Network Rail April 2008 Strategic Business Plan update

Supporting document

Structure of charges

1 Introduction

Context & background

As part of the supporting documents for our *Strategic Business Plan* (SBP) published in October 2007, we set out indicative charging proposals to meet the objectives set for us by the Office of Rail Regulation (ORR). We signalled then that significant further work was necessary to turn the indicative proposals into firmer proposals. This additional work has been prompted by:

- Issues we identified in October where further analysis was necessary and/or desirable.
- Many useful comments and responses from stakeholders that have prompted additional thinking.
- Guidance from the ORR on 14 February 2008 setting out the response to our SBP documentation[1].
- Updated cost information from the Infrastructure Cost Model (ICM) that in turn influences the charges to be levied to recover the costs.

This document synthesises the additional work that has been stimulated by these sources, and sets out our Structure of Charges proposals. As a consequence of these workstreams we believe that the results are robust and deliver the ORR requirements, including enhanced cost reflectivity and improved incentives for industry parties whilst retaining simplicity.

The material is a key input to the ORR in relation to its *Draft Determination* due to be published on 5 June 2008.

Structure of document

It is intended that as far as possible this document be a stand-alone description of our Structure of Charges (SOC) proposals. We cover each charge within a dedicated chapter, outlining:

- A summary of the proposals we set out in the SOC supporting documentation for the *Strategic Business Plan* in October 2007;
- Key issues raised by stakeholders (including the ORR), and how we have addressed them;
- An overview of the main analytical tasks that we have undertaken in responding to these issues;
- Detailed information around our SOC proposals, including analysis of how they compare to charges in CP3 and/or our indicative proposals set out in October last year.

As noted in this list, we largely deal with stakeholder issues as relevant within the individual chapters. We also set out a comprehensive list of stakeholder comments Appendix 1.

While this document is intended to be stand-alone, for a comprehensive understanding of the issues, interested parties should read it in conjunction with the SBP supporting documents published in October 2007[2]. For example, we do not replicate the material around the objective of the SOC review which can be found in a number of places including Section 4 of our October 2007 supporting document. Where appropriate, we have included additional reference material as appendices or provide references to additional supporting documentation.

[1] See: http://www.rail-reg.gov.uk/upload/pdf/351.pdf

[2] These can be accessed at: http://www.networkrail.co.uk/aspx/4357.aspx

Overview & summary of analysis

A summary of the key messages arising from each of our charges workstreams is as follows:

- *Chapter 2 – variable usage charges.* We have substantially reviewed and refined the ICM calculation of the variable costs. We have also enhanced the technical accuracy of the vehicle damage modelling taking account of stakeholder feedback.
- *Chapter 3 – freight-only charge*. We have finalised our process to identify the cost of freight-only lines, and have calculated the mark-ups (on variable usage charges) proposed for the two commodities that ORR has identified have the ability to pay: ESI coal and spent nuclear fuel.
- *Chapter 4 – coal spillage charge*. We have revised the mark-up in line with work by Halcrow (the independent Reporter) to assess the cost impact of coal spillage on the network.
- *Chapter 5 – capacity charge.* There have been significant deliberations since the SBP to address concerns around the operation of the capacity charge, including the interaction with Schedule 8 benchmarks and the overall complexity of the charge. We set out a simplified methodology proposal and outline the ongoing work to resolve the issues.
- *Chapter 6 – electric traction charge*. We set out our proposals around discounts for regenerative braking (where technically feasible). We also provide an update on the ongoing workstreams such as dealing with train metering and the modelling process to recalculate vehicle consumption rates.
- *Chapter 7 – station fixed charge*. Based on further thinking and significant industry liaison our station charge proposals have evolved since the SBP. We propose a new station fixed charge by SFO to go into track access agreements to replace the current Long Term Charge (LTC). The new charge will reflect the annual post efficient expenditure profile assumed for each SFO portfolio.
- *Chapter 8 – fixed track access charge*. Using the methodology outlined in the SBP we calculate fixed track access charges for TOCs. These represent a step-change improvement in cost reflectivity.

2 Variable usage charges

Summary of previous proposal

How we calculate variable usage costs and charges

Development of the ICM has allowed us to completely change the approach to calculating variable usage charges compared with previous Control Periods. In principle, variable usage charges are to recover 'short-run' marginal costs. This means the extra cost to the network of running additional trains above the forecast level of traffic.

In the past this has been calculated using 'top-down' assumptions by multiplying cost totals in relevant categories by assumed 'variability' assumptions. We have changed this approach so that we calculate a bottom-up picture of the changing costs and more directly analyse how costs change from changes in traffic at the margin.

The key steps are as follows:

- *Establish base-costs*. The first step is to understand the costs of forecast levels of traffic, because the variable costs are calculated by assessing additional costs with reference to this base-level. This sort of cost calculation is a core role of the ICM, and the costs are calculated according to numerous activities at an extremely disaggregated geographic network level. To make the analysis more tractable, we typically summarise detail to the 'Strategic Route Section' (SRS) level, with around 300 SRSs across the network. The model calculations encapsulate our engineering knowledge, relevant standards, and key cost-drivers[3]. The base-cost scenario reflects forecast traffic growth. We run the model over a 35 year period. We use a longer-term (35 years) modelling horizon to ensure that the impacts of periodic renewals and differences between incremental tasks are 'smoothed' out. We have also noted that the calculations are based on an explicit assumption of a given capability[4] and therefore do not allow for any 'step-change'. Model output is £ by geography (SRS) by cost category.
- *Determine the increment to be used in calculating 'marginal-costs'*. For the purposes of calculating pence per mile charge, we must choose an appropriate 'increment' – that is, change in usage. The cost relationship is assessed over this usage band. As the purpose of the variable usage charge is to provide signals for decision-making at the margins while providing that Network Rail neither over- nor under-recovers, a 'smaller' rather than 'larger' increment makes sense. Our choice of 5-10% as the appropriate increment is a judgement, reflecting changes in traffic:
    - consistent with the short-run marginal costs (that is, not leading to a requirement for change in capability); and
    - sufficiently large as to enable smoothing of the effects on the various individual cost components. Very small changes (in the limit, a single additional vehicle) would lead to changes in costs of those categories with a linear relationship, but may not trigger additional costs in those categories where the relationship is more of a step-change.
- *Calculate costs associated with scenarios incorporating change in traffic.* We go through the same ICM modelling process but with changes to the assumed usage levels. We have completed four runs: ±5% and ±10%.

[3] A detailed description of how the ICM works can be found in the *ICM function specification* which is included in the suite of supporting documents published with the SBP update.

[4] *See* the detail contained later in this section.

- *Identifying changes in costs compared to changes in traffic*. The modelling allows us to compare the change in costs with changes in traffic. This effectively produces an 'average' vehicle cost per vehicle km (for passenger) and per thousand gross tonne-km (kgtkm) (for freight). To calculate the total variable costs we multiply the average per-unit charges by the base-level traffic forecast. These data also allow us to calculate the 'variability', which we define as the % change in costs from a % change in traffic volume for a given level of capability. This stage allows us to investigate the variability of different cost items, and also to analyse costs by route category and/or geography.
- *Calculate per-vehicle charges*. We use the model developed by TTCI(UK) to produce individual vehicle charges based on the relative engineering damage they do. This is effectively an adjustment of the average vehicle cost generated by the previous step. Vehicles that cause greater than average damage will be charged at a level higher than the average cost, and vice-versa. In calculating the engineering damage we include the effects of vertical forces as has historically been the case, as well as tangential forces, which is a new proposal for CP4. Over all classes of rolling-stock, vertical forces count for 70% of the variable costs, and tangential forces for the remaining 30%. The methodology to model tangential forces has been developed by TTCI(UK)[5]; in summary, it depends on the speed and curving performance of the vehicles.

Our October 2007 proposal

As part of the SBP documentation we proposed indicative charges on a system-average basis that were calculated using the methodological steps outlined above. Total variable costs were estimated to be £301m in 06/07 prices, at 06/07 efficiency and using 09/10 forecast traffic levels. This was split £203m for passenger and £98m for freight. To be comparable with other numbers presented in the remainder of this section, we need to adjust this for end-CP4 efficiency, yielding a total of £226m in 06/07 prices.

As part of the discussion around the benefits and costs of route-based charging we also presented summary cost information on a pounds-per-thousand-gross-tonne-km (£kgtkm) basis in a matrix showing route-category and curvature. We included curvature as a possible category in keeping with the cost-drivers encapsulated within the tangential forces term we are proposing.

While the direction of the cost-differentials made sense – rural and freight being more costly than primary and L&SE route categories – the magnitude of the differentials was larger than we expected. We believe this was due to the relatively short time we had to review and refine ICM output in the lead-up to publication of the SBP. We set out below the process we have gone through to improve the ICM calculations, as well as the findings that arise.

We noted that the SBP proposals were indicative, and set out a number of areas that we would review and improve. Notwithstanding this, our main concern with the impact of route-based charging was the perverse incentives that it would create in the absence of charges relating to the scarcity of capacity given that more congested routes would be cheaper. We recommended that route-based charging be re-evaluated in future reviews in conjunction with analysis around the treatment of capacity.

Further consideration

This section sets out the significant workstreams we have undertaken to improve the indicative variable costs presented in the SBP. This has included a fundamental review of the underlying ICM activities and cost relationships. We also set out how these workstreams have addressed the various stakeholder comments we have received.

[5] *See* Appendix 4.

Review of the ICM and variable costs

As explained earlier in this section, the first step in calculating the per-vehicle charges is to understand the variable costs. To do this we have used ICM modelling. We have undertaken a full review of the modelling process since producing our indicative charges in October 2007. This has involved a major review of the way that a number of the activities are modelled, and further investigation around the interaction between these activities and how they substitute for each other under different time-frames and different drivers.

We have undertaken a detailed review of the workings of the track maintenance elements of the ICM. This review was partly driven by our concerns about the results of the variable cost analysis presented in the SBP which showed surprising variations in incremental costs of different routes. We reviewed forecasts volumes for every activity at network level and by route category and revisited the engineering specifications for the model. This review process was informed by Halcrow's independent review of the SBP variable cost estimates, and the detailed ICM audit described below.

The outputs of this analysis are summarised in the following table, together with a comparison to SBP figures. We have not repeated the curvature route category as this is not relevant now that we are not pursuing route-based charges. We have adjusted the October SBP figures so that they are in 06/07 prices at end CP4 efficiency and are thus comparable with the April update numbers.

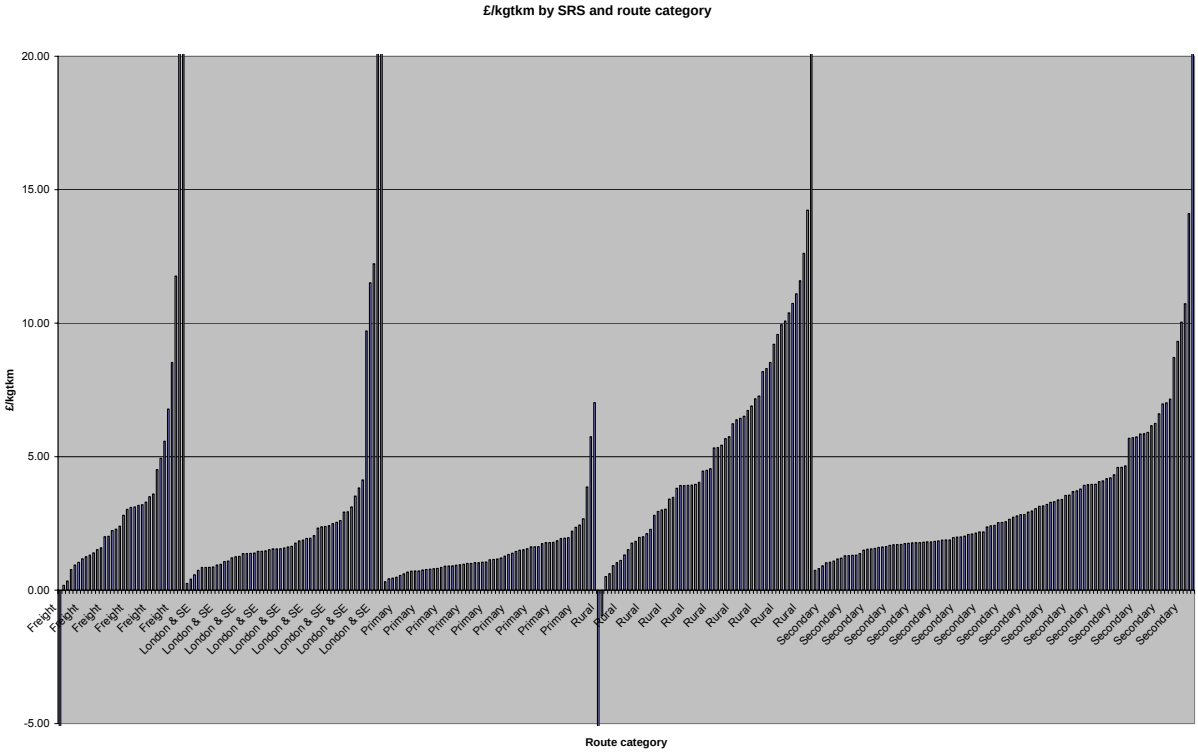
Table 2.1 Cost by route category. April update vs SBP (£kgtkm, 06/07 prices, end CP4 efficiency)

Route category	October SBP £/thousand gtkm	April update £/thousand gtkm
Primary	0.98	0.96
London & South-East	1.38	1.45
Secondary	2.28	2.36
Freight	1.94	1.98
Rural	4.83	4.04
System-wide	*1.34*	*1.40*

This table shows that while the overall system-wide average is essentially unchanged, the differentials between route categories (particularly the rural category) are greatly reduced. We believe that our internal review process – including extensive data checking and diagnostic analysis – has generated robust numbers. Some model 'noise' is inevitable at disaggregated levels given the strategic nature of the ICM, but we have reduced the incidence of what we are terming 'anomalies' to SRSs representing less than 3% of the network (by track miles).

This can be seen with the following Figure that shows the £/kgtkm for each individual SRS, grouped by route category and arranged in ascending order. These are at 06/07 prices and end-CP3 efficiency. It shows the differentials in cost between the route categories. It shows the variation that we would expect given the location-specific drivers of costs such as specific usage, age, maintenance and renewal strategy, and the specific point on the asset life-cycle being reached. As would be expected, there is greater variation within the rural and freight categories.

The chart also shows a small number of 'outliers' which we believe is to be expected given inevitable modelling 'noise'. We are comfortable that these outliers typically relate to very small sections of the network and in total relate to less than 3% of the network. We therefore do not consider their impact to be material.



Halcrow review

Early this year, Halcrow undertook a detailed independent technical audit of the whole model, reporting jointly to Network Rail and ORR[6]. This follows the independent audit of version 1 by AMCL in 2006. While the AMCL review was strategic and focused on the model's application of our asset policies, Halcrow's remit was to carry out a forensic audit of all the calculations in the model to ensure that they accurately captured the model specification. The audit identified some errors in the calculation of activity volumes, principally in the track maintenance module, some of which had already been corrected during our own review. Halcrow also drew our attention to software 'bugs' affecting some calculations (which were actually coded correctly) and suggested technical solutions. The thoroughness of Halcrow's process and the small number of significant errors found increases our confidence in the modelling process. In general, Halcrow endorsed the work undertaken[7].

