Network Rail conclusions on the Variable Usage Charge

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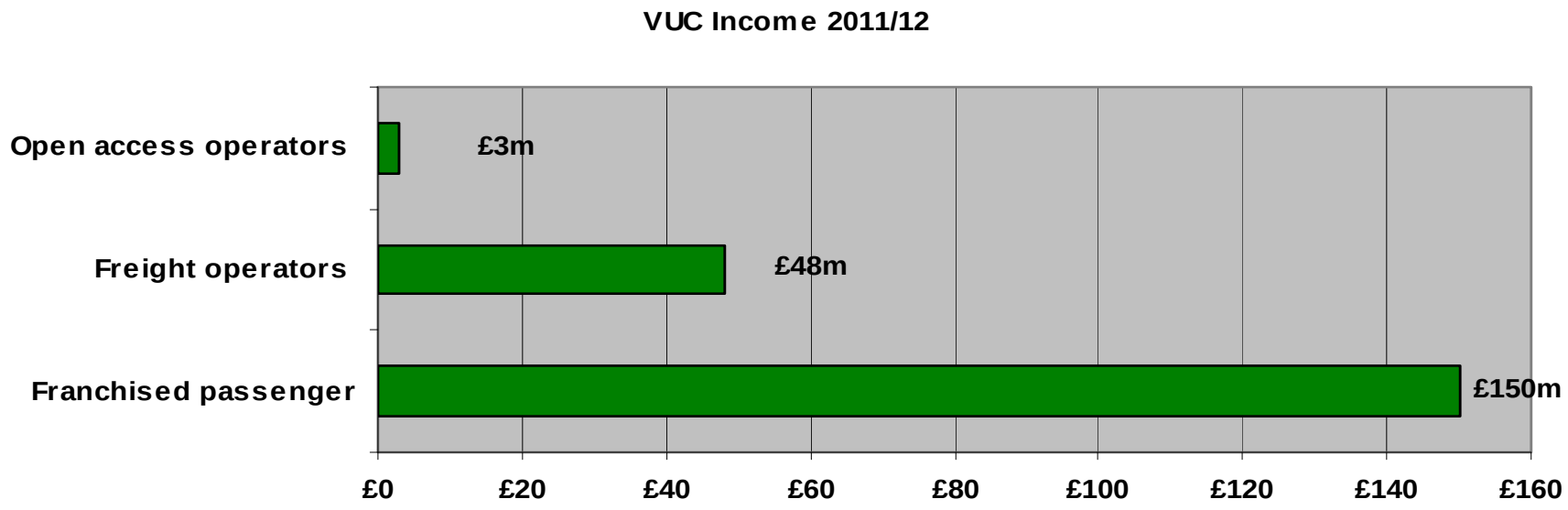
The process – where we are

Introduction

- The Variable Usage Charge (VUC) is designed to recover Network Rail's operating, maintenance and renewal costs that vary with traffic.
- The primary purpose of our consultation was to seek views on the methodology for allocating the VUC between individual vehicle classes in Control Period 5 (CP5).
- The graph, below, sets out the income that we received through the VUC in 2011/12.



Issues considered in our December 2012 consultation

1. Allocating vertical track variable usage costs;
2. Allocating horizontal track variable usage costs;
3. Allocating non-track (civils and signalling) variable usage costs;
4. Vehicle characteristics that inform VUC rates;
5. Temporary default rates;
6. Rates for modified vehicles ; and
7. Next steps.

1. Allocating vertical track variable usage costs: CP4 methodology

- Vertical track costs make up approximately 60% of total variable usage costs.

Review of VUC allocation methodology

- In CP4 vertical track costs were apportioned using the following 'equivalent track damage' equation. Equivalent track damage is a measure of 'track friendliness'. Hence more 'track friendly' vehicles attract a lower share of total variable usage costs.

