options and hence the strongest link between those road users that cause damage and those that pay for it.

## Equity

Option D scores well with respect to equity. The main equity issues associated with Option D is the charging based upon maximum gross laden weight (subject to legal road limits). As has been discussed under the other options, this creates a disadvantage between those vehicle users who are able to capture backloading tasks, whilst disadvantaging those that have fewer opportunities for backloads.

## Broader policy objectives

Arguably a key rationale for moving to Option D is that it provides a path to implementation of a broader policy objective to move to full road pricing, and the economic benefits that this would be expected to provide.

## Future Proofing and road pricing

By mandating the adoption of OBUs for the measurement of distances travelled on road, Option D provides a pathway towards full road pricing. Road pricing could be expected to deliver significant efficiency and equity improvements, through charging by location (even down to individual roads), time of day (to counter congestion) and for actual laden weight and even incorporate environmental externalities.

### *Efficiency benefits of road pricing*

At a broad level, the efficiency benefit of full road pricing is that it provides significantly stronger price signals than those that can be achieved under the status quo. These price signals are achieved through the removal of much of the averaging required by current road user charging systems.

Therefore, each road user would, theoretically, be charged for a much closer approximation of the cost that they impose on the road network (though there are some practical barriers to achieving this, such as the valuation of the road network).

Charging each road user for the cost that they impose on the road network will improve road user decisions around their use of the network. Users would be expected to consider the relative costs and benefits of travelling by road, and consider whether:

- The route taken minimises overall costs on the road network in terms of damage caused as well as other factors such as congestion;
- The trip is actually needed;
- Whether they consider it best to travel by private vehicle or some other mode; and
- Whether there is substitute activity or location (closer by) that can be used.

It is expected that changes in these consumption decisions, as a result of full road pricing, would drive greater resource allocation decisions across the economy. Specific improvements in resource allocation decisions could be expected through:

- Encouraging more efficient use of the road network. This would essentially involve creating the disincentive for heavier vehicles to use roads of a lower strength. On such roads, heavier vehicles would cause significantly higher damage, and be charged a significantly higher fee for its use.

Therefore, heavier vehicles would try to maximise the use of major roads with higher strengths. This would be expected to result in a reduction in the overall cost of maintaining the network, as there would be less damage to 'local' roads caused by heavy vehicles;

- Influencing the decisions around the time of day that travel is undertaken. By incorporating congestion charging in a road pricing regime, it is expected that there would be a significant cost associated with travelling during peak times. This would encourage users to travel outside of peak times, increasing the overall utilisation of the road network, and potentially reducing the demand of expansions of network capacity; and
- Influencing decisions around mode choice and destinations. Full road pricing could see users change behaviour around their destinations for certain activities. For instance, users may decide to travel to nearby local shops instead of large shopping complex that are further away, reducing the overall level of resource consumption in the economy. Users may even decide to walk, use a bicycle or catch public transport for certain journeys rather than use a private vehicle.

Whilst there are potentially significant efficiency benefits from full road pricing, it is still necessary to consider the cost effectiveness of full road pricing (such as the administrative costs, and costs involved in installing and maintaining OBUs).

Furthermore, implementation of full road pricing in New Zealand in advance of other economies could actually have adverse economic impacts. For instance, full road pricing could raise the costs of the New Zealand supply chain if charges beyond a weight and distance basis are introduced, such as congestion pricing, location pricing and environmental externalities.

If this is undertaken in advance of other economies, then higher costs in the supply chain are likely to negatively affect the competitiveness of exports.

*Equity improvements of full road pricing*

Adoption of full road pricing, in its purest form, would remove all averaging that is currently required by existing road user charging systems around the world. There would be no need to 'group' vehicles into weight categories; there would be no averaging of distances travelled, fuel consumed, backloads, etc. By removing averaging, there would be no inequities, as every road user would be charged for their exact road use.

However, in practice, there may still be a need for averaging across categories. For example, it may not be feasible to determine the actual value of each individual road in New Zealand, and some form of road groupings may be required in order to determine location charging. Furthermore, there may actually be a need for some averaging in order to convey price signals to users.