[6] This can be found at the ORR website: http://www.rail-reg.gov.uk/upload/pdf/cnslt-var_usg_cost_halcrow.pdf

[7] See for example section 9.1, p35 of the Halcrow report.

They also highlighted a number of queries and/or recommendations for further analysis. In its February 2008 document, ORR noted its expectation that we would address the issues raised by Halcrow.

A summary of how we have addressed these issues in relation to the ICM modelling process is set out in the following table.

Table 2.2 Addressing the ICM modelling issues raised by Halcrow

Issue	Description	How addressed…
1. Treatment of service life for curved rails Critical radius where rail service life changes	Halcrow concerns around using the same constant and exponent for rail below 2500m radius as for flatter radii. Halcrow seek further justification for choice of 2500m curve radius as critical point.	Our treatment of curvature essentially reflects a judgement that any additional model complexity would not generate sufficient additional benefit. Our modelling suggests that the choice of critical radius does not have a material impact on the eventual model calculations. 2500m curve radius reflects our best judgement and reflects studies we have completed that demonstrate the incidence of rolling-contact fatigue at this curvature.
2. Negative numbers in modelling results	Explanation of how modelling has generated negative variable costs at SRS level.	The general review process means that the number of negative results at SRS level is extremely small, and not material overall. The negatives are explicable in terms of increased traffic bringing forward renewals and triggering either reduced maintenance and/or substitution between activities.
3. Variable cost results for 'opted out' SRSs	Some (small) renewals variable costs for SRSs that have been designated as 'opted out'.	We have discussed and resolved this issue with Halcrow. Our rules actually opt-out at the 'Constant Traffic Section' (CTS) level, which is a greater degree of disaggregation as compared to SRSs. There are approximately 3,000 CTSs and 300 SRSs. Each SRS comprises a unique mapping of CTSs. The issue is that within an SRS, many *but not all* of the constituent CTSs are designated as 'opted out'. Therefore there is an overall non-zero variable cost at the SRS level, which is as we would expect from our modelling rules.
4. Track renewals 'variability'	Explanation of reduced 'variability' for track renewals as compared to ACR2000 and SOCC2005.	It is difficult to directly compare estimates of 'variability' given that we have fundamentally changed the approach to calculation. Based on the robust process we have gone through and all of the checking, we believe that we can be more confident in the bottom-up calculations. Further, our bottom-up approach is more directly related to the marginal cost definition of variable charges. Previous variability estimates were derived by asking for opinions around 'how much of costs varied with traffic'. It seems likely that individuals would provide a higher 'variability' estimate in relation to this question as compared to the question we consider in terms of changes at the margin. Our focus in testing our analysis is more around reviewing the modelling steps rather than comparisons with other figures.

Choice of increment used in analysis

We have not changed our approach to the use of ±5 to 10% as the appropriate 'increment' to be used in the analysis. At the industry workshop we held in November 2007 some freight stakeholders believed that the increment was too small and would not sufficiently capture the impacts of changes in traffic because of the 'stepped' functions for some activities. In contrast, ITS's peer review suggested that our chosen increment was too large, and was more in keeping with a 'step-change'.

The table and charts below shows that the relationship is broadly linear across the scenarios we have modelled. This gives us comfort that our approach is a robust one. It

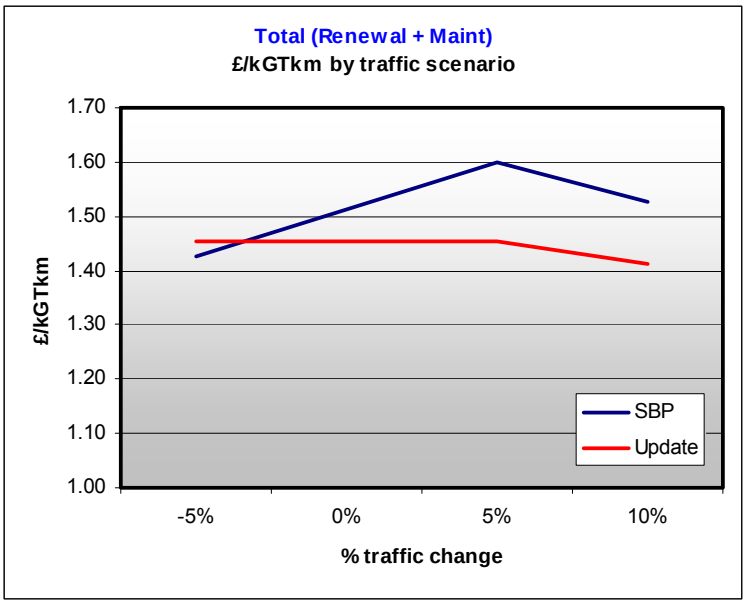
should be noted that following the ITS approach and using an increment substantially less than ±5% would likely reduce the variability, and consequently reduce the variable costs.

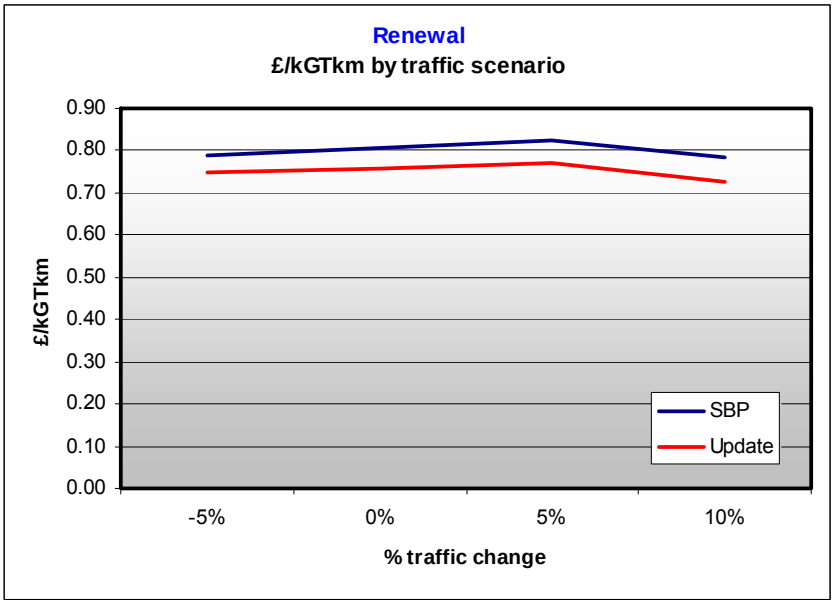
Note that these figures relate to track only as the remaining cost categories reflect a top-down application of variability.

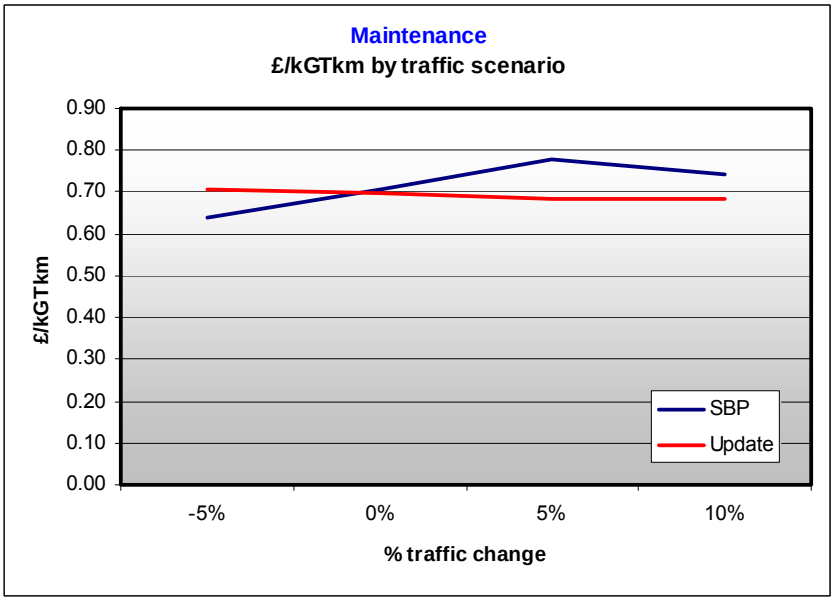
Table 2.3 Results from ICM increment scenarios (£/kgtkm) [06/07 prices, end CP3 efficiency]

	-5%	+5%	+10%
Total	1.45	1.46	1.41
Renewals	0.75	0.77	0.73
Maintenance	0.71	0.69	0.68

The following charts illustrate these numbers, including a comparison with our SBP calculations. Note that the '0%' is an average of the -5% and +5% scenarios for the purposes of the graphs only.







For clarity, the calculations of variable cost used in calculating vehicle prices use the results from the +5% scenario.

Review of the vehicle-damage allocation model

The vehicle damage model is used to adjust the average £/kgtkm figure derived from the ICM analysis, into vehicle specific charges. It does so by calculating the relative damage done by each vehicle taking into account the vertical and tangential forces arising.

The model has been developed over time by consultants TTICI(UK) working initially with ORR and subsequently Network Rail. There has been substantial stakeholder input at each stage of the process. This section provides a summary of how we have refined the

model since the SBP. Detailed information around the development of the methodology and how the model works is set out in the TTCI(UK) reports included at Appendix 4.

As we noted in the SBP, a number of technical judgements and simplifying assumptions have been necessary to overcome data limitations and ensure that the result is computationally practical. The key judgements – and the underlying rationale – are set out in the following table.

Table 2.4 Methodological approach – Rail Surface Damage term

Issue	Issue / description	Approach taken…
Route curvature	The RSD term is driven by the curvature of the network and the curving capability of the rolling-stock. Some summary way of capturing the network curvature is needed so that the calculations are not excessively complex.	ICM curvature data classified by bands of 300m radii. The ultimate source of the data is the New Measurement Train. We assume that any unmapped parts of the network has a curvature distribution equivalent to the mapped network.
Curving class	The summary means of describing the curving capability of vehicles.	We have allocated all rolling-stock operating on the network to one of 40 curving classes. The information fed into the modelling process covers vehicle mass and primary yaw stiffness.
Cant deficiency	Also a factor in the forces generated when curving, as it reflects the nature of the vehicle and curving speed.	Passenger vehicles assumed to operate with a cant deficiency of 40mm. Freight vehicles limited to 45 miles/hr are assumed to operate at balance speed (cant equilibrium), and all other freight vehicles assumed to operate at 20mm cant excess. These were drawn from an analysis of the distribution of cant and operational speed across Network Rail infrastructure.
Rail profile	A factor in the modelling and forces produced.	Measured semi-worn rail profiles are used for each of four curvature ranges (<750m, 751 to 1500m, 1501 to 3000m, >3000m).
Rail lubrication	Influences the coefficient of friction used in the T-γ modelling.	Assume that all curves with radius less than or equal to 1500m to have the gauge face of the high rail lubricated. Therefore, the coefficient of friction is assumed to be 0.4 at all contact points except the gauge face of the high rail where it is assumed to be 0.2.
Wheel profile	Important parameter in capturing the interaction between wheel and rail.	Measured semi-worn wheel profiles used. For passenger this is assumed to be a worn P8, and for freight a worn P5.

TTCI(UK) completed sensitivity analysis in relation to these issues, which gave us comfort that our approach is robust. The analysis also informed the judgements being used.

Workstreams for improvement

As well as the publication of the SBP in October 2007, we also undertook a specific technically-focussed consultation around draft TTCI(UK) reports in December 2007[8]. The purpose of that consultation was to provide an update on our thinking, give stakeholders an opportunity to input, and to transparently expose the assumptions that we made around vehicle characteristics.

The queries we have addressed have fallen into the following categories:

- Challenges to the simplifying assumptions that we have inevitably had to use to generate a tractable and workable model. For example, the cant to be assumed in modelling the tangential forces.
- Queries around the curving class assumptions used for vehicles, with relevance to the Rail Surface Damage (RSD) term that encapsulates the tangential forces.
- Queries around the other vehicle assumptions we have used.
- General requests to demonstrate the sensitivity of key assumptions and to demonstrate the business-case implications of the new approach to charging.

A complete description of how we have addressed all of these queries can be found in the Annex of the TTCI final report[9]. As a result of our ongoing thinking and the challenges received, the key items we have amended are:

- *Treatment of assumed cant deficiency*. This is one of the factors in determining the forces produced during curving. Our assumptions reflect the fact that freight vehicles tend to travel at lower speeds around curves than do passenger vehicles.
- *Amended the loading assumptions for inter-modal wagons*. Previously we had been assuming that inter-modal wagons were loaded to their maximum capacity. Based on FOC representations and an analysis of actual loading patterns across the network, we have amended the assumptions used.

While we have amended a number of the details, the essential approach to calculating RSD is unchanged. We believe that the extensive process and the sensitivity analysis completed have demonstrated the robustness of the model.

ATOC raised a number of queries in relation to the technical assumptions we used in modelling rail surface damage, including issues around the primary yaw stiffness assumed for each vehicle. The TTCI(UK) methodology report found at Appendix 4 sets out how we have addressed each of the individual comments. In general, the query is around whether the simplifying assumptions we made to facilitate the modelling are reasonable. In line with the charging objectives set by ORR – which involve a balance of cost-reflectivity and administrative ease – we believe we have made appropriate assumptions and judgements. This belief is reinforced by:

- sensitivity analysis undertaken around key variables;
- the small number of queries raised by stakeholders in relation to the new prices for their vehicles; and
- results that are intuitively plausible and match our expectations around the model impacts (see later in this section for further detail).

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[8] *See* documents A, B & C at the following link: http://www.networkrail.co.uk/browseDirectory.aspx?dir=\Regulatory%20Documents\Access%20Charges%20Reviews\Consultations%20on%20Future%20Charging\Variable%20Track%20Access%20Charges&pageid=2893&root=

[9] *See* Appendix 4

As part of their review of variable costs and charges, Halcrow also examined the methodology and workings of the RSD term. Overall Halcrow expressed a view that the new term was a step-change improvement in the incentives facing industry. In paragraph 5.1.18 they note the following:

> We believe the work completed to date by TTCI for a RSD track access charge, and included by Network Rail in their total variable track access charge, is based on sufficient evidence to be accepted for CP4.

Halcrow also noted a small number of issues that they believed we should address in developing our April update proposals. These are summarised in the following table. In all cases, further information is available later on in this chapter where we outline comparisons with the CP3 price-list and provide some illustrative case-studies explaining the size of changes.