Equivalent Track Damage = $Ct * A^{0.49} * S^{0.64} * U^{0.19}$ (per tonne.mile) * GTM

where:

Ct = 0.89 for loco-hauled passenger stock and multiple units, and 1 for all other vehicles

A = axle load (tonnes)
S = vehicle operating speed (miles/hour)
U = un-sprung mass (kg/axle)
GTM = Gross Tonne Miles

1. Allocating vertical track variable usage costs: Serco review

- We commissioned Serco to review the current equivalent track damage equation. It used the Vehicle Track Interaction Strategic Model (VTISM) to assess how vertical track damage varies with the existing CP4 variables:

Axle load | **Un-sprung mass** | **Operating speed**

- It modelled 48 scenarios with varying axle load, operating speed and un-sprung mass and then performed regression analysis to fit a relationship to these runs. It proposed the following equation to represent track damage as a function of the three variables:

$$\textbf{Relative damage (per axle.mile)} = 0.473.e^{0.133\mathbf{A}} + 0.015.\mathbf{S}.\mathbf{U} - 0.009.\mathbf{S} - 0.284.\mathbf{U} - 0.442$$

- In order to enable comparison with the CP4 equivalent track damage formula, Serco also derived the below power formula. However, this had a less good fit to the VTISM data and Serco recommended using the above equation.

$$\textbf{VTISM power formula} = \mathbf{A}^{1.71} * \mathbf{S}^{0.27} * \mathbf{U}^{0.31} \textbf{ (per tonne.mile) * GTM}$$

- The Serco analysis indicated that the exponents for axle load and un-sprung mass should increase, however, the speed exponent should reduce.

1. Allocating vertical track variable usage costs: NR conclusion to ORR

- We consider that the work carried out be Serco represents a step-change improvement in our understanding of the drivers of vertical track damage.
- However, initial analysis carried out by Serco and ourselves indicated that VUC rates for laden freight wagons, particularly bulk wagons, are likely to increase between 50% and 100% (we have now confirmed this).
- Following the careful consideration of consultation responses, we believe that changes to charges of this scale would be inappropriate to introduce in CP5 (especially when combined with the effect of the new Freight-Specific Charge).
- Therefore, we propose that, as part of the wider charges review that the industry has committed to in early CP5, the revised approach developed by Serco should be adopted from the start of CP6.
- Our proposed approach would provide more time for consideration of ATOC's concerns in relation to how the modelling results for the 100mph scenarios were treated in the Serco analysis.

2. Allocating horizontal track variable usage costs: Review of CP4 methodology

- Horizontal track variable usage costs make up approximately 25% of total variable usage costs.
- The CP4 approach to cost allocation places each vehicle into a ‘curving class’ (measure of ‘track friendliness’) depending on its mass and suspension characteristics.

Review of Horizontal VUC allocation methodology

- We reviewed the existing approach to apportioning horizontal track costs and defining the individual vehicle curving classes.
- We proposed, in our consultation, modifying the existing methodology to incorporate the following four refinements:
  1. Introduce an updated damage calculation methodology, comprised of separate components for rail grinding, RCF and wear,
  2. Use a coefficient of friction on the flange of 0.1 to reflect better lubrication,
  3. Include sample track alignment variations to allow better modelling of dynamic behaviour, and
  4. Include the tangential forces for the trailing wheelset of a bogie in the calculation.
- We considered that these refinements would improve the accuracy of the apportionment of horizontal track variable usage costs.

2. Allocating horizontal track variable usage costs: NR conclusion to ORR

- We consider that the analysis that we have carried out and the revised methodology that we have developed in order to apportion horizontal track variable usage costs in CP5 is robust and represents a significant improvement, relative to the CP4 allocation methodology.
- However, in light of our proposal that the revised methodology developed by Serco, which would be used to apportion the vast majority of track variable usage costs, should be deferred until the start of CP6. We do not consider that it would be appropriate to introduce a revised methodology for apportioning the minority of track variable usage costs.
- Therefore, consistent with our proposal in relation to implementing the revised methodology developed by Serco, we propose that, as part of the wider charges review that the industry has committed to in early CP5, the revised methodology for apportioning horizontal track variable usage costs should be adopted from the start of CP6.

3. Allocating non-track (civils and signalling) variable usage costs: CP4 methodology

Civils variable usage costs (10% of total variable usage costs)

- In CP4, metallic underbridge and embankment costs were apportioned between vehicles using the following equivalent structures damage equation (a measure of 'track friendliness'):

Equivalent Structures Damage = $Ct.A^{3.83}.S^{1.52}$ (per tonne.mile).GTM

Where: Ct is a constant: 1.20 for two-axle freight wagons, and 1 for all other vehicles, A is the axle load (tonnes), S is the operating speed (miles/hour), GTM is the Gross Tonne Miles

Signalling variable usage costs (5% of total variable usage costs)

- In CP4, signalling variable usage costs were apportioned on the same basis as vertical track variable usage costs.