For instance, congestion charging in its purest form would require real time displays of what the congestion charge would be on a particular road. However, this could fluctuate significantly from one day to the next (say, due to a car accident, or slight changes in road user behaviour, such as leaving a few minutes earlier). Therefore, in pure congestion charging, there may be too much information for consumers such that they simply cannot synthesis the information in order to make rational decisions.

# 7. Transition Implications

**Option A: RUC for vehicles over 3.5 tonnes only, with option of technology enabled measurement of on-road distance. License fees only for vehicles under 3.5 tonnes.**

Key transition requirements under Option A are:

- Removal of all light vehicles under 3.5 tonnes from the RUC system;
- Communication of the new MVR license fee charges for light vehicles under 3.5 tonnes and the available methods for payment;
- Enhancement of systems to allow for a large number of light vehicle payments quarterly (where most pay no more than 6-monthly presently);
- Communication of changes to RUC/CAM for vehicles over 3.5 tonnes including the change from actual weight to maximum gross laden weight and the consequential abandonment of supplementary RUC distance licenses, and the option to install GPS-based OBUs to measure distances travelled on-road;
- Facilitation of the supply of “eligible” OBUs (i.e. OBUs recognised by Government for the purpose of calculating RUC – such OBUs would be provided only by accredited suppliers) to HGVs that choose to take up this option and installation of roadside/back office equipment to enable collection

of data from OBUs and translation into useable data for the purpose of calculating RUC charges;

- Establishment of back office systems to allow for payment in arrears and on-account for those that install OBUs; and
- Installation of any systems and processes required for the enforcement of OBU-based data collection which are different from those currently employed – including (if considered necessary) back-up road side technology such as ANPR cameras/systems or tag and beacon gantries.

**Option B: Excise duty on diesel. Additional RUC for heavy vehicles.**

Key transition requirements under Option B are:

- Removal of all light vehicles under 6 tonnes from the RUC system;
- Communication of changes to RUC/CAM for vehicles over 3.5 tonnes including the change from actual weight to maximum gross laden weight and the consequential abandonment of supplementary RUC distance licenses, and the option to install GPS-based OBUs to measure distances travelled on-road;



- Facilitation of the supply of “eligible” OBUs (i.e. OBUs recognised by Government for the purpose of calculating RUC) to HGVs that choose to take up this option and installation of roadside/back office equipment to enable collection of data from OBUs and translation into useable data for the purpose of calculating RUC charges;
- Establishment of back office systems to allow for payment in arrears and on-account for those that install OBUs;
- Installation of any systems and processes required for the enforcement of OBU-based data collection which are different from those currently employed – including (if considered necessary) back-up road side technology such as ANPR cameras/systems or tag and beacon gantries;
- Establishment of systems and processes to allow for the levying and collection of diesel excise duty; and
- Establishment of processes to enable processing of refunds of diesel excise duty for the off-road use of diesel by heavy vehicles (and communication that this will not be available for light vehicles).

### Option C: Excise duty on diesel. No RUC. Scale of MVR license fees differentiated by weight for all vehicles.

Key transition requirements under Option C are:

- Removal of the RUC system;
- Establishment of systems and processes to allow for the levying and collection of diesel excise duty;
- Establishment of processes to enable processing of refunds of diesel excise duty for the off-road use of diesel by heavy vehicles (and communication that this will not be available for light vehicles);
- Facilitation of the supply of “eligible” OBUs (i.e. OBUs recognised by Government for the purpose of calculating refunds of diesel excise) to HGVs that choose to take up this option and installation of roadside/back office equipment to enable collection of data from OBUs and translation into useable data for the purpose of calculating diesel excise refunds;
- Communication of the new MVR license fee charges and the available methods for payment; and
- Enhancement of systems to allow for a large number of MVR license fee payments quarterly (where most pay no more than 6-monthly presently).