Table 2. 5 How we have addressed the Halcrow recommendations for further analysis

Issue	Description and how resolved
Price for Desiros	Halcrow noted that our indicative price list contained a substantial reduction in price for the Desiro units which was counter-intuitive. The main issue was an administrative error and the Desiro units were allocated an incorrect curving assumption. This has now been rectified. Under the CP3 methodology Desiros had variable usage charges in the order of 24-30% higher than the vehicles they replaced in Wessex. Under the new framework the differential is 40-50%.
Increase in prices for freight wagons	The main issue was that the indicative charges were compared to the CP3 price list. The CP3 price list had some inaccuracies in terms of weight assumptions and so gave an unrealistically low price. We have been billing on the basis of the higher weight assumptions which were then also used for the modelling calculations.
Relationship between vehicle price and 'rail surface damage factor'	Halcrow presented tables of prices for the most heavily used freight and passenger vehicles and expected to see that vehicles with high rail surface damage factors would have higher prices and/or higher % change in price. As we outline later in this section, the driver of price change is not simply the size of the rail surface damage factor. It is the *relativity* between rail surface damage and vertical damage factors that is more important in explaining price changes, although caution is needed in making absolute generalisations. For example, a vehicle that has a relatively high rail surface damage factor and a relatively high vertical damage factor may not experience a substantial price change.

Impact of RSD term

We propose to modify the charging framework by reflecting vehicle damage caused by tangential forces because we believe it will:

- enhance cost-reflectivity of the charges; and
- improve the incentives for design and deployment of rolling-stock across the network. In turn this is likely to assist in achieving objectives to minimise whole-system costs over time.

This is not a case of prohibiting any particular design features. It is simply trying to give better to information to funders, operators and manufacturers about the cost implications of the design features, so that they can be weighed against benefits and therefore factored into decision-making as appropriate.

We believe that the biggest impact will be in the longer-term design of rolling-stock to be introduced onto the network in future. The amendment to the charges will complement and reinforce administrative processes around the specification of new rolling-stock. It is a process that will be refined and reinforced over time.

The ATOC Engineering submission was broadly positive in relation to the introduction of the RSD term:

> As you will be aware, from earlier comments on your emerging proposal, ATOC are enthusiastic supporters of the use of a discrete element for rail surface damage (rsd) within a cost-reflective transparent Track Access Charge (TAC).

ATOC attach caveats to this view. Some of these relate to the technical underpinnings of the RSD term, and the way we have addressed these are set out in the TTCI(UK) report at Appendix 4.

ATOC also ask for a number of case-studies to be developed to demonstrate what they see as the most important role for modification to the variable usage charge – to fund modifications to vehicles to make them more track-friendly.

As we noted above, we believe the key issue for the proposed charges is the longer-term optimisation of the fleet. However, it is also instructive to consider the impact on existing vehicles. We believe it is most helpful to consider a stylised example:

- Based on a comparison of the passenger vehicle charges for similar vehicles, modifications to existing vehicles might overall save in the order of 2-5p per vehicle-mile (vm);
- Average vm is in the order of 13m vm/pa. Some vehicles operate as little as 2m vm/pa, whereas others operate between 35 and 50m vm/pa. At the upper end, Mk III coaches operate 155m vm/pa and Mk IV coaches 77m vm/pa;
- If we take the average of 13m vm/pa and apply 2-5p per vehicle-mile, this produces a saving of between £0.26m and £0.65m per annum. Those vehicles operating significant mileage could save up to £2-3m per annum;
- When these annual amounts are aggregated over 5 / 10 / 15 / 20 year intervals then it provides an indication of the benefits of modification for an individual vehicle. This could then be compared to the costs of modification and introduction;

This is the sort of information that we believe will be taken into account by industry parties as they consider the implications of our proposals.

Review of vertical force equations

As noted in the SBP we will consider a further review of this during CP4, for possible subsequent implementation. This would clearly need to be a process involving the industry and ORR so we will present further thoughts and proposals on this subject early in CP4.

Stakeholders raised no objection to our proposal. A small number agreed with our proposal to leave the vertical force formulae unchanged for the current review.

Vehicle assumptions

One of the factors in the charging equation is vehicle speed. The methodology to calculate the speed to be used was set out in an ORR letter dated 12 May 2003. For vehicles where data existed, the speed was based on an average operating speed. For new vehicles a formulaic relationship was used:

Average operating speed = 0.021 x (maximum speed)$^{1.71}$

Some stakeholders have challenged these assumptions, noting that their actual practical speed is lower than that is assumed.

ORR has signalled that they will be reviewing the approach to this matter later this year (likely to be June-October 2008). Pending this review we have left the speed assumptions unchanged in our charges calculations.

Route-based charges

We have presented average costs by the five route category definitions (primary, secondary, L&SE, freight, rural). There are differences in cost across these categories, with primary the least cost and rural the highest cost. Following the principle that charges should be cost reflective, there is a potential benefit from having differential route charges. In particular, the incentive properties of the RSD term would be strengthened by the introduction of route-based charging.

However, cost-reflectivity is not the only relevant factor to consider in developing charges – as set out in the criteria outlined by ORR. In our SBP we were concerned about the perverse incentives that route-based charging might bring in the absence of charges relating to scarcity of capacity given that more lightly used routes would be more expensive.

These concerns were echoed throughout the stakeholder consultation process.

In its February document, ORR outlined its decision that charges on the basis of route category should not be introduced in CP4.

For the reasons outlined above, we believe this is the correct decision. However, ORR has questioned whether our view was based on concern over robustness of costs. We noted that the material set out in October was indicative, and that we did not consider it completely robust at that point in time – particularly in relation to issues such as the magnitude of the cost differential between primary and rural / freight categories.

We did not, however, say that we did not believe it was possible to generate robust numbers, and we have outlined in this document the process we have gone through to do so.

Route-based charging is an area for further review in subsequent Control Periods. In light of concerns about incentives, this would need to be combined with a review of the treatment of capacity.

Geographical charging: Scotland / England & Wales

In its February document ORR said[10]:

> Establishing separate charges in England & Wales and Scotland is consistent with our charging principles by increasing cost reflectivity (particularly at the margin), improving transparency and allowing Network Rail to recover the higher variable costs in Scotland. Separate charges would also reinforce the regulatory accounting separation between England & Wales and Scotland in line with the separate specifications of high-level outputs and funding for the railway between the two countries. We do not consider that levying different charges for England & Wales and Scotland would be administratively onerous, as it would simply require two different price lists with a clear indication of where each would apply. We expect Network Rail to introduce different variable usage charges for England & Wales and Scotland in CP4 if the material differences in cost remain once it has undertaken its further calculations of costs and charges. We have asked Network Rail to include separate variable usage charges for England & Wales and Scotland in its SBP update.

In its February document, ORR did not include the caveats we set out in relation to the comparison of Scotland and England / Wales costs. We reproduce these here:

[10] *See* paragraph 6.22, p70.

- We noted that the costs set out in the SBP were indicative and that we expected to make substantial refinement to them;
- We also thought that it made little sense for charges to change simply as a consequence of reaching the border – rather than some change in cost conditions. For example, the primary passenger routes would face a separate charge in Scotland regardless that there had been no change in route category of the infrastructure;
- Our other concern was equivalent to that in relation to route-based charges. There is the potential for perverse incentives given Scotland would be more expensive but less lightly utilised.

These concerns have been echoed by other stakeholders such as Transport Scotland.

We are able to provide an update on these points now that we have completed further analysis. The following table summarises the costs in Scotland and England/Wales, cut by route category.

Table 2.6 Route category costs by geography

£/kgtkm (end CP4 efficiency)	England / Wales	Scotland	Network average
Primary	1.00	0.93	1.00
Secondary	2.25	2.03	2.21
Tertiary	3.89	3.75	3.87
Network	1.37	1.64	1.40

The table shows that there is not a significant differential in costs on a route-category basis. Although England/Wales are marginally higher than Scotland in each route category there is a higher overall average for Scotland (as a whole) which is driven solely by the higher proportion of secondary and tertiary routes.

On this basis we do not believe that geographically-based charges are appropriate. It would be particularly perverse given that charges would be based on the network average (higher for Scotland) but modelled costs by route category are slightly higher in England/Wales.

For completeness, Appendices 2 and 3 provide vehicle charges for: England/Wales, Scotland and network average. Our proposal is that charges for CP4 be based on the network average figures.

Variable electrical asset utilisation charge

SBP proposal

In CP3 the variable costs relating to electrification assets were recovered via an 0.89 pence mark-up (in 2001/02 prices) per kilowatt hour. In total we will recover in the order of £30m per annum for the last years of CP3.

To make the charge more cost-reflective, we set out in the SBP our proposal to recover the costs of wear and tear on electrification assets through a separate charge. This was supported by stakeholders and ORR[11].

We set out a number of possible options for the basis on which we levy our charge:

[11] *See:* ORR February 2008 document, paragraph 6.51, p77

- *Pence per electrified vehicle-mile* – this would be applied on a network average basis and would take into account the existence of multiple pantographs as an 8 car consist (i.e. 2 x 4 cars) with 2 pantographs would have twice the vehicle km as a 4 car consist.
- *Pence per electrified train-mile* – this would be simpler than a vehicle-km basis but would not take into account multiple pantographs and is not necessarily a proxy for speed.
- *Differential charges based on speed* – we could choose (say) three speed bands and choose pence per km (it could be train or vehicle) rates reflecting the relative differences between the forces generated at different speeds. This could be complicated and would require a clear view of the relative differentials to be applied.
- *Route-based rates* – this might be a proxy for speed and other factors such as vertical movement within the overhead line. However, it is likely to be very complex to devise and to bill, and there is no guarantee that it would be a useful proxy.

As an overlay to these options we will also need to decide whether the charges should be a network-wide average or separated into overhead-line and third-rail specific charges.

Proposal for charging

Stakeholders made very few comments about the benefits and costs of each of these detailed options. The main point was that the approach should be kept relatively simple.

As a consequence, we are **proposing that CP4 charges be based on pence-per electrified vehicle mile**. We believe that this is the best overall approach balancing issues around simplicity and cost reflectivity. It is also in keeping with our current charges which are levied on a pence per vehicle-mile basis.

We set out a build up of costs in the SBP. We have not had any challenge to this or received any information to suggest there should be a change to the cost calculation so have used this as the basis for our approach. This equated to:

- £7m per annum for OLE electrification assets;
- £2m per annum for conductor-rail electrification assets.

For 2009/10 the ICM records 408m electric vehicle-miles for the DC (conductor-rail) network, and 535m electric vehicle-miles for the OLE network.

This yields a variable electrification usage charge of:

- 0.50 pence per vehicle-mile for vehicles that use the DC network; and
- 1.31 pence per vehicle-mile for vehicles that use the OLE network.

The treatment of electric powered vehicles that use both the DC and OLE network needs to be considered. Network Rail's current proposals are to use a weighted average (by total vehicle miles) of the above charges.

These are additional to the variable usage charges presented in Appendices 2 and 3. The final price list to be published in December 2008 will reflect these mark-ups for the relevant vehicles, and these will also be incorporated into the billing system.

Freight suspension bandings

Context and background

As described above the vertical forces element of our variable usage charge is based on a formula reflecting axle-load, operating speed and unsprung mass characteristics of each vehicle. To augment this calculation, freight wagons also have a 'suspension' factor

applied depending on how 'track-friendly' the wagon's suspension characteristics are deemed to be.

Each wagon is allocated to one of seven 'bands' set out in the following table. It can be seen that the description of the wagon characteristics in each band are qualitative.

Table 2.7 Freight wagon suspension factors

Suspension band	Wagon type description	Suspension factor
1	Four wheel wagon with pedestal type suspension	1.0980
2	Four wheel wagon having leaf springs, friction damped	1.0580
3	Bogie wagon with three piece bogie	1.0180
4	Bogie wagon with enhanced three piece bogie; e.g. 'swing motion' and Parabolic four wheel wagon	0.9780
5	Basic bogie wagon with primary swings, e.g. Y25	0.9380
6	Bogie wagon with enhanced primary springs – Low Track Force bogies, TF25, 'axle motion' (like HV primary sprung bogies)	0.8980
7	Bogie wagon with enhanced primary springs and steering	0.8580

ORR has asked us to propose an approach to quantify the suspension bandings. This is to ensure that the process of allocating new vehicles to bands is transparent and clear.

We are still completing this exercise and will engage with ORR and industry stakeholders in the coming months as we finalise our proposal. The remainder of this section describes:

- work completed to-date;
- proposed metric for use in implementing a quantified suspension banding approach; and
- remaining tasks and time-frames to complete the analysis and agree a quantified suspension banding.

Work to-date

This is an area we have been reviewing, particularly in order to respond to and resolve discussions with operators and manufacturers about which band their vehicles should be placed in. For example, we have developed what is a benchmark set of vehicle performance for a Band 5 vehicle.

We have used vehicle dynamics software to investigate the forces arising on typical pieces of track. We seek to validate this with reference to peer review and available actual vehicle data. Using model simulation is a powerful technique as it enables us to identify, isolate, and evaluate the impacts of relevant factors.

Proposed methodology and metric

On the basis of our modelling, the proposed metric for vertical forces would be based on Ride Force Coefficient. The Ride Force Coefficient is a measure of the dynamic variation in vertical track forces generated by a vehicle on a section of track. Data are generated either via modelling results or observing vehicles in service. A linear best-fit relationship can be fitted to the data generated, and this gives rise to the summary Ride Force Coefficient metric.

Consistent with the development of our RSD term, tangential forces would be captured via a metric around curving performance such as a T-gamma table.

Next steps

We believe that the modelling completed to-date represents a way forward. A number of challenging issues remain to be resolved, including:

- Access to relevant representative vehicle models. This is the single largest hold-up to finalising the quantification of suspension bands.
- Carriage of the work. Related to the previous point, given the sensitivity around vehicle details, it may be appropriate for the workstream to be undertaken by an independent consultant. Model validation becomes a crucial issue.
- Technical issues around differentiating between wagon behaviour when laden and un-laden. Currently there is no such differentiation in the bands.
- Difficulties in modelling lower banded wagons as the design and performance of these wagons has a large variation and is difficult to neatly summarise in modelling work.
- Treatment of the impact of vertical forces on 'track-friendliness' as against the impact of tangential forces. Based on work to-date, it would appear that differentiation between bands 5 and above is more to do with tangential forces than vertical forces. There is a number of ways we could resolve this, including a matrix approach and/or a multiplicative banding with a factor for both vertical and tangential forces in each band. The tangential factor would become decisive in the higher bands.

We will work with ORR and industry to complete this analysis in time to be included within the final price lists for CP4.

It would seem appropriate that the focus be on identifying clear boundaries between bands 4, 5, 6 and 7.

Calculating freight mark-ups

In addition to the variable usage charges set out in this section, mark-ups will also need to be applied for ESI coal and spent nuclear fuel commodities. The methodology we have followed to calculate these mark-ups are described in the following section 3 of this document – freight-only line charges.

Changes to vehicle charges in CP4

The price-list finalised in December will contain charges for all known vehicles that we expect to use the network during CP4. We noted two related issues in October 2007:

- What is the process for developing charges for new vehicles?
- Under what circumstances – such as a material modification or new technical information – would it be appropriate to modify charges for existing vehicles, and what would be the appropriate process to follow?

We will discuss these issues with ORR and set out full proposals as part of (or in conjunction with) ORR reviews of the vehicle characteristics such as speed, and the finalisation of the price lists by the end of the year. This will build on the initial proposals – such as the information requirements and information flows – that we set out in our December 2007 technical consultation.