Allocating Non-track (civils and signalling) variable usage costs: Review of CP4 methodology

- In CP4 it was assumed that only metallic underbridge, embankments and signalling (maintenance) costs vary with traffic. For CP5, based on emerging evidence in relation to the cost variability of civils and signalling assets, we proposed also recovering the following variable costs through the VUC: masonry underbridge, culverts and signalling minor works.

Serco review

- Serco reviewed the approach to allocating civils and signalling variable usage costs. Its recommendations are summarised, below:

- **Metallic underbridge**: the existing civils equation should be used, however, consistent with Euronorm standards, a modified axle load exponent of 4 should be used, rather than 4.83.

- **Other civils (embankments, culverts and masonry underbridge)**: The existing civils equation should not be used because the relevant axle load and speed exponents cannot yet be defined. Instead, the revised equivalent track damage equation should be used.

- **Signalling:** The revised equivalent track damage equation should be used to apportion the 50% of signalling variable usage costs estimated to be load related and the remaining 50% of costs (i.e. those not load related) should be apportioned based on vehicle mileage.

Allocating Non-track (civils and signalling) variable usage costs: NR conclusion to ORR

- We consider that there is merit in Serco's recommendations in relation to refining the methodologies for apportioning non-track (civils and signalling) variable usage costs.
- However, in light of our proposals to defer the implementation of the revised approaches for apportioning track variable usage costs until CP6. For CP5, we also propose retaining the existing approach to apportioning civils and signalling variable usage costs in CP5. Specifically, we propose:
  - **Retaining the existing axle load exponent of 4.83 in the structures damage equation** (a measure of 'track friendliness') which is used to apportion metallic underbridge variable usage costs;
  - **Using the same existing structures damage equation to apportion civils variable usage costs** that we propose including in CP5 but which were not included in CP4; and
  - **Continuing to apportion signalling variable usage costs using the existing equivalent track damage equation**.

Vehicle characteristics that inform the level of VUC rates: NR conclusion to ORR

- Vehicle characteristics are important inputs which inform the allocation of variable usage costs and, therefore, charges.
- We propose refining the current freight operating speed estimates to reflect our analysis of the working timetable, which has been adjusted to exclude ‘stopping time’.
- We propose that the default approach for estimating the operating speed for passenger vehicles should be to use the existing formula (based on maximum speed). However, if, based on timetable information, an operator is able to demonstrate that an alternative operating speed would be more appropriate, we would accept this for charging purposes.
- We have updated passenger vehicle weights to reflect 50% passenger loading, on average, rather than the 100% currently assumed .
- Following reasonable endeavours, as an industry, to set VUC rates based on a robust list of vehicle characteristics, we also propose that VUC rates for existing vehicles, not subject to vehicle modification, should be fixed for all of CP5.
- **Hence, it is very important that you are content with our assumptions in relation to vehicle characteristics (these were published prior to our consultation, as part of our consultation and alongside our conclusions).**

Temporary default rates applied when a 'correct' rate cannot be calculated: NR conclusion to ORR

- At present, a single 'average' default rate applies to freight vehicles for which the necessary vehicle characteristic information has not been provided to enable a 'correct' VUC rate to be calculated. There is currently no default rate for passenger vehicles.
- Operators, therefore, generally, face a weak incentive to provide the necessary vehicle characteristic information, resulting in Network Rail not recovering its full wear and tear costs.
- For CP5, we propose that we should retain a default rate for freight vehicles and introduce a default rate for passenger vehicles, where a bespoke rate has not been approved by ORR.
- We also propose introducing default rate bands and that the respective rate for each of these bands should be the highest relevant rate on the CP5 price list.