### Option D: Electronic Road User Charges (“e-RUC”) for all vehicles.

- Communication of changes to RUC/CAM for all vehicles including the requirement to install OBUs to measure distance travelled on-road and the change from actual weight to maximum gross laden weight and the consequential abandonment of supplementary RUC distance licenses;
- Facilitation of the supply of “eligible” OBUs (i.e. OBUs recognised by Government for the purpose of calculating RUC) and installation of roadside/back office equipment to enable collection of data from OBUs and translation into useable data for the purpose of calculating RUC charges;
- Establishment of back office systems to allow for payment in arrears and on-account for all road users using e-RUC; and
- Installation of any systems and processes required for the enforcement of OBU-based data collection which are different from those currently employed – including (if considered necessary) back-up road side technology such as ANPR cameras/systems or tag and beacon gantries;

## 8. Conclusions

Based upon the evaluation of each option presented above, a scoring which compares the relative performances of each of the options against the status quo was undertaken. Each of the options were rated using a scale of 1 to 5 compared against the status quo current RUC system – where a 3 is neutral compared to the status quo and a 1 is poor performance and a 5 is good performance.

Criteria	Option A	Option B	Option C	Option D
Effectiveness	<p>Rated 4-5</p> <p>&lt; 3.5 tonnes more effective, with reduced opportunity for non-compliance</p> <p>&gt; 3.5 tonnes more effective, less room for weight non-compliance</p>	<p>Rated 4 short term but 3 long term</p> <p>Diesel excise is an effective way to raise revenues however over time this effectiveness may weaken with new vehicle technologies</p>	<p>Rated 4 short term but 3 long term</p> <p>Diesel excise is an effective way to raise revenues however over time this effectiveness may weaken with new vehicle technologies.</p> <p>Removal of RUC makes this option slightly more effective than Option B as there are fewer opportunities for non-compliance.</p>	<p>Rated 1-2 in the short term but 3-4 in the longer term as technology reliability improves.</p> <p>Currently significant uncertainty around implementability, compliance costs and reliability.</p> <p>However assuming these can ultimately be overcome this option allows for effective implementation of cost recovery principles as well as marginal pricing principles.</p>

Criteria	Option A	Option B	Option C	Option D
Efficiency	<p>Rated 4</p> <p>Simplifies administrative costs to both business and government, particularly in respect of weight measurement.</p> <p>Encourages HGVs to carry maximum loads and use of diesel vehicles generally where long distances travelled.</p> <p>Retains usage based charges in RUC system for all vehicles over 3.5 tonnes (compared against 6 tonnes for Option B). Direct price signals therefore retained for a large category of vehicles.</p> <p>However price signals absent for vehicles under 3.5 tonnes which may encourage higher road usage than is desirable.</p>	<p>Rated 1-2</p> <p>Introduction of diesel excise creates a new administrative burden, including systems for refunds in respect of off-road use of diesel and non-road users of diesel.</p> <p>Partially offset by similar cost reductions to Option A.</p> <p>RUC based on max gross laden weight encourages HGVs to carry maximum loads.</p> <p>Diesel usage is the primary means of sending price signals to all vehicles (and particularly vehicles under 6 tonnes)</p> <p>However diesel usage is only a proxy for distance and weight and this may tend to distort price signals – particularly over time.</p>	<p>Rated 3-4</p> <p>Introduction of diesel excise creates a new administrative burden, including systems for refunds in respect of off-road use of diesel and non-road users of diesel.</p> <p>However costs of compliance to operators will be significantly reduced – i.e. shifts costs from operators to government (noting that the deadweight burden of the collection costs will need to be incorporated into the CAM)</p> <p>Diesel usage as a proxy for distance and weight will tend to be less efficient as a means of sending price signals – notwithstanding the license fee “top-up” for HGVs based on weight.</p>	<p>Rated 4-5 short term, potentially 2-3 longer term</p> <p>It is currently unclear how significant would be the cost both to Government and road users of implementing an e-RUC system and the cost of enforcement and verification systems.</p> <p>More efficient than any of the other options in sending appropriate pricing signals, with the potential for even greater benefits should road pricing be implemented in future.</p>