Choosing the efficiency base for variable usage charges

ORR has advised that we should calculate variable charges on the basis of end-CP4 efficiency. This means we have adjusted the ICM output, which is at end-CP3 efficiency.

We have calculated the appropriate adjustment factor as 0.864 – i.e. a 13.6% reduction. This is a weighted average of our efficiency targets for maintenance and renewals.

Where we present comparisons between numbers we have adjusted to end-CP4 efficiency in order to have a common basis. Comparing with CP3 numbers is slightly more complex as we need to adjust the price base to 06/07 prices, and also adjust for the fact that passenger prices were based on 2003/04 efficiency (i.e. start CP3) and freight prices were based on 2011/12 efficiency (i.e. mid CP4 efficiency).

Updated proposal

As a result of the workstreams outlined in the previous section we have developed updated proposals. A full list of the proposed variable usage charges are presented in Appendix 2 for passenger and 3 for freight. As noted in earlier sections we propose that the 'system-wide' rates be used for CP4. However, the Appendices also show rates calculated for 'England/Wales' and 'Scotland' as requested by the ORR.

This section presents some summary comparisons with CP3 charges. We set out an explanation of the factors driving these changes, and why we believe that it demonstrates the charging model is working as intended.

What drives the changes in price?

Much of this analysis updates the work undertaken by Halcrow in their January 2008 review[12]. As is the case now, many of the per-vehicle charges have changed in the order of ±20-30%, and there was a general question of whether this is reasonable given that the main change has been to introduce a rail-surface damage term accounting for 30% of total variable costs.

There are a number of changes to the methodology that might drive changes to per-vehicle charges:

- Changes in the proportion of total tonne-km operated;
- Change in the total size of variable costs;
- Price-base;
- Introducing rail-surface damage component.

In terms of the RSD component, it is possible that a vehicle was relatively cheap on the vertical forces basis, but relatively expensive on the RSD component and this can generate substantial percentage changes.

This can perhaps be best seen through the use of a highly stylised example:

1. assume the CP3 charge is 1 based on vertical forces (and the overall average was 2).
2. For CP4, the vehicle will get 0.7 for the vertical forces (because it is a 70:30 split between vertical and RSD), and the remainder will be determined by the relative curving properties. If its curving properties are relatively the same in comparison to all the other vehicles then it would get 0.3. However, if it had relatively poor curving performance, this component might double or even triple.
3. So if the RSD component doubled, then the CP4 charge would be 0.7 plus 0.6 making 1.3 overall, a 30% increase.
4. This might apply in reverse for decreases in CP4 compared to CP3.

This explains the possible magnitude of any change. There is also an issue about what causes the nature of the change – i.e. either an increase or decrease. Because of the many factors that might cause a change it is not possible to completely generalise, but the main driver is the comparison, for a given vehicle, of the relative nature of that vehicle's vertical forces compared to the relative nature of that vehicle's tangential forces.

[12] See: http://www.rail-reg.gov.uk/upload/pdf/cnslt-var_usg_cost_halcrow.pdf

Taking this in stages. The vehicle damage model generates charges based on the relative characteristics of a given vehicle. So, if a vehicle has high vertical forces compared to other vehicles, it will be allocated a higher charge. And vice-versa.

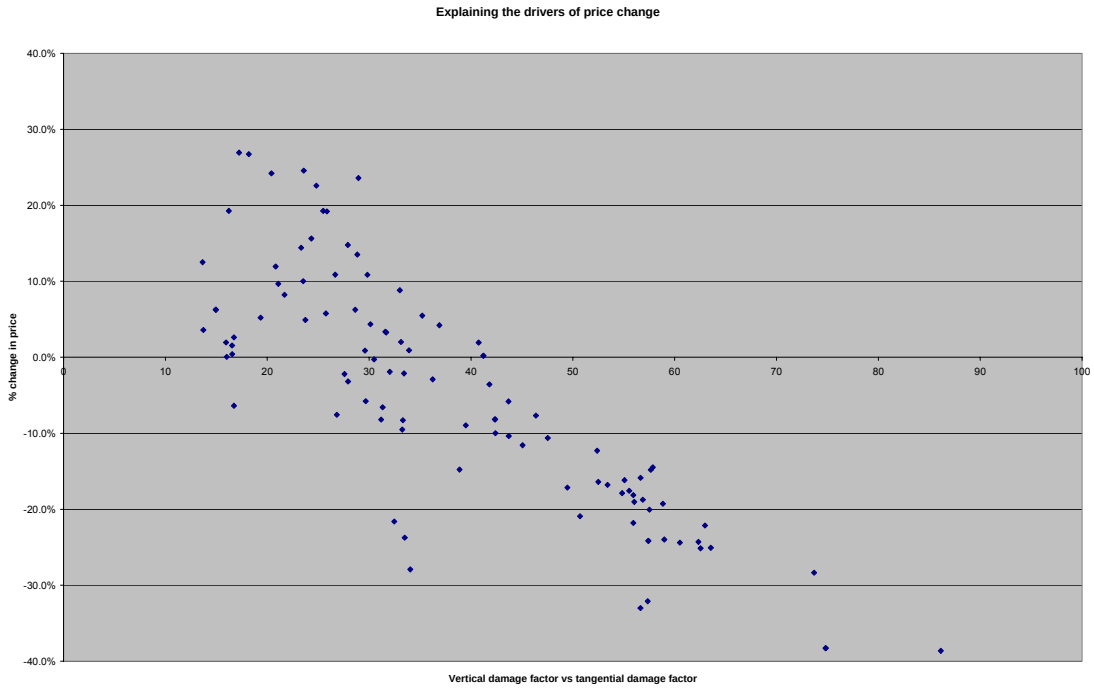
Whereas the CP3 prices were generated solely by looking at the vertical-forces caused by a vehicle, our proposals for CP4 are determined 70% by vertical-forces and 30% by tangential forces. The change in price can therefore be thought of as the 30% previously (i.e. in CP3) being driven by vertical forces, now (i.e. in CP4 proposals) being replaced by tangential forces calculations.

The following table summarises the possible scenarios and consequent direction in price change.

Table 2.8 Possible changes in vehicle charges

Vehicle vertical forces (relative to all-vehicle average)	Vehicle tangential forces (relative to all-vehicle average)	Indicative impact on price
High	Low	DECREASE
Low	High	INCREASE
High / Medium / Low	Equivalent to vertical forces	NO CHANGE

This relationship for passenger vehicles is shown in the following chart, which plots the ratio of vertical forces : tangential forces against % change in price. Based on Table 2.8 we would expect a negative relationship. That is, as the ratio of vertical to tangential forces increases, we would expect greater decreases in price, and vice-versa.



The fact that there is not an exact relationship demonstrates that other factors influence the outcome. For example the plot excludes the impact of the structures vertical damage factor as well as the change in any composition of costs in the latest ICM versions compared to earlier versions.

The chart also shows the magnitude of the price changes, in line with the stylised example we set out above. In the Appendices we include a full set of the proposed prices for passenger and freight, as well as the change in price compared to CP3.

Capability issues

The variable charges described in the SBP and in this update are based on unchanged capability – in the sense that significant changes in traffic can require step-changes in our maintenance and/or renewal regimes. By definition these 'step-changes' are beyond the marginal cost of additional traffic covered by variable charges.

We have already proposed to enhance the capability definition to include a cumulative tonnage measure. However, it should be noted that this issue relates to any significant change in traffic that requires a change in capability.

Appendix 6 sets out case-study examples that demonstrate why capability is a material issue and why significant changes in traffic can generate costs over and above what we would expect to recover over time through variable track access charges. For example, the Hellifield to Clitheroe line currently has timber sleepers and is used mainly as a diversionary route. With current tonnage levels this is sustainable within our current maintenance regime. However, there will be a ten-fold growth in freight tonnage from December 2008 requiring complete renewal with continuously welded rail. This was not expected in our CP3 funding settlement and is not covered by marginal wear and tear costs recovered through variable charges and therefore represents a step-change for which we are not funded. The impact of step-changes was also highlighted by ORR in Annex E of its February document, but in this case in relation to a decrement in traffic rather than an increase.

We have previously proposed options to deal with this issue as and when it arises in the future. This will need to be resolved in the coming months. We believe it would be inappropriate to introduce the change in variable usage charges described in this chapter without addressing this issue.

3 Freight-only charge

Summary of previous proposal

In our Strategic Business Plan we described the costing work we had carried out to implement the ORR decision to introduce a new charge for freight-only lines. We explained how we had derived a list of 27 freight-only lines following extensive industry consultation and how we had assessed the overall cost of maintaining and renewing those lines. We estimated the total annual cost to be recovered from the new charge as £7.9m. We then described how we had converted the cost into two network-wide mark ups on variable charges (for ESI coal and nuclear fuel) in accordance with the ORR policy decision in October 2007. These mark ups were assessed at £0.437 per 1000 gross tonne km for ESI coal and £3.620 per 1000 gross tonne km for nuclear.

Further Consideration

Stakeholder Feedback

Some stakeholders opposed the new charge completely and others opposed the decision to levy the charge on ESI coal and spent nuclear, however as these matters were determined by ORR[13] we have not changed the charging proposals described in this update.

Some stakeholders commented that our initial estimates for freight-only line costs were high. The ORR also said that it expected us to improve the estimates following improvements in our ICM[14].

Further Consideration by Network Rail

There are a number of changes we had always intended to make to the initial cost estimates we provided in the SBP in October, including:

- Our initial estimates assumed that unit renewal costs on freight-only lines were the same as the network-wide average. The Halcrow[15] review recommended that unit renewal costs on freight-only lines should be 80% of the average; we agree with this and have applied this factor in this update;
- The variable costs presented in our SBP were based on assumed levels of efficiency as at the end of CP3. We always intended to change this and this update is based on the assumed level of costs as at the end of CP4 as requested by ORR;
- Finally the costs presented in the update reflect the further improvements we have made to the ICM since October

[13] Charge to recover the costs of freight-only lines, Office of Rail Regulation, October 2007

[14] Update on the framework for setting outputs and access charges and SBP assessment, Office of Rail Regulation, February 2008

[15] Further assessment of Network Rail's freight variable usage costs and freight-only lines costs, Halcrow, February 2007

Updated Proposal

Introduction

This section describes our proposals to implement the ORR decision to introduce a new charge for freight-only lines.

The current structure of freight track access charges was established by the 2001 freight charges review[16]. Under these arrangements freight operators pay a range of variable charges but do not currently contribute to fixed costs (costs that do not vary with traffic) or common (shared) costs. The Government currently pays freight operators' contributions to these costs as part of the network grant it pays to Network Rail.

The proposed new charge reflects the Government's statement in the Future of Rail White Paper[17] that: "Where lines carry only freight, and no passenger services, the freight operators will pay its full costs". To be consistent with relevant legislation, the costs of freight-only lines can only be charged where the freight market can bear this cost. In its Advice to Ministers[18], ORR concluded that only two market segments had the ability to bear the fixed costs of freight-only lines, coal for the electricity supply industry (ESI coal) and spent nuclear fuel.

Definition of Freight-Only Lines

The ORR consultation document on freight charges[19] set out a definition of freight-only lines. This was discussed and confirmed at industry meetings in 2007, such that the agreed definition for the purposes of charging is as follows.

A freight-only line is one that:

- would close if freight services ceased to operate;
- includes segments of branches used only by freight traffic; and
- is a terminal line.

Freight-only lines do not include:

- through lines, as these provide operational benefits for the mixed-use network;
- freight-only sections that are used for passenger diversionary traffic or empty coaching stock on a normal basis;
- branch lines on which Network Rail infrastructure services operate;
- freight-only lines on which there is a realistic prospect of extensive passenger services;
- goods/slow lines that run parallel to passenger lines; and
- lines where franchised passenger services have access rights regardless of how frequently they are used.

[16] Review of freight charging policy: final conclusions, Office of the Rail Regulator, October 2001

[17] The Future of Rail CM6233, July 2004, Department for Transport

[18] Advice to Ministers and framework for setting access charges, Office of Rail Regulation, February 2007

[19] Consultation on caps for freight track access charges, Office of Rail Regulation, December 2006

Table 3.1 List of fright-only lines

Name	ELR	From mileage	To mileage	Track miles	Track KM	Route Miles	Route KM	Number of tracks	Territory	Baker Ref	Quail ref
ESI Coal											
Ayr Harbour to Newton Jn	AYH1	0.81	0.05	0.76	1.22	0.76	1.22	1	SCO	77	Scotland 3
Boldon Colliery Jn – Green Lane	BGE	0.03	0.65	0.63	1.01	0.63	1.01	1	LNE	76	Eastern 49A
Immingham to Ulceby	BRI2	100.54	104.08	7.08	11.39	3.54	5.70	2	LNE	63	Eastern 32B
Bedlington Nth L.C. to West Sleekburn Jn	BWC	0.00	0.72	1.45	2.33	0.72	1.16	2	LNE	74	Eastern 23C
West Sleekburn Jn to North Blyth Alcan	BWC	0.72	2.71	3.98	6.40	1.99	3.20	2	LNE	74	Eastern 23C
Ashington Jn to Lynemouth Alcan	BWC	2.71	4.13	2.83	4.55	1.41	2.27	2	LNE	74	Eastern 23C
Ashington Jn to Butterwell Jn	BWO2	0.00	3.06	0.09	0.15	0.09	0.15	1	LNE	74	Eastern 22B/23C
Drax National Power to Drax Branch Jn	DRA1	0.00	4.20	8.40	13.52	4.20	6.76	2	LNE	62	Eastern 40B
East Usk	EUB	0.00	1.18	1.84	2.96	1.84	2.96	1	WES	32	Western 21A
Green Lane – Tyne Dock	GLT	0.65	1.54	0.89	1.43	0.89	1.43	1	LNE	76	Eastern 49A
Harworth Colliery	HAC	11.25	14.68	3.43	5.52	3.43	5.52	1	LNE	53	Eastern 35A
Shirebrook East Jn – Thoresby Colliery	HIM	9.90	17.26	7.29	11.73	7.29	11.73	1	LNE	53	Eastern 30A/B
Hessle East Jn to Hull Saltend BP	HJS	0.00	5.79	5.79	9.31	5.79	9.31	1	LNE	63	Eastern 38C
Annbank to Killoch	KCH1	43.65	48.91	5.26	8.47	5.26	8.47	1	SCO	77	Scotland 3
Bank Jn to Greenburn	KSH	54.04	55.00	0.96	1.55	0.96	1.55	1	SCO	71	Scotland 2E
Portobello Jn to Leith South Goods	LHS1	0.00	2.76	2.76	4.44	2.76	4.44	1	SCO	79	Scotland 11A
Madeley Jn to Ironbridge	MJI1	156.24	160.19	6.22	10.01	6.22	10.01	1	LNW	41	Mids&NW 21C/D
Garston – Speke	SCR	22.74	24.39	1.65	2.66	1.65	2.66	1	LNW	59	Mids&NW 38A/40
Bootle Junction to Seaforth	SCT1	5.00	7.15	2.15	3.46	2.15	3.46	1	LNW	59	Mids&NW 40/41A
Cottam Powergen to Clarborough Jn	TYB1	68.39	71.99	7.19	11.56	3.59	5.78	2	LNE	54	Eastern 31B
Tower to Aberdare	VON	22.46	27.24	4.77	7.68	4.77	7.68	1	WES	31	Western 29A
Onllwyn & Cwmgwrach Ryans	VON	33.16	46.76	15.69	25.25	15.69	25.25	1	WES	31/32	Western 24A/B
Dalrymple to Chalmerston	WAT	43.66	52.87	9.21	14.81	9.21	14.81	1	SCO	70	Scotland 2C
Welbeck Colliery Jn – Welbeck Colliery	WKC	0.00	2.79	2.79	4.49	2.79	4.49	1	LNE	53	Eastern 30A
					165.91						
Spent Nuclear											
Appledore to Dungeness	APL	64.73	74.05	9.32	15.00	9.32	15.00	1	SEA	13	Southern 18D
Sizewell Sidings	SIZ	91.50	95.19	3.68	5.93	3.68	5.93	1	SEA	46	Eastern 8/9A
Seaton On Tees	SOT	0.00	1.33	1.33	2.13	1.33	2.13	1	LNE	68	Eastern 48A
					23.06						