Passenger default bands (P/VM)		**Freight default bands (£/KGTM)**	
Locomotive	105.49	locomotive	7.39
multiple unit (motor)	25.96	wagon (laden)	3.33
multiple unit (trailer)	16.60	wagon (unladen)	2.29
coach	15.40		

Rates for modified vehicles: NR conclusion to ORR

- Based on our experience in CP4, it is not uncommon for individual vehicles, subclasses or entire fleets to undergo modification or re-fitment during the control period.
- In CP4, to facilitate the accurate charging of individual vehicles that have been modified to be more ‘track friendly’, we incorporated additional functionality into our Track Access Billing System to bill the VUC at an individual vehicle level, in addition to vehicle class level.
- We propose that for CP5 that this functionality is utilised to charge operators an appropriate, ORR approved, VUC rate where vehicles are modified mid-control period resulting in a different VUC rate becoming appropriate.
- We agree with respondents who noted that adjusting VUC rates in this way creates incentives for operators to modify vehicles to be more ‘track friendly’, therefore, reducing whole-industry costs.

Next steps

- We have now provided our conclusions in relation to the VUC in CP5 to ORR (including a draft price list).
- Ultimately, however, the final decision in relation to the level of VUC rates in CP5 rests with ORR and although we have published a draft price list now, ahead of ORR's Draft Determination, it could well be the case that ORR's Draft Determination will necessitate changes to these prices.

Principal milestones	
12 June 2013	ORR Draft Determination
31 October 2013	ORR Final Determination
By 31 December 2013	Final pricelists made available
1 April 2014	Implement new variable usage charge

•If you have any queries in relation to this presentation or Network Rail's conclusions in relation to the VUC, please contact: **Ben.Worley@networkrail.co.uk**

Annex – Impact of implementing Serco analysis (1)

Average Rates (2012/13 prices end CP5 efficiency)

	No Serco	With Serco	Variance (%)
Freight (£/KGTM)	1.8040	2.5146	39%
Passenger (p/vehicle mile)	11.5979	10.2447	-12%

Annex – Impact of implementing Serco analysis (2)

Average rates by commodity (£/KGTM, 2012/13 prices end CP5 efficiency)

Commodity	No Serco	With Serco	Variance (%)
Industrial Minerals	1.6382	2.8001	71%
Coal ESI	1.9552	3.3397	71%
Engineering Haulage	1.5309	2.6024	70%
Chemicals	1.1655	1.8338	57%
Construction Materials	2.0795	3.2205	55%
Coal Other	2.1417	3.3142	55%
Iron Ore	2.2760	3.4510	52%
Steel	1.9459	2.7602	42%
Biomass	1.9149	2.5537	33%
European Conventional	2.0100	2.6193	30%
Petroleum	1.5192	1.9329	27%
Other	2.1502	2.5681	19%
Enterprise	1.8512	2.2077	19%
General Merchandise	3.4925	4.1184	18%
Domestic Waste	2.1418	2.4452	14%
European Automotive	1.9626	2.2297	14%
Domestic Automotive	1.5662	1.7221	10%
Domestic Intermodal	1.5147	1.5356	1%
European Intermodal	1.6581	1.6759	1%
Mail and Premium Logistics	4.8354	4.7975	-1%
Royal Mail	1.9413	1.5268	-21%

Annex – Impact of implementing Serco analysis (3)

Revenue by Commodity (£m, 2012/13 prices end CP5 efficiency)

Commodity	No Serco	With Serco	Variance
Industrial Minerals	0.7	1.2	0.5
Coal ESI	14.4	24.6	10.2
Engineering Haulage	0.0	0.0	0.0
Chemicals	0.0	0.0	0.0
Construction Materials	8.6	13.3	4.7
Coal Other	1.3	2.1	0.7
Iron Ore	0.4	0.6	0.2
Steel	5.5	7.9	2.3
Biomass	0.8	1.1	0.3
European Conventional	0.2	0.2	0.1
Petroleum	2.2	2.8	0.6
Other	0.8	0.9	0.1
Enterprise	0.5	0.6	0.1
General Merchandise	0.0	0.0	0.0
Domestic Waste	0.4	0.5	0.1
European Automotive	0.1	0.1	0.0
Domestic Automotive	0.5	0.6	0.1
Domestic Intermodal	13.7	13.9	0.2
European Intermodal	0.6	0.6	0.0
Mail and Premium Logistics	0.0	0.0	0.0
Royal Mail	0.3	0.2	-0.1
Total	**51.1**	**71.2**	**20.1**