Criteria	Option A	Option B	Option C	Option D
<p>Cost recovery principles</p>	<p>Rated a 4</p> <p>Option is expected to improve the simplicity and transparency of the system. There will however be increased averaging for light vehicles in respect of distance.</p> <p>However, overall the trade-off between simplicity and accuracy of cost allocation is expected to deliver cost savings to the economy.</p>	<p>Rated a 2</p> <p>Option is expected to improve simplicity of the system for road users, but create complexities for road users with high off-road use, non-road diesel users and diesel suppliers.</p> <p>It is also expected to reduce the transparency of cost allocations through a three-tiered structure for heavy vehicles.</p> <p>It is not clear whether the trade-off between simplicity and accuracy of cost allocations will deliver overall cost savings.</p>	<p>Rated a 3</p> <p>Use of a fuel excise duty is expected to simplify the system for road users, but place complexities on road users with high off-road use, non-road diesel users and fuel suppliers.</p> <p>It is also expected that the transparency will be improved although this will be at the cost of significantly increased averaging through use of fuel excise and MVR license fees differentiated based on weight alone (no distance component).</p> <p>The trade-off between simplicity and accuracy of cost allocations may be warranted based upon expected cost savings (it is likely that the cost savings will be greater than under Option B).</p>	<p>Rated 4-5</p> <p>The option simplifies the charging structure around weight. It is unclear whether the option would improve transparency or not, given the potential 'black box' nature of using an on board unit.</p> <p>Trade-off between simplicity and accuracy of cost allocations is unlikely to be justified given possible high costs of implementation, but these are essentially sunk costs, so could deliver benefits over the longer term.</p>

Criteria	Option A	Option B	Option C	Option D
Equity	<p>Rated 2</p> <p>Creates inequities around distance based charging (for light vehicles) and greater averaging of weight for heavy vehicles.</p> <p>To an extent these are offset by the perception at least of reduced opportunities for non-compliance (i.e. enhanced effectiveness).</p> <p>Retains inequities between diesel and petrol powered vehicles.</p>	<p>Rated 3</p> <p>Introduction of diesel excise duty as a proxy for distance and weight mutes impacts noted in Option A.</p> <p>However of itself the diesel excise introduces inequities around fuel consumption and in relation to refunds for off-road use of diesel.</p> <p>Reduces inequities as between diesel and petrol powered light vehicles.</p>	<p>Rated 2</p> <p>Similar to Option B.</p> <p>However complete replacement of RUC with a combination of diesel excise and license fees substantially increases the use of averages and proxies and inevitably this introduces inequities.</p> <p>For HGVs this will mostly relate to distance, for light vehicles to fuel efficiency.</p>	<p>Rated 3</p> <p>e-RUC is effectively a replacement of the current paper system.</p>
Broader policy objectives	<p>Rated a 4</p> <p>This option may encourage long distance light vehicle road users to purchase diesel vehicles</p>	<p>Rated a 4</p> <p>Implementation of diesel excise duty could be beneficial in signalling pricing of environmental externalities.</p>	<p>Rated a 4</p> <p>As for Option B</p>	<p>Rated a 3 in the short term but 5 in the long term</p> <p>e-RUC does not signal a significant change from the current environment. However, the potential for implementing a range of price signals such as in relation to congestion is huge for this option over the longer term.</p>

Criteria	Option A	Option B	Option C	Option D
Future proofed	<p>Rated a 4</p> <p>Strong incentives for the voluntary installation of OBUs into HGVs – which is the first step towards enabling road pricing more generally.</p> <p>Option A does not create any barriers to progressing towards road pricing and is unaffected by changes in vehicle technology impacting on the validity of fuel usage as a good proxy for distance and weight.</p>	<p>Rated a 3</p> <p>Some incentives for the voluntary installation of OBUs into HGVs, but weaker than in Option A as RUC charges will be lower.</p> <p>Introduction of diesel excise could create barriers for a transition to road pricing and over time the validity of fuel usage as a good proxy for distance and weight is likely to weaken.</p>	<p>Rated a 2</p> <p>Incentives for voluntary installation of OBUs restricted to vehicles with high off-road usage only.</p> <p>Similar issues to Option B in respect of diesel excise duty.</p>	<p>Rated a 5</p> <p>This option makes the installation of OBUs mandatory across the entire vehicle fleet which would be a huge step forward towards road pricing.</p> <p>At the same time it does not introduce diesel excise duty and indeed seeks to remove petrol excise duty over time.</p>

In carrying out this analysis the RUCRG requested that a conclusion was not reached as to a specific option to be implemented or used as a replacement for the existing RUC system. The purpose of the evaluation is to assess the relative merits of a range of potential alternatives to the current RUC system to help inform the recommendations of the RUCRG to Government on what, if any, changes should be made.