Table 3.2 Cost estimates for freight-only lines

Name of freight-only line (all costs at 2006/07 prices)	Track renewal attributed (£000)	Track maintenance attributed (£000)	Signalling renewals attributed (£000)	Signalling maintenance attributed (£000)	Civils renewal attributed (£000)	Electrification renewal attributed (£000)	Electrification maintenance attributed (£000)	Telecom renewal attributed (£000)	Related renewals (£000)	Total annual cost of line from ICM at end CP3 efficiency (£m)	Total annual cost of line at assumed end CP4 efficiency (£m)
ESI Coal											
Ayr Harbour to Newton Jn	11	15	1	5	15	0	0	1	18	0.067	0.058
Boldon Colliery Jn – Green Lane	9	13	1	4	13	0	0	1	15	0.055	0.048
Immingham to Ulceby	108	168	0	34	101	0	0	7	96	0.515	0.445
Bedlington Nth L.C. to West Sleekburn Jn	9	22	9	15	14	0	0	5	57	0.131	0.114
West Sleekburn Jn to North Blyth Alcan	26	60	26	41	39	0	0	13	157	0.361	0.312
Ashington Jn to Lynemouth Alcan	18	43	18	29	28	0	0	9	111	0.257	0.222
Ashington Jn to Butterwell Jn	1	1	1	1	1	0	0	0	4	0.008	0.007
Drax National Power to Drax Branch Jn	265	214	69	108	96	0	0	10	185	0.946	0.817
East Usk	28	37	2	12	37	1	1	2	42	0.161	0.140
Green Lane – Tyne Dock	13	18	1	6	18	0	0	1	21	0.078	0.067
Harworth Colliery	82	90	3	23	54	1	0	2	74	0.330	0.285
Shirebrook East Jn – Thoresby Colliery	69	84	0	40	120	0	0	8	65	0.386	0.333
Hessle East Jn to Hull Saltend BP	69	98	0	18	231	0	0	5	81	0.500	0.432
Annbank to Killoch	44	86	0	22	264	3	7	0	0	0.428	0.369
Bank Jn to Greenburn	8	16	0	4	15	1	1	0	0	0.045	0.039
Portobello Jn to Leith South Goods	49	48	0	15	57	3	8	5	86	0.270	0.233
Madeley Jn to Ironbridge	87	126	2	16	118	0	0	4	53	0.407	0.351
Garston – Speke	25	33	2	10	34	1	1	1	38	0.145	0.125
Bootle Junction to Seaforth	14	33	1	17	16	10	7	0	41	0.139	0.120
Cottam Powergen to Clarborough Jn	110	171	0	35	103	0	0	8	98	0.523	0.452
Tower to Aberdare	65	67	0	10	93	0	0	0	37	0.272	0.235
Onllwyn & Cwmgwrach Ryans	102	254	0	65	264	0	0	2	154	0.841	0.727
Dalrymple to Chalmerston	77	151	0	39	183	6	12	1	0	0.469	0.405
Welbeck Colliery Jn – Welbeck Colliery	27	32	0	15	46	0	0	3	25	0.148	0.128
	1,316	**1,882**	**134**	**581**	**1,960**	**26**	**38**	**88**	**1,456**	**7.483**	**6.465**
Spent Nuclear Fuel											
Appledore to Dungeness	198	209	8	62	107	0	0	1	102	0.687	0.594
Sizewell Sidings	51	53	0	21	65	5	0	2	0	0.196	0.170
Seaton On Tees	21	27	0	16	14	0	0	2	20	0.101	0.088
	270	**289**	**8**	**100**	**186**	**5**	**0**	**5**	**122**	**0.985**	**0.851**
Overall Total	**1,586**	**2,171**	**142**	**681**	**2,146**	**32**	**38**	**93**	**1,578**	**8.467**	**7.316**

Table 3.3 Cost to be recovered from new ESI coal and spent nuclear fuel charge

Name of freight-only line (all costs at 2006/07 prices)	Track KM	Total annual cost of line at assumed end CP4 efficiency (£m)	Total traffic 000s gross tonne km (2006/07)	ESI coal traffic 000s gross tonne km (2006/07)	Spent nuclear fuel traffic 000s gross tonne km (2006/07)	Proportion of Total cost for ESI or Nuclear (£m)	Variable unit cost (£ per 1000 gross tonne km)	Variable cost (£m)	Cost to be recovered from new charge (£m)
ESI Coal									
Ayr Harbour to Newton Jn	1.22	0.058	6,712	6,390		0.055	1.34	0.009	0.046
Boldon Colliery Jn – Green Lane	1.01	0.048	5,960	4,750		0.038	1.34	0.006	0.032
Immingham to Ulceby	11.39	0.445	465,109	195,827		0.187	1.34	0.262	0.000
Bedlington Nth L.C. to West Sleekburn Jn	2.33	0.114	2,274	1,068		0.053	1.34	0.001	0.052
West Sleekburn Jn to North Blyth Alcan	6.40	0.312	3,013	2,303		0.239	1.34	0.003	0.235
Ashington Jn to Lynemouth Alcan	4.55	0.222	4,228	590		0.031	1.34	0.001	0.030
Ashington Jn to Butterwell Jn	0.15	0.007	55	50		0.006	1.34	0.000	0.006
Drax National Power to Drax Branch Jn	13.52	0.817	166,130	145,865		0.718	1.34	0.195	0.522
East Usk	2.96	0.140	2,172	2,093		0.134	1.34	0.003	0.132
Green Lane – Tyne Dock	1.43	0.067	8,400	6,700		0.054	1.34	0.009	0.045
Harworth Colliery	5.52	0.285	4,556	4,555		0.285	1.34	0.006	0.279
Shirebrook East Jn – Thoresby Colliery	11.73	0.333	5,526	5,508		0.332	1.34	0.007	0.325
Hessle East Jn to Hull Saltend BP	9.31	0.432	47,260	45,271		0.414	1.34	0.061	0.353
Annbank to Killoch	8.47	0.369	17,598	17,570		0.369	1.34	0.024	0.345
Bank Jn to Greenburn	1.55	0.039	2,030	2,030		0.039	1.34	0.003	0.036
Portobello Jn to Leith South Goods	4.44	0.233	13,752	13,683		0.232	1.34	0.018	0.214
Madeley Jn to Ironbridge	10.01	0.351	26,040	25,478		0.344	1.34	0.034	0.310
Garston – Speke	2.66	0.125	7,529	663		0.011	1.34	0.001	0.010
Bootle Junction to Seaforth	3.46	0.120	55,411	43,490		0.094	1.34	0.058	0.036
Cottam Powergen to Clarborough Jn	11.56	0.452	53,580	49,987		0.421	1.34	0.067	0.354
Tower to Aberdare	7.68	0.235	5,615	5,467		0.229	1.34	0.007	0.222
Onllwyn & Cwmgwrach Ryans	25.25	0.727	27,754	20,084		0.526	1.34	0.027	0.499
Dalrymple to Chalmerston	14.81	0.405	19,411	19,403		0.405	1.34	0.026	0.379
Welbeck Colliery Jn – Welbeck Colliery	4.49	0.128	10,190	10,186		0.127	1.34	0.014	0.114
	165.91	**6.465**	**960,305**			**5.345**		**0.843**	**4.577**
Spent Nuclear Fuel									
Appledore to Dungeness	15.00	0.594	710		669	0.560	1.34	0.001	0.559
Sizewell Sidings	5.93	0.170	150		147	0.166	1.34	0.000	0.166
Seaton On Tees	2.13	0.088	41		41	0.087	1.34	0.000	0.087
	23.06	**0.851**	**900**			**0.813**		**0.001**	**0.812**
Overall Total	**188.97**		**961,206**						**5.389**

List of Freight-Only Lines for the new charge

The process we followed to establish a list of freight-only lines applicable for the new charge was described in our SBP and involved several stages. In summary the steps were as follows:

(a) In February 2007 we published an initial list of freight-only lines[20] on our website and in early August published a revised list[21], this time containing data on commodity traffic. We received useful feedback on both lists and used it to refine the list accordingly.

(b) As the new charge is intended to be levied only on lines carrying ESI coal or spent nuclear fuel we then revised the list further to remove all lines not used for these two commodities or with no traffic for these two commodities in 2006/07. The original register included a few lines that were covered by connection agreements where Network Rail receives separate income. Clearly these sections should not be subject to the new charge and so we reviewed the list of freight-only lines carrying ESI coal and spent nuclear fuel to remove any sections where separate income was received.

The overall effect of these reviews and iterations resulted in the list shown in Table 3.1. There are 24 freight-only lines that carry ESI coal and 3 that carry spent nuclear fuel with a total length of track of 166km and 23km respectively. It may be appropriate to review the list again before ORR determine charges later this year to consider if there have been any other changes to the status of freight-only lines and whether it is appropriate to reflect this in charges.

Updated Costing

The total cost of the 27 freight-only lines shown in the SBP was £10.35m. This estimate comprised costs we termed as directly attributed and contained within a freight-only line as well as "related" costs that are the costs of activities relating to a route section but not fully contained within it (e.g. renewal of the signalling interlocking at a junction).

Since the SBP we have updated the ICM to address some anomalies with the modelled civils costs, applied a lower unit cost to freight-only lines and based the estimates on the assumed level of efficiency as at the end of CP4 (this is a weighted average for maintenance and renewal of 13.6% less than end CP3 costs). There are arguments for and against including the "related" costs in the overall cost to be recovered given that the renewal of "related" interlockings is generally driven by the needs of the mixed network. We sought confirmation from ORR that it wanted us to include related costs in our assessment of freight-only line costs. ORR confirmed that it did want "related" costs to be included and so the figures presented in this update are on that basis.

The revised estimate for the total cost of each of the freight-only lines is shown in Table 3.2 and gives a total of £7.3m, a reduction of 30% on the SBP figure. The table shows the breakdown of the cost by asset category; these were derived from ICM costs for Strategic Route Sections (SRSs) converted into unit costs per track km and then the relevant SRS figures were multiplied by the length of each freight-only line.

[20] Register of freight-only lines, Network Rail, February 2007

[21] Freight-only line register with traffic, Network Rail, August 2007

There are two adjustments to these costs that must be made to assess an appropriate figure for charging purposes. Firstly, many of the freight-only lines carry other commodities, not solely ESI coal or nuclear, and so the chargeable cost should be adjusted to reflect this. Secondly, our cost estimates represent the total cost of freight-only lines and so to assess the proportion of fixed costs an adjustment must be made to deduct the variable costs on the line. Each of these adjustments is considered in turn below.

Adjustment for other commodities

Many of the freight-only lines carry other commodities as well as ESI coal or spent nuclear fuel and so, as described in the SBP, we propose a reduction in the cost estimates to reflect this. We believe that the most appropriate way of doing this is in proportion to the volume of ESI coal or nuclear traffic compared to the total traffic on the line. As explained in the SBP we decided to use gross tonne kms as the most appropriate metric to do this split. Table 3.3 shows the list of freight-only lines along with 2006/07 traffic data in gross tonne kms for ESI coal, spent nuclear and the total for all commodities. It also shows the resulting proportion of the total freight-only line cost that applies to the two commodities that ORR concluded should be chargeable. This adjustment reduces the cost to £5.35m for ESI coal and £0.81m for spent nuclear fuel.

Adjustment for variable costs

The cost estimates described above represent the total annual cost of renewing and maintaining the relevant freight-only lines. However, we will recover variable costs through variable charges and so this amount must be deducted to give the fixed costs to be recovered through the new charge. To make this adjustment we have used the average freight variable cost of £1.34 per 1000 gross tonne km (see section on variable charges) and the traffic data for 2006/07 to estimate the total variable income from each line. This is then deducted from the cost in the previous step as shown in Table 3.3. The resulting cost of £4.58m for ESI coal lines and £0.81m for spent nuclear fuel lines is our estimate of the cost to be recovered from the new charge.

Comparison of latest proposals with October SBP

A comparison of the cost estimates presented in this SBP update with the indicative figures given in the October SBP is shown in the following table. The revised cost estimates represent a significant reduction (about 30%) compared with indicative figures presented in October; this would be further reduced (to 45%) if "related" costs were excluded.

Table 3.4 Comparative cost estimates

Description (at 06/07 prices)	SBP (October 2007)	SBP Update (April 2008)	SBP Update if "related" costs are excluded
Cost to be recovered from ESI coal	£6.99m	£4.58m	£3.7m
Cost to be recovered from spent nuclear fuel	£0.91m	£0.81m	£0.7m

Charging

The ORR set out various options for recovering the costs of freight-only lines through new charges in its consultation paper in June 2007[22], namely: a fixed charge on each line; a variable charge applied only to traffic on freight-only lines and a variable charge applied across the network as a whole. ORR stated that it considered the third option of a mark-up on variable charges for ESI coal and spent nuclear fuel to be the most appropriate as it would be simple and easy to introduce. ORR also concluded that a network-wide mark up would avoid some of the problems of the other options (administratively complex and bureaucratic and likely to lead to disputes between operators and Network Rail). ORR confirmed these decisions in its October 2007 conclusions letter[23] and we have therefore based the charges shown in this SBP update on that basis.

Based on 2006/07 ESI coal traffic of 16 billion gross tonne km and an overall variable cost of £1.34 per 1000 gross tonne km gives a variable cost for ESI coal of £21.4m per annum. The freight-only line fixed cost to be recovered from the new charge is £4.58m as mentioned above which represents a mark up of £0.286 per 1000 gross tonne km.

Similarly for spent nuclear fuel, the 2006/07 traffic of 0.25 billion gross tonne km and an overall variable cost of £1.34 per 1000 gross tonne km gives a total variable cost of £0.34m per annum. The freight-only line fixed cost to be recovered from the new charge is £0.81m as mentioned above which represents a mark up of £3.192 per 1000 gross tonne km.

However, in its Advice to Ministers, ORR set annual caps for the new ESI coal and spent nuclear fuel charges. Although the caps at the end of the control period are higher than the costs to be recovered, the caps for earlier years will impact on the amount charged. The ORR caps are set out in Table 3.5 and the impact of these caps on the new charge is set out in Table 3.6.

Table 3.5 Caps set by ORR for the new Freight-Only Line charges

£m at 05/06 prices	2009/10	2010/11	2011/12	2012/13	2013/14
Cap on ESI coal freight-only line charge	2.8	5.6	8.4	11.2	13.9
Cap on spent nuclear fuel freight-only charge	0.3	0.6	0.8	1.1	1.4

[22] Charge to recover the costs of freight-only lines, Office of Rail Regulation, 22 June 2007

[23] Charge to recover the costs of freight-only lines, Office of Rail Regulation, 15 October 2007

Table 3.6 Impact of caps on new charge					
(at 06/07 prices and end CP4 efficiency)	2009/10	2010/11	2011/12	2012/13	2013/14
ESI Coal					
ESI Coal Cap as proportion of cost to be recovered (£4.58m)	61%	≥100%	≥100%	≥100%	≥100%
Total ESI coal charge (£m)	2.8	4.58	4.58	4.58	4.58
ESI Coal mark up in £ per 1000 gross tonne km	0.175	0.286	0.286	0.286	0.286
Spent Nuclear Fuel					
Nuclear Cap as proportion of cost to be recovered (£0.81m)	37%	74%	99%	≥100%	≥100%
Total spent nuclear fuel charge (£m)	0.3	0.6	0.8	0.81	0.81
Nuclear mark up in £ per 1000 gross tonne km	1.182	2.365	3.153	3.192	3.192

We propose that the new charge is levied as an additional charge over and above the variable track usage charges described in a previous chapter. The additional charge would only be levied on wagons carrying the two commodities, ESI coal and spent nuclear fuel. We intend to do this by making a slight adjustment to our billing system to use the TOPS commodity codes for the new charges. Usage charges are billed in terms of gross tonne miles and so the relevant figures for the additional charges are as noted in Table 3.7.

Table 3.7 Additional usage charges for ESI coal and spent nuclear fuel					
£m at 06/07 prices and end CP4 efficiency	2009/10	2010/11	2011/12	2012/13	2013/14
ESI coal additional charge (£ per 1000 gross tonne miles)	0.282	0.460	0.460	0.460	0.460
Spent nuclear fuel additional charge (£ per 1000 gross tonne miles)	1.902	3.806	5.074	5.137	5.137

4 Coal Spillage Charge

Summary of previous proposal

In our Strategic Business Plan we described the initial costing work we had carried out to estimate the cost impact of coal spillage on the network and review the basis for the current mark-up on variable charges for loaded coal wagons. We estimated the cost to be £7m per annum and described five charging options for dealing with these costs with our preferred option being to retain the existing 20% mark-up on the track element of variable charges (that recovers about £5m per annum). We also proposed offering a rebate for operators who can demonstrate that they are taking steps to minimise spillage.

Further Consideration

Stakeholder Feedback

There was support for the proposal of a discount for an operator who could demonstrate that it was minimising spillage as many people felt that it was better to prevent spillage at source. Some stakeholders thought the initial cost estimates were high and thought they should be reviewed.

Further Consideration by Network Rail

Following discussion with ORR we agreed that the best way of determining the efficient incremental cost of coal spillage would be to ask the independent reporter, Halcrow, to review our initial estimates and also to consider whether a different approach was more appropriate. The cost estimates presented in this SBP update reflect the findings of the Halcrow review.

Updated Proposal

Introduction

Variable usage charges for loaded coal wagons include a coal dust spillage factor. It is not included in the usage charge for empty coal wagons or for wagons carrying other commodities. The overall income generated for Network Rail from the factor is about £5m per annum. The current spillage factor is a 20% mark-up on variable usage charges (track element only) and was set by ORR in its review of freight charges in 2001. The tariff model for freight wagons comprises an element to reflect the cost impact on track assets and an element to reflect the impact on our structures assets. Both are dependent on a number of factors, particularly the speed and weight of wagons, but the spillage factor only affects the track element of the charge.

Coal spillage occurs when wagons are over-filled above the top edge of the wagon or when they are poorly loaded, causing spillage onto to top edges (or raves), the sloping ends of wagons or onto couplings that can then subsequently slide off in transit. Thus, even those wagons with cowls/raves that are intended to reduce spillage from within the wagon, do cause problems if, when loading, coal is spilt onto the top of the raves. These deposits of coal can then slide off when the train gathers sufficient speed and when the wagons are subjected to sudden movements. Thus coal spillage commonly occurs at switch and crossings and where coal trains stop and start.

Problems also occur following the emptying of wagons whilst moving slowly over the discharge hoppers at power stations. It is quite common for the discharged coal to build up as the wagons pass over the discharge hoppers and for coal to be deposited on the under-frames and running gear. This coal then falls off along the return route when the empty wagons are subject to jolts as described for the spillage from loaded wagons.

Updated Costing

Typical problems caused by coal spillage are as follows:

- points failures due to switch blades being obstructed
- ballast blocked by coal dust leading to wet beds
- track circuit failures due to wet coal slurry shorting out the rails
- reduced life of track components, e.g. rail corrosion due to sulphur content and moisture retention and shortened ballast life

Our SBP described how we had estimated the cost impact of coal spillage on the network in terms of reduced ballast life, reduced S&C life and the maintenance cost of rectifying point failures. Since then we commissioned Halcrow, the independent reporter, to review our estimates and consider whether a different approach and cost was more appropriate. Halcrow has recently produced its draft final report[24] and a summary of the main conclusions is set out below.

- Clean-up costs and Schedule 8 delay minute costs of point failures. Halcrow estimate this cost at £0.29m per annum
- Preventative work by use of RailVac or other specialised equipment at points that fail repeatedly. Halcrow have assumed that annual treatment at 64 point ends would cost £0.80m per annum
- Reduced service life for S&C affected by coal spillage. Halcrow has assumed a 22.5% reduction in service life for points affected by coal spillage and a lower figure, 15%, where RailVac preventative treatment is carried out. The estimated cost is £1.46m per annum
- Reduced service life for plain line track affected by coal spillage. Halcrow has assumed a 10% reduction in service life for plain line track and assumed that 515 miles of track are affected by spillage. The estimated cost is £1.52m per annum

Therefore Halcrow's total estimated cost of coal spillage on the network is £4.07m per annum and we have used this figure for the charges proposals in this SBP update.

Charging

Our August consultation paper on coal spillage described five different options for the charge. The SBP also described the same options and also sought views from stakeholders. Most respondents preferred option 5 for a revised mark-up on variable track access charges for loaded coal wagons (reflecting latest cost estimates) with a rebate for operators who can demonstrate that they are minimising coal spillage. We support this view and propose that the revised cost estimate from Halcrow (£4.07m per annum) is used to determine the appropriate mark-up.

The current coal spillage charge is a 20% mark-up on variable usage charges (track element only) for all loaded coal wagons. We propose that this mark-up is reduced to 16% to reflect the revised cost estimate of £4.07m compared to the current cost recovered of £5m per annum.

We would prefer it if there was no coal spillage onto the network and are therefore proposing to offer a rebate against the mark-up for those operators who can demonstrate that they have minimised, and are continuing to minimise, spillage from their wagons. We will assess the eligibility and value of any rebate on the effectiveness of actions taken to reduce spillage, however, some examples of possible mitigating measures that operators

[24] Coal Dust Spillage Costs, Halcrow Group Ltd, March 2008

could take are: (1) scraping coal deposits off the top edges (or raves) of wagons before they go onto our network; (2) spray washing or brushing coal deposits off the wagons; (3) better loading equipment at the port terminals that use hoppers to fill the wagons rather than bucket filled arrangements - the hopper arrangements are less likely to spill coal during loading; and (4) brushing or spray cleaning arrangements for the “empty” wagons at the power stations so that coal is removed from the under-frame and couplings.

A possible way of operating the rebate could be to apply it at a train service code basis with, say, 3 levels of discount; 0%, 50% or 100% depending on our assessment of the degree of reduction in spillage. We would need to periodically monitor the reduction in coal spillage and assess the appropriate rebate based on that.

5 Capacity charge

Background

The concept of a passenger capacity charging regime was developed as part of ORR's review of track access charges, which concluded in October 2000. It was designed to replace case-by-case negotiated capacity charges. The capacity charge is set to recover Network Rail's congestion costs, as a result of running passenger trains on the network. In October 2001 ORR's conclusions on freight charging determined that freight operators should also be subject to a similar regime. For freight services other than Royal Mail, charges were set at 90% of passenger rates, recognising the higher degree of flexibility in timetabling freight trains.

It was intended that a tariff varying by location and time of day should be introduced. However, due to a number of implementation issues, simplified arrangements were developed for both passenger and freight services, based on an average rate per service group. The simplified arrangements were formally introduced as part of the 2003 Access Charges Review.

In the Consultation on the Structure of Charges Review in June 2006, ORR set out in its guidance that the implementation of the charge in its original form was not necessary, particularly due to the development of the Route Utilisation Strategies (RUS) and the potential for the introduction of a reservation charge. However, ORR would expect there to be some degree of geographical and temporal disaggregation.

Proposed capacity charge in Strategic Business Plan

In our Strategic Business Plan in October 2007, we proposed the implementation of a tariff, varying by location and time of day, in a form similar to that intended to be introduced in 2001. It was envisaged that this would apply both to passenger and freight services. Our proposal was for an aggregation and mapping to the number of route sections in the Infrastructure Cost Model (ICM), i.e. three hundred and seven. The tariff would be bi-directional, so there would be six hundred and fourteen route sections in total. The number of timebands was reduced to six.

We advocated that the key benefit of such an approach was that the capacity charge would be more cost reflective compared to the current charge, as it would be more location and time-specific and align with a route-based charging policy that ORR was considering at the time. It would also provide for efficient network use in terms of both geographical location and time of day.

Further consideration

Stakeholder feedback

The majority of respondents accepted in principle that a capacity charge was justified, but there were some concerns about the actual design of the tariff and whether it should be re-calculated on a annual basis. One respondent explicitly rejected the principle of a capacity charge in the first place, as it felt it militated against rail growth, which was a key element of public policy.

One of the key concerns of respondents was the complexity of the charge. It was felt that the additional transaction costs could only be warranted where there was a clear benefit. Some of the respondents raised the point that the charge does not incentivise franchised train operators, as their level of service is largely specified by Government. Furthermore, it was argued that the incentive effect of the charge was eroded through the RUS process. Only one respondent expressed explicit support for the proposed disaggregation by route and time of day.

One respondent suggested that our proposal not to recalculate the charges during the control period, was untenable, as it does not take account of performance improvements that are likely to arise from the significant rail network investments which are proposed as part of this periodic review.

Some respondents raised the issue as to why the capacity charges should apply to base-load traffic, given that Schedule 8 payments are being reset from the beginning of CP4, though there was general acceptance that it should apply to incremental traffic over the baseline.

ORR

In its response to the SBP, ORR said that a charge based on significantly fewer route sections would balance simplicity and cost reflectivity better, whilst agreeing with the number of timebands proposed.

During the industry consultation a number of issues were raised, which ORR agreed would need to be answered before they could conclude how the capacity charge should be applied, which include the following:

- the implications of the performance regime benchmark re-calibration;
- the implications of the freight performance regime given that in the event of growth of other services, freight operators' performance payments are affected; and
- whether the level of complexity is an appropriate balance between reflecting major differences in congestion costs and retaining sufficient simplicity to make sure that the charge is practicable and does not impose excessive transaction costs on the industry.

Updated proposal

In light of the comments on our SBP charges proposal about the effectiveness of the capacity charge and some of the earlier concerns relating to payments made through Schedule 8, we have been looking at various options to address the issues.

Since the capacity charge was introduced in PR2000 there has been a fundamental change in the amount of capacity available, and we have reached the point where the incentive effect of the capacity charge has been significantly diminished. Also the in last periodic review we assumed no growth in establishing cost allowances and performance projections, whereas for PR08, our projections take account of a baseline demand forecast, thereby minimising the risk that the capacity charge will reflect the impact of growth on delay.

We therefore believe that it would be appropriate to retain a simple average charge per service group approach, as we would continue to charge for the costs of congestion and avoid the complexity of a pure geographic based charge and the attendant transaction costs that would be incurred.

We therefore propose the charge for each market segment should be as follows:

- Passenger operators – the charge would be based on the current average rate per service group approach, but with a discount applied for Saturday and Sunday services reflecting the difference in rates for these periods. Such a proposal is likely to incentivise third party funders to invest in new Saturday and Sunday services. We understand that at least one funder has raised the issue with the ORR in the past;
- Freight operators - the charge would be based on the current average rate approach, but rather than a rate for each service group, a single rate would be applied as an average across all service groups. The current 10% discount on

passenger rates would also be retained (except for Royal Mail services). As with the proposed passenger charge, there would also be a discount for Saturday and Sunday services.

We are doing further work to consider options for the level of the discount for weekend services and plan to discuss this with ORR over the next few weeks. One option for deriving the discount would be to base it on the proportion of the total average weekend pence per train mile rate compared to the total average weekday rate. We propose that the discount should be on the same basis for passenger and freight services.

With the planned re-calibration of the Schedule 8 Network Rail benchmarks, and the update of the Schedule 8 payment rates, we expect that there will be a need to re-calculate the capacity charge rates. In light of this and other on-going work we believe that is would be inappropriate to make a judgement at this stage as to whether we should use the CUI / CRRD relationship (2006-07), which was calculated for our SBP, as a basis for the calculation of average rates, or retain the current CUI / CRRD relationship. Once the re-calibration and payment rates are updated, we will be in a better position to make a decision on this.

Recalculation of the capacity charge

It was suggested by one respondent that we should recalculate the capacity charge during CP4 to take account of performance improvements as a result of investment. We still believe that it is only appropriate that the charge should apply for the whole periodic review period. Although, we acknowledge the incentive effects are limited, we believe that there is still merit in having stability in the charges, so that operators can react to the incentives that exist. Moreover, we are keen to ensure that the administrative costs both for Network Rail and operators are minimised.

CC term

The congestion costs of the existing level of traffic in 1999/2000 were implicitly covered by the fixed track charge in the case of franchised operators. These are represented by a term known as the CC term. Thus franchised operators are currently required to pay separately for the incremental traffic since 1999/2000 with the remainder being included in their fixed charges. This was designed to avoid unnecessary risk associated with the introduction of the new charge. As with our SBP approach, we propose removing the CC term from the fixed charge to make the overall charge more transparent.