Both the current system and each of the options evaluated represents a trade off between competing objectives. On the one hand the current scheme has been conceived as a means of tying back charges as

closely as possible to the costs each user imposes on the system. On the other hand, for the system to be workable it has to be sufficiently simple to be understandable to users and those charged with its enforcement and administration. This inevitably leads to averaging of charges across user groups and the associated inequities and cross subsidies this causes.

In developing the options for assessment we have taken a longer term view of what may be achievable with developing technology. Option D represents a possible initial step towards a “price per kilometre” charge for all road users using tracking and enforcement technology which is becoming available.

In assessing the existing RUC system and options A to C we considered the extent to which they facilitated or hindered an eventual move to such a system. Consideration of whether this is an important criteria or not depends upon whether Option D provides a better compromise between the competing criteria which the current system is trying to balance than the existing RUC regime.

We hold the view that road pricing has the potential to be a more effective and equitable road charging mechanism with higher costs offset by its much greater flexibility to charge based on location and time of day in the future making it a much more powerful tool for the implementation of Governments policy aims and objectives. As such it was considered to be one of the high priority evaluation criteria.

Option A provides some useful simplifications to the existing RUC system, improving its efficiency whilst remaining effective in collecting charges for road use. It remains based on the principles of weight and distance and provides incentives to adopt technology which would eventually assist a transition to road pricing. It is the most attractive of the options analysed and an improvement on the status quo although simplicity is achieved at the expense of equity.

Option B is a somewhat unsatisfactory compromise, adding a new collection mechanism without wholly eliminating any of the existing ones. Never the less it remains effective although its efficiency is compromised by the need to develop a new collection mechanism whilst retaining significant parts of the existing ones, and by its use of diesel excise duty as a somewhat unsatisfactory proxy measure for distance and weight for a large category of vehicles. It also requires an entire new category of businesses to interact with government with respect to refunds on diesel excise

used entirely for non road purposes. Without a full financial analysis it is not possible to identify the extent of overall savings versus the status quo but it is likely to be a less efficient option than A. It goes some way to solving the inequities created in Option A but introduces other complications in relation to refunds.

Option C is simple in concept but potentially costly to implement initially. It is also the least equitable option analysed and creates the most difficulty in transition to a road pricing regime. It essentially largely abandons the principles of cost allocation and recovery on which both the existing RUC system and road pricing are based on and lacks the flexibility to readily accommodate alternative fuelled and electric vehicles. Like Option B it also requires an entire new category of businesses to interact with government with respect to refunds on diesel excise used entirely for non road purposes.

The standing of Option D in the analysis is largely due to the cost of establishment and the fact that it is initially used only as a distance based charging mechanism. This option is not deemed cost-effective or economically viable in the short term due to the need make it mandatory across the entire diesel fleet.

As technology develops further Option D has the potential to provide the best balance between the competing objectives of a road user charging system being both effective, efficient and equitable whilst providing the capability for both location and time based charging.