SBP income assumptions

Given the proposed changes to the structure of the capacity charge, the likely need to re-calculate the charge following the completion of the Schedule 8 review and other on-going work, we have not updated the capacity charge rates. Therefore, for the calculation of the freight and passenger capacity income assumptions for the SBP update, we have used the actual level of the charge in 2006/07 as the base figure and have uplifted each year of CP4 by the growth trajectory. This is subject to change. For the freight income split between England / Wales and Scotland, the estimates for both were based on the split in train mileage. The capacity charge (CC) term is also based on the actual level of the charge in 2006/7 and the base figure is uplifted by the growth trajectory to derive the CP4 figures. The passenger income split between England / Wales and Scotland has been derived by assuming that ScotRail for both the CC term and capacity charge represents the figure for Scotland and all other TOCs are assumed to represent the England / Wales element of the income. The income assumptions are shown in Table 5.1 below.

Table 5.1 Capacity charge income assumptions for CP4						
£m at 06/07 prices	***2009/10***	***2011/12***	***2012/13***	***2013/14***	***2014/15***	***Total***
Passenger E&W	144	145	146	147	148	730
Freight E&W	4	4	4	4	4	20
Sub Total E&W	***148***	***149***	***150***	***151***	***152***	***750***
Passenger Scotland	4	4	4	4	4	20
Freight Scotland	<1	<1	<1	<1	<1	<1
Sub Total Scotland	***4***	***4***	***4***	***4***	***4***	***20***
Grand Total	**152**	**153**	**154**	**155**	**156**	**770**

6 Electricity for Traction charge

Introduction

In October 2006 a joint working group was set up by Network Rail and the Association of Train Operating Companies (ATOC) to look at electricity prices. At the time price increases were causing considerable concern among train operators. The working group included franchised passenger owning group representatives and freight operator representatives and was led by Network Rail and ATOC.

Once the group had addressed the pricing issues, the focus then shifted towards volume related issues including on-train metering, improving the accuracy of non-metered consumption and regenerative braking issues.

Pricing for Passenger Operators

For passenger operators, a set of prices was determined in PR2000 and was uplifted annually by the Department for Business, Enterprise and Regulatory Reform's Moderately Large Users Index (MLUI). The index lags the market. This lag effect is compounded by the fact that prices in each year are determined by the level of the index for the previous year's Q2 figure, which is published in September and subsequently revised in December. In addition, to the lag effect, it is unclear as to the contractual mix of the underlying price data that is used to construct the index.

A solution was devised based on a recommendation made by NERA economic consultants to the working group, which was intended to be short term. It was agreed to move to a system in which we recover our actual procurement costs. This would enable operators to mitigate their risks through the use of hedging strategies. Procurement decisions would be discussed and agreed with ATOC and the franchised passenger operators in advance. For 2007/08, the prices for traction electricity were fixed prior to the start of the financial year. This solution took *de facto* effect on 1 April 2007. As a progression from collective procurement it was envisaged that operators would devise their own individual strategies. We understand that operators now wish to retain collective procurement as it offers them greater flexibility.

When revising the price matrix to reflect the change, we did not take account of the structural changes in the electricity industry that have taken place since 2000, such as the British Electricity Trading Arrangements, as we needed to maintain the relativities of the tariffs, otherwise there would have been a redistribution of costs among operators. However, for CP4 as proposed in our Strategic Business Plan, we plan to take account of these changes, so that the price is fully cost reflective.

As part of the change, an additional process was added to the regime; that of a cost 'wash-up' (in addition to the existing consumption wash-up). As the use of MLUI was discontinued, the reconciliation process needed to separately take account of price risk. Whilst the energy price is fixed, the transmission costs may vary with demand, particularly at peak times, so the tariff that Network Rail sets at the outset is therefore an estimated tariff, rather than an actual tariff. For CP3, this cost 'wash-up' is being done at a national level, as it would not be appropriate to do it on an Electricity Supply Tariff Area (ESTA) level given that we are maintaining the relativities of the 2000 matrix. However, for CP4, as we will be using actual costs, we will do the cost 'wash-up' at ESTA level.

Pricing for Freight Operators

As a general principle we stated in the SBP that we did not believe it was appropriate to use the Moderately Large Users Index (MLUI), as it was not reflective of prices in the market nor was it clear as to the contractual mix of the underlying price data that was used to construct it. The work carried out in the Network Rail / ATOC working group confirmed this. Furthermore, operators using such an index cannot mitigate their risks through the use of hedging strategies. However, given that freight operators consume a

small proportion of overall consumption and could incur significant transaction costs in devising procurement strategies, we proposed the continuation of the use of MLUI for freight users should freight operators choose not to adopt an arrangement similar to the passenger operators.

Given the significant structural changes that have occurred in the electricity industry since the price matrix was last reviewed in PR2000, we proposed re-basing the charges in the matrix to the expected 2009/10 prices (or, if this is not possible, at least the 2008/09 rates).

Further Consideration

Stakeholder feedback

Freight operators welcomed the option of continuing with MLUI in CP4, however, they were concerned about the rebasing of costs. In particular, they felt that the reasons for the rebasement needed to be further elaborated.

ORR

Although recognising the serious flaws in MLUI, ORR affirmed that freight operators can continue to use the index, if they wished.

Proposal

By continuing with the use of the Moderately Large Users Index (MLUI), which is not fully reflective of prices in the market, Network Rail will continue to be exposed to price risk. It does not seem appropriate to propose the use of a price matrix which does not take account of the structural changes in the electricity industry since 2003, such as the introduction of new trading arrangement, as well as the normal changes one would expect in distribution and transmission charges, notwithstanding the change in energy prices since then. Furthermore, if the price matrix was not rebased, Network Rail would even face greater price risk. We therefore believe there is a strong justification for rebasing the matrix.

Derivation of Indicative tariffs

The electricity market has risen significantly since the SBP was submitted in October 2007, primarily due to the rise in the price of oil. The price changes included in the SBP were estimated based on the underlying market fundamentals and in general, these have not changed. However, many market specialists believe that the current market price is higher than it should be and that the prices will fall in the short-term. Because of this, we have not updated the detailed price data in this submission, as it would distort the likely price profile going forward, but for information purposes the following table shows how the current market rates vary from the original submission:

Table 6.1 Baseload Market Rates (£/MWh) Median Scenario

Year	SBP Rate	Current Rate
2008/09	37.9	49.6
2009/10	39.5	57.8

The assumptions we made in the SBP about the drivers for electricity prices are still valid and include the following:

1. Global Warming Pressures: under phase two of the EU emissions trading scheme, which started in January 2008 and will run until December 2012, carbon prices are currently at €12-20 / tCO_2carbon, which is a big increase from phase 1 where they where trading close to zero. It is uncertain how the scheme will operate post 2012 but it is likely that tougher targets will be set which may push up the price of carbon further. Together with the Large Combustion Plant Directive, electricity prices may potentially increase by around 20%.

2. Oil and Gas Prices: given that the costs of oil, gas and electricity are closely linked, any events, such as a new conflict in the Middle East or significant demand increases, that restrict the flows of oil and gas would have a knock on effect on the price of electricity. However, we assumed that this influence will decrease over time, due to increased investment in renewable and nuclear power.

3. Increased Investment in Renewables: while some renewable technologies may currently be more expensive than fossil fuelled generation, it has been assumed that a decreasing reliance on fossil fuels will stabilise or reduce the price of electricity in the medium term.

It is important to restate that whilst the combination of all of the factors above means that it is very difficult to predict how prices may vary in the future, it does seem likely that prices could rise above inflation for CP4.

For transmission costs, which are regulated by the Office of Gas & Electricity Markets (OFGEM), the current price control review lasts until March 2012 and allows National Grid to raise its charges by RPI + 2% each year. From April 2012 it has been assumed that the same regime will continue to apply. For distribution costs, which are also regulated, the current price control which lasts until March 2010 and allows the Distribution Network Owners (DNOs) to raise its charges by RPI each year. From April 2010 it has been assumed that an RPI increase will continue to be applied.

We expect or total income for CP4 to be £913million as shown in Table 6.2, the same as we had assumed in the SBP.

Table 6.2 Total EC4T Income Projections for CP4

£m at 06/07 prices	***2009/10***	***2011/12***	***2012/13***	***2013/14***	***2014/15***	***CP4 Total***
E&W	162	164	171	178	182	857
Scotland	10	10	11	12	13	56
Total	172	174	182	190	195	913

Electricity Volumes

Further to the work on pricing, the industry focus has moved to the area of electricity volumes. DeltaRail were appointed by Network Rail and ATOC to conduct a thorough review of the end to end processes in autumn 2007, specifically focusing on a number of areas which are of concern to operators, which include:

- visibility of the likely 'wash up' adjustment from year to year (both in terms of size and direction);
- the integrity of the underlying data used to derive the modelled consumption figures; and

- the interaction between the discount applied to users of regenerative braking and the 'wash up' adjustment. This can result in a situation where operators who do not use regenerative braking face higher energy bills.

In their report for the working group in December 2007, Deltarail put forward a number of proposals on how to address the concerns of operators. Although acknowledging that on-train metering would be the optimal solution, in view of the low probability of it happening in the short-run, the recommendations are mainly focused on infrastructure metering.

Among the recommendations were:

Non-traction supplies

- Install smart meters at stations fed from traction supply (Euston, Waterloo and Merseyrail stations). At Euston, there are meters, but not all may work and in any case are not remotely monitored. For Merseyrail, meters are in the process of being installed.

Stabling loads

- Install meters at depots, sidings to capture stabling loads; and
- Meter domestic depot consumption separately (e.g. Slade Green, Northam).

LUL

- Reinstate meter readings on East Putney-Wimbledon and Waterloo & City;
- Install meters at Stonebridge Park depot; and
- Review methodology for calculating consumption on remaining lines (Gunnersbury-Richmond and Queen's Park-Harrow & Wealdstone).

Further Consideration

ORR

ORR made it clear in their response to our SBP update they would expect us to outline a strategy for metering non-traction use of traction electricity e.g. at specific boundaries between London Underground and National Rail network and at specific stations, e.g. Euston. It would also expect us to establish a methodology for measuring consumption for stabled vehicles.

Proposal

We are currently evaluating the above proposals from a business case and funding perspective. As noted below, we are also looking at 'on-train' metering. We will keep the industry informed of developments as they arise.

Regenerative Braking

In PR2000 a uniform cost discount of 16.5% (based on a consumption reduction of 20%) was introduced which was based on an analysis of consumption of Heathrow Express trains before and after regenerative braking came into use. At the time of the Regulator's determination in 2000, the only rolling stock which the 16.5% discount applied to was the Class 323 rolling stock. However, since 2000 other vehicles have been introduced on the AC network with regenerative braking capability. Given that Heathrow Express was based on a particular configuration, is unlikely that the 16.5% discount will be appropriate where there are different configurations. Furthermore, it is expected that regenerative braking will be rolled out on the DC network over the next couple of years.

Whilst over the longer term the industry is likely to move to universal metering, there was a need to come up with a more cost reflective discount(s) in the interim to address operators' concerns.

For CP4, we proposed to continue with the concept of a discount mechanism in the price list. However, we proposed a differentiation between AC and DC and also with these broad categories themselves. For the AC network, we proposed that for long distance services a cost discount of 16% should apply; for local and commuter services we proposed a cost discount of 20% and for Regional and outer suburban stock a discount of 18%. To differentiate between the three discounts, we will categorise them at Service Code level on the basis of the average miles per stop and the appropriate Service Codes will be flagged in our billing system. We outline this in Table 6.3. All services within a Service Code would have to be in the same category and that would be defined by the majority of services in that Service Code.

Table 6.3 Regen Discount for AC

Type of Service	*Regen Discount*	*Average Miles Per Stop*
Long Distance	16%	>10 miles per stop
Regional & Outer Surburban	18%	≤10 miles per stop
Local & Commuter Services	20%	≤2.1 miles per stop

For DC we suggested that the discount should be based on the four proposed Southern region ESTAs which we plan to introduce on 1 April 2009. For the Central ESTA we proposed a cost discount of 15% and for the Wessex, Sussex and Kent ESTAs a discount of 5%, which reflected the lower propensity to regenerate energy in areas area where the traffic was less dense. The discounts were based on international examples and engineering judgement. If regen is rolled out on the DC network during CP4, we may need to revisit the discounts to take into account the effectiveness of them.

However, given the likelihood that greater evidence may come to light as to the true extent of the savings, in particular from metering, we also proposed that the operator should be allowed to provide evidence if it believes that a different discount is more appropriate. We therefore suggested that the above discounts should be treated as default discounts. In the event that no evidence is submitted, or the evidence submitted is insufficient or unconvincing, then the default would automatically apply.

Further Considerations

Stakeholder feedback

Generally respondents were supportive of our efforts to differentiate the discounts and match them more closely to the level of energy returned to the system / grid. However, one respondent did suggest it would be better if the regeneration rates were linked to the consumption rates for each unit type.

Proposal

We propose to continue with the proposed approach in the SBP. It should be noted that the discounts either for AC and DC will only be granted if the network is capable of accepting regenerated energy and the train is regenerating. It should also be noted that we will carry out the consumption wash-up by comparing the net metered grid energy with the net estimated train consumption (i.e. estimated train consumption minus the regen discount).

Consumption 'Wash-up'

In order to improve the granularity of metered data we increased the number of ESTA's from 12 to 26 on 1 April 2007 to provide more information to operators. However, the consumption wash-up will continue to be based on the 12 areas during CP3. We are currently looking at the feasibility of increasing the number of wash-up areas further to potentially 40 from 1 April 2009 and conducting the wash-up on this basis.

Consumption Modelling

Due to the retirement of TRATIM, a system used for train planning purposes and also for the calculation of consumption rates for vehicles, we have looked at a number of options as to how best calculate electricity consumption rates going forward.

A solutions architect was appointed and an outline EC4T solution design was produced in accordance with the business requirements and a number of internal and external supplier options were evaluated. The options were evaluated on the basis of the following criteria:

1. Simplicity;
2. Ease of use;
3. Simple to understand (on screen presentation);
4. Intellectual property rights maintained within Network Rail;
5. Data feeds (data collection) taken where possible from Network Rail systems;
6. Ease of maintenance and data update;
7. Degree of flexibility;
8. User support; and
9. Visibility of Methodology;

We chose a model based on a system used internally for performance modelling, called RailSys. When RailSys is combined with a beskpoke in-house system, it will enable the calculation of consumption rates for each operator and their associated Train Service Codes.

We describe the methodology for the model below.

The methodology for the calculation of consumption rates

RailSys has been used as a performance modelling tool by Network Rail since April 2005. This software is supplied by Rail Management Consultants (RMCon) based in Hanover, Germany. It is a detailed signal berth train simulation modelling software and its main purpose is to compare how the planned timetable reacts to primary delay events. It is used to test the operability of a development timetable and compare its performance to the current timetable.

The system structure of RailSys is divided into three parts:

a) the Infrastructure Manager;

b) the Timetable and Simulation Manager; and

c) the Evaluation Manager.

The Infrastructure Manager is used to construct, edit and manage the rail network. The Timetable and Simulation Manager is used to input the timetable, rolling stock characteristics and also the delay data. The Evaluation Manager is an evaluation program for the output obtained during multiple simulation.

A new version of the system RailSys 6.3 was introduced to the business in July 2007. A key feature of this new version is the ability to calculate the train's mechanical energy consumption. This new version along with a conversion tool will be used to calculate the consumption rates for EC4T for CP4.

RailSys Inputs

There are four main inputs into RailSys namely the route data and infrastructure, the timetable data, the rolling stock characteristics and the primary delay data taken from Train Running System on TOPS (TRUST). TRUST is a system containing historical recorded timings of all services in the timetable. For a train's energy consumption calculation, the TRUST delay data is not required and therefore is omitted from the description. All data sources are reliable and have a very high degree of accuracy. The following sections below describe in more detail the three major inputs into RailSys.

1. *Route Data and Infrastructure*

   Most of the UK rail network has been built in the RailSys infrastructure, using information from the Railway Sectional Appendix and Five-mile diagrams. It should be noted that any changes to the rail infrastructure since the middle of 2007, e.g. removal or addition of signals, line speed changes, removal or addition of tracks, have not been incorporated.

2. *Timetable Data*

   A representative timetable is selected and used to calculate energy consumption, using the TRAINPLAN system. As part of this exercise, there will need to be a categorisation of electric train types to TOCs/FOCs. Once this has been done, each of the trains has to be defined in terms of the number of coaches and the class types. These definitions can be obtained from TRUST (the performance system) or from a Stock Working Diagram provided by the TOCs and FOCs.

3. *Vehicle Characteristics*

   Vehicle characteristic information is the other key input into the system and is derived from the Rolling Stock Library. Whilst we are likely to have most of the vehicle characteristics, for some of the latest traction types e.g. Classes 395, 350 and 222 etc., we expect that we will have to approach train manufacturers for such data. There could be complications in retrieving this information as the operators and manufacturers, according to past experience, are sensitive to the sharing such information.

RailSys Output

From the inputs listed above the RailSys software produces the output, as mechanical energy at the wheel rims as an output. This can be produced at Service Code and vehicle type level.

Calculation of Consumption Rates

Extra processing is then done to convert the amount of mechanical energy to electrical energy at the pantographs, using the electrical characteristics of the trains, as the amount of mechanical energy does not take into account the traction efficiency losses. The electrical characteristics (which give efficiency data) for the majority of trains can be sourced from a system called OSLO. In addition to this, energy is added for the non-traction loads on the trains (saloon heating etc). For the non-traction loads a temperature-

dependent model would be used which will provide nominal values, as it would be an onerous task to get actual data for each train.

This process for the calculation of consumption rates can be expressed mathematically as:

- Electricial Energy = mechanical work / efficiency + Energy for non traction purposes

- Consumption Rate = Electricial Energy / Miles Travelled

It is important to note that the system designed around the above methodology is not intended to exactly replicate the results of Tratim, and may result in different rates. We are therefore proposing to re-calculate rates for each vehicle type and Service Code, rather than just for new vehicle types that will run on the network in future, so that there is consistency among operators.

Once a set of rates have been produced, which we expect to be in the early summer, we will consult with the industry.

Freight and the Consumption 'Wash-up'

Under the current arrangements there is a risk to freight operators that their actual consumption could be lower than the estimated consumption and therefore the operator ends up paying more than it should do, by virtue of being excluded from the wash-up. Similarly, if actual consumption is higher for a freight operator than estimated consumption, this poses a risk to other operators, as they could potentially be paying for a greater of volume of electricity than they consumed. We are also conscious of the need to promote energy efficiency, so there should not be a perverse incentive for an operator to consume more electricity than estimated. We therefore proposed that freight operators should be included in the consumption wash-up. However, where a freight operator installs a meter on a train and is billed on that basis, we proposed to exclude that operator from the 'wash-up' process, subject to the appropriate treatment of transmission losses.

Further Considerations

Stakeholder feedback

One respondent affirmed that freight operators should either join the wash-up, or be charged a premium which reflects the risk taken on the wash-up by franchised TOCs.

Respondents from the freight sector were particularly concerned with being included in the EC4T wash up process. They argued that unlike franchised passenger operators, freight operators are not protected from any financial penalties that may arise from a change of industry charging rules and principles. Respondents from the freight sector also argued that it would be impractical and unacceptable to include re-opener clauses in freight operator customer contracts to deal with uncertain annual reconciliations such as the EC4T wash up.

One respondent raised a concern that if the freight companies were included in the wash up with incorrect consumption rates that they would benefit from such an error.

ORR

ORR agreed in principle to the inclusion of freight in the wash-up, provided that accurate consumption rates for freight vehicles are calculated, as well as some of the other issues associated with EC4T volumes being resolved.

Proposal

Although, we acknowledge the concerns of freight operators, we continue to believe that the proposal to include freight within the wash-up adjustment is appropriate, so that other operators are not exposed to volume risk.

On-train Metering

ORR, in its consultation on the Structure of Charges Review in June 2006 set out in the guidance that it would like us to further consider the issues surrounding the introduction of on-train metering in tandem with the industry. It also stated that it would expect us to build on the findings of the AEAT report and consider a more geographically disaggregated approach to determining discounts for regenerative braking. The accuracy of these discounts was also raised in the traction electricity procurement review.

In the Strategic Business Plan we set out some of the issues raised in our discussions, with the industry such as accuracy, and legal and technical issues.

Further Consideration

ORR

ORR stated that it welcomed the work carried out to date on the use of on-train meters. In particular, it wants to conclude on the minimum quality of meter to be used for billing and how the data would be managed, before CP3 is finished, which would enable operators to start fitting on-train meters and use them for billing the traction electricity charge from the start of CP4.

Proposal

We note that ORR's suggestion that they would wish to see a conclusion on the minimum quality of meter to be used for billing and how the data would be managed, before CP3 is finished, enabling us to facilitate on-train metering by 1 April 2009. However, we note that it is not just about installing meters. Whilst we are supportive of metering, there are a number of complexities that will need to be resolved by the industry before billing on this basis would be appropriate, which include the following:

- How would we deal with a situation where there is partially metered data? Some operators may only wish to meter part of their fleets and continue with a modelled solution for the other trains. In particular, this may be problematic for the wash-up process;
- Data Collection: Consideration would need to be given as how to collect the data. A systems based on GPS has been developed in Scandinavia to do this and may be easily adapted to our needs, however work would need to be done on this;
- Metering Standards: what metering standards should be adopted? European standards are currently being agreed. It would need to be discussed and agreed with the industry whether proposed European standards are appropriate for the UK;
- Validation of data: We would need to consider how data would be validated. In particular, who would check the accuracy of the calibration of the meters on a periodic basis;
- Data protocols: protocols would need to be developed for missing data, either when the system fails in its totality or there is individual failure;
- Contractual changes: at present the contracts between Network Rail and each operator are drafted on the basis of modelled consumption. These would have to be modified to allow operators the option of using actual consumption figures;
- Losses: we would need to determine how to deal with the issues of losses, as there will be a disconnect between the meter readings and the total consumption levels. Losses vary by train / service type and a tiered approach along similar lines to AC regen is proposed; and

- The interactions between the billing system and metered consumption data would need to be examined, i.e. how the new Track Access Billing System (TABS) will interact with a data collection system.

We will support the industry in addressing and resolving the above issues (in fact we are taking a metering scenario into account in the design of our new billing system). However, we think it will be challenging to close out all the above issues by 1 April 2009, to enable billing on that basis.

It was agreed at the Carbon Reduction Working Group (CRWG) on 15 February 2008 that a group be set up to formulate a draft metering project programme. It is likely that there would need to be a number of workstreams to address the various issues, including:

- Technical workstream
- Data workstream
- Systems workstream
- Contractual workstream

7 Station charges

Summary of previous proposal

In our Strategic Business Plan we set out a number of options that had been considered for station charges in Control Period 4 (CP4). We proposed that our long term station costs should be allocated to each Station Facility Owner (SFO) and charged via the Fixed Track Access Charge.

Separately, we have published proposals for Qualifying Expenditure (QX) which would involve fixing the charge for the duration of CP4. The QX proposal is being pursued with train operators and ORR via the Industry Steering Group (economic and contractual framework). Whatever the shape of the QX charge, this would continue to be a separate and unregulated charge, and not part of the periodic review. The following therefore does not relate to our QX proposals.

Consultation Responses

Since submitting the SBP we received responses specifically addressing station charges from National Express Group, First Group, Merseyrail, Northern, South West Trains, the Association of Train Operating Companies (ATOC) and Transport for London.

ATOC welcomed greater transparency on costs, but commented that SFOs needed greater certainty over expenditure per portfolio. It cited the way that train operators and Network Rail have worked together to develop the National Stations Improvement Programme as a potential model of effective joint working.

Similarly, First Group asked for greater involvement in station maintenance and repair plans. It agreed that a portfolio level charge would be acceptable if a more inclusive approach was taken to planning, with associated increased reporting.

Both South West Trains and Northern remained concerned about the potential reduction of visibility that would result from including station costs in the Fixed Track Access Charge. Again, visibility of station expenditure was a key concern.

National Express Group agreed that a portfolio approach was appropriate but were concerned at the effect of removing contributions from beneficiaries. It was also concerned with transparency at a station level.

Transport for London and London Underground raised some specific concerns regarding the implications arising from London Underground's non-regulated track access agreement. We have discussed our proposal with Transport for London and London Underground in order to understand the specific implications of the proposal for these organisations. These discussions are ongoing and Transport for London and London Underground have not yet provided their support for our proposal outlined below.

Further consideration

As is clearly shown above, the general theme in the responses from train operators was concern over both visibility of costs and expectation of expenditure. Following receipt of the responses we held discussions with representatives from some owning groups and ATOC. These discussions have been very helpful and have allowed us to clarify outstanding areas of concern and refine our proposals such that we have been able to reach a general consensus on the way forward with ATOC, subject to the resolution of the impact of the proposal on beneficiaries.

There is broad agreement within the industry that the question of how best to charge for stations should be seen as part of a wider set of station issues. Network Rail wrote a letter (agreed with ATOC) to ORR in February to advise that it wants to work together more closely with train operators and owner groups on the way overall resources for

stations are determined; how resources are allocated to the station portfolios of each train operator; how priorities within each portfolio are determined; and how procurement is best undertaken. We advised our view that far as possible within the overall national policy framework, these decisions about relative priority and procurement should be taken at a local level.

An extract from this letter is as follows:

- *"There should be transparency of (a) the steady state cost of stations maintenance and renewal at a train operator portfolio level; (b) planned expenditure at a train operator portfolio level; and (c) actual expenditure at a train operator portfolio level.*
- *A charge to train operators should represent the amount of planned expenditure per train operator associated with the portfolio of stations for which it is SFO. The amount of planned expenditure will be based on Network Rail's projections as adjusted to take into account any implications of the final CP4 settlement following ORR's conclusions in October 2008.*
- *An expenditure based charge would have the benefit of aligning the information we publish on the general expected spend at the stations an SFO manages with the specific amount payable at a SFO portfolio level. As the charge would reflect planned expenditure, this would provide train operator SFOs with a reasonable expectation of spend at their stations over 5 years.*
- *We recognise the tension between our desire to give certainty on resources over 5 years to each TOC, and the need for some flexibility to address emerging issues. We want to work with train operators to determine how best to do this.*
- *Network Rail is doing further work over the next 6 months to gain a better more disaggregated understanding of condition and liability at SFO portfolio level. This will enable improved allocation of expenditure per train operator. However, it is possible that issues could still emerge – unexpected and significant spend levels being required in portfolios with a small number of stations, for example. In such scenarios it may be appropriate to adjust the allocation of spend between operators. We will consult with train operators on this approach, and the NSIP Board [25] may be a useful forum for this.*
- *Network Rail would also need to retain the ability to adjust total station spend, but this would only occur in extremis and in consultation with operators. We will work with train operators to identify examples of the type of scenarios under which this may occur.*
- *To facilitate the above, train operators and Network Rail should work together at a local level to determine priorities within each SFO portfolio, and to determine the procurement and delivery of work in a way that delivers best value for money. Practical solutions for the delivery of these objectives are being developed; the local delivery groups (LDGs) established in the context of NSIP or a similar forum may be the suitable* [forum] *to do this. We are considering the way ahead and the NSIP Board will consider proposals to give effect to this."*

[25] The National Stations Improvement Programme (NSIP) is overseen by the National Programme Board. For more information on NSIP please refer to the relevant SBP Update supporting document.

The letter also stated that, in light of these bullet points, costs would be included in a new 'fixed station charge' in the Track Access Agreement, and Long Term Charge would be set to zero.

As noted above, this letter was agreed with ATOC, and our discussions with Transport for London and London Underground remain ongoing.

We are working with train operators via the NSIP National Programme Board as envisaged by the letter. The NSIP National Programme Board decided in its February meeting that a "Joint Stations Board" should evolve from the current board, consisting of Network Rail and train operators only, in order to take forward the broader scope of station issues, which will include aspects of those points outlined above. We also expect to continue to work with ISG in understanding how this relates to charges.

We have also discussed our proposal in more detail separately with ORR since the SBP. ORR requested that we justify our view that "up to the point where capacity is reached, additional usage can be met at very low cost". This is a view informed by Network Rail's engineering experience at stations and we consider it is supported by general principles defined in "Buildings and Construction Assets Service Life Planning – Part 1" BS/ISO15686-1:2000. This document relates to service life planning and lists factors which affect deterioration, placing "other factors" such as level of usage, low on the list. We consider that if, for example, the usage changes very dramatically such as a station with a surface designed to cope with 100 people a day suddenly gets a 5,000 people a day, then this would be a factor but otherwise fluctuations in footfall should have a minimal impact on maintenance and renewal costs.

In terms of the impact on beneficiaries, ATOC have advised that there appears to be a wide range of views on this point within the train operator community. To resolve the issues around beneficiaries, ORR has indicated it is doing some work on the financial implications of the proposal and Network Rail will produce a paper on the contractual implications in order to seek an industry consensus. In the absence of any industry consensus, ORR will need to determine this point in its draft conclusions in June 2008.

ORR also requested that we justify our split of costs per SFO. For the October SBP, costs were modelled as a long term average, allocated to each station according to station category and size banding, and then summed to a portfolio level. Since October 2007, we have been working to improve our expenditure forecasts, which has been possible due to the increasing availability of more detailed data. Our revised expenditure projections in Appendix 11 to the SBP Update are more reflective of asset volumes and material types, and hence long term average costs but are not reflective of relative condition – they assume steady state across the whole portfolio. Further detail on the changes in our expenditure projections since the SBP can be found in the expenditure and income projections section of the main SBP Update.

We continue to assess the more detailed data that is now available to us and are seeking to use this to give a better picture of condition of assets. This will enable us to refine our assessment of projected expenditure for each SFO portfolio. Clearly, if charges were to be set early on the basis of our current long term average cost estimates then these would be less reflective of final expenditure than charges set later which can take account of condition. This work is ongoing and we will further refine our assessment of relative condition and activity plans over the period between now and October. Additionally, in order for charges to train operators to be linked to a reasonable expectation of spend on their portfolio, the charges themselves must be reflective of ORR's final conclusions on Network Rail's activity levels and costs. It would be counter productive for charges to be set at a level that did not reflect Network Rail's regulatory settlement as this would disconnect activity expectations from our ability to spend. As such, we would expect that such charges could only be finally set