# Appendix A: Evaluation Criteria

Level 1	Level 2	Level 3	Degree of Importance	Ranking
<b>Effectiveness</b>				
The degree to which the option is effective in collecting the required road user charges	Alignment of RUC with road funding costs	Weight based charging	It is important that a new system is able to be implemented effectively and without major hiccups. It is important that all road users are supportive of the system - i.e. recognise its necessity and support the basis of collection. If a system is perceived to be ineffective in collecting the charges from all road users in the way it was designed (e.g. if it is perceived that there is room for evasion or that some parties might be in a position to benefit from holes in the system while others can not) this will undermine support for the system. Furthermore, the charges calculated through the CAM make assumptions regarding projected revenues actually collected from different road user groups. The CAM is therefore predicated on an ability to project with reasonable accuracy these revenues. If this fundamental assumption is flawed or is not able to be sustained over time then there is a risk that insufficient revenues will be collected to fund the projects planned under the NLTP.	Equal highest importance with efficiency. If a system is regarded high risk to implement or likely to diminish in effectiveness over time then this will undermine the system.
		Distance based charging		
		Charging based on location (on-road/off-road)		
	Compliance	Disincentives for non-compliance		
		Opportunities for non-compliance?		
	Enforceability	Simplicity of collection process		
Weight				
Ability to accurately collect revenues	Distance			
	Location			
Ease of implementation				
<b>Efficiency</b>				
Is the option an efficient means of collecting the required road user charges	<i>Cost efficiency</i>		Road user charges are fundamentally a cost method of recovering the costs of building and maintaining a functional, accessible nationwide road network. It is very important therefore that the costs of collection are small relative to the revenues collected - both costs of administration to Government and costs of compliance to road users. Such costs are a deadweight burden to the economy. At the same time it is equally important that the method of collecting the charges are not distortionary to road user behaviour in a way which is detrimental to the economy. These considerations often pull against each other since in order to minimise the likelihood of distortionary behaviour, the aim is often to minimise the amount of "averaging" in the levying of charges, however some degree of averaging is necessary to avoid making the system overly complicated and increasing the admin costs.	Equal highest importance. It is vital that the balance between compliance costs and impacts on the economy is right.
		Administrative burden to government		
	Administrative burden to users	Ease of collection		
		Cost of collection		
	Compliance burden	Simplicity of system for users		
		Business friendly		
	<i>Incentives</i>			
	Price signals	Efficient use of road network		
		Investment decisions		
		Adjustment mechanisms		
Technology friendly (enabling)	Cashflow impacts			
<b>Equity</b>				
Are specific road user groups treated fairly	Equity (fairness) between and within different categories of vehicles	Are RUC charges independent of vehicle fuel type	Equity is similar to effectiveness in that if there is a perception of "unfairness" this will undermine support for the system and this in turn will likely lead to increased evasion which will need to be counterbalanced by higher levels of enforcement. The trick therefore is to maintain equity at an acceptable level.	Next order of importance alongside other broader policy objectives and future proof. There is a degree of magnitude here - if an option is manifestly inequitable then this is likely to undermine the system. Some degree of inequity is however inevitable.
		Fair recovery of costs between road users (between vehicle types and weights)		



Level 1	Level 2	Level 3	Degree of Importance	Ranking
<b>Broader Policy Objectives</b>			It is clear that some collection options such as diesel excise will likely have much wider implications in respect of collection of road user charges. Whilst the primary purpose of road user charges is to collect revenue for application under the NLTP, these wide implications can not be ignored and indeed in some cases could be equally as important.	As for equity. Again important to understand magnitude as it is likely that all options will to some extent support or undermine other policy objectives. However if an option significantly undermines other policy objectives then this would be of major concern - equally if it could be of significant support then this would be noteworthy.
Does the option align with broader policy objectives	NZTS (e.g., congestion, public transport, electric vehicles)	Contribution to policy outcomes		
		Potential barriers to policy outcome		
		Impact on business		
		Impact on competition		
		Environment (externalities)		
		Contribution to policy outcome		
	Economic (supply chain, inter-modal funding and competition etc)	Potential barriers to policy outcome		
		Impact on business		
		Impact on competition		
		Contribution to policy outcome		
		Potential barriers to policy outcome		
		Impact on business		
Impact on competition				
<b>Cost Recovery</b>			This criteria is really a cross-over of the above criteria of effectiveness and efficiency.	Not ranked as this would be double-counting
Does the option align with cost recovery principles	Covers costs imposed	Cost recovered are relative to costs of use (i.e. cost of wear and damage caused)		
	Financial sustainability			
	Auditable	Ease of data collection and verification		
	Transparency	Charging method is easily understood		
	Technology friendly (enabling)			
<b>Future Proof</b>			The key point here is that new technologies are likely to allow road user charges to be collected in a way which is more economically efficient (reduces averaging) and potentially also more cost efficient, equitable and (in the long term) effective (although in the short term this might be less the case). For this reason, it is important that an option does not act as a barrier against introduction of new technologies. It would also be highly beneficial if it could actively act as a bridge to the introduction of these technologies at a later date.	To the extent that there is a policy preference over the longer term to move closer to "true" road pricing then this criteria assumes a similar degree of importance to other policy objectives such as fuel efficiency as without greater application of technology this is unlikely to be possible.
Does the option allow for new technologies	Vehicle technology	Permissive of new technologies (e.g. fuel types and fuel efficiency)		
		Incentives on new technology uptake		
	Measurement devices	Supports alternative means of charging/collection (e.g. road pricing)		
	Flexibility to adapt to changed objectives			

# Glossary

**Diesel excise duty** is a charge on the purchase and use of diesel. The charge is on each litre of diesel fuel purchased and will be included in the price paid by purchasers of diesel either at the pump or on delivery to a storage facility (e.g. on farms, at wharves etc.). It will likely be remitted to the Government by wholesale diesel distributors.

**RUC** is Road User Charges. These are currently paid by all diesel powered vehicles and other vehicles powered by a fuel not taxed at source, regardless of weight. Vehicles with a manufacturer's gross laden weight of more than 3.5 tonnes must also pay RUC regardless of the fuel used to power them.

**RUC distance licenses** are purchased in units of 1,000 kilometres or multiples thereof. Vehicles must be licensed for a continuous distance so that when the finish distance is reached a new licence is required.

**Supplementary RUC licenses** provide for an increase in the weight limit of a RUC licence to allow for the occasional carrying of heavier loads. They are more expensive than ordinary distance RUC licences, but may be bought in multiples of 50 kilometres.

**MVR license fee** is the payment of a fee to use a motor vehicle on public roads for a defined period of time (usually six months or one year). When the fee is paid, a label is received indicating the expiry date of the MVR licence. In the context of this Report, all references to MVR license fees are references to this fee.

**Registration fee** is the fee paid when a vehicle is added to the motor vehicle register and issued with registration plates. Vehicles must be registered to be used on the road and only require re-registration if the registration has lapsed or been cancelled.

**Congestion charging schemes** are those which charge road users for the congestion costs they impose on others. These schemes are typically used in urban areas where there are high traffic-flows.

**Road pricing** is the charging of vehicles at a price per kilometre. Road pricing can take into account the location of roads travelled on and the distance travelled on-road. This is intended to efficiently charge vehicles for the costs they impose on the road network and other road users.

**HGVs** are Heavy Goods Vehicles and buses/coaches. For the purpose of this exercise we have defined HGVs as powered vehicles and trailers with a maximum gross laden weight over 6 tonnes.

**OBUs** are On Board Units. In the context of this report these are units which use GPS signals (amongst other things) to pinpoint and record vehicle location. Position, distance and time data is then transmitted via a mobile data network from the OBU to a computer centre to calculate charges on the route segments travelled. Using this technology, road use can be differentiated according to distance, time, and location.

**GPS** is Global Positioning System. Positional chipsets for general commercial use are currently accurate (to device level) to around 5 to 7 metres with older and less expensive devices having reduced accuracy. GPS is prone to a number of weaknesses such as bouncing signals and loss of signal at certain locations and times.

**Maximum Gross Laden Weight** is specified by the vehicle manufacturer and means the safe design weight to which the vehicle can be loaded. This manufacturer's specification may, or may not, be relevant to the maximum weight that roading authorities permit on any given road. Where the manufacturer's specified weight is greater than the legal on-road maximum, the latter will form the basis for charging.

**ANPR** is Automatic Number Plate Recognition technology. This records images using high resolution digital cameras assisted by infra red or other technologies for night time detection, then automatically processes the images, accurately and automatically reading the numberplates of around 95% of vehicles at highway speeds. Images that cannot be recognised are forwarded to operators for manual identification.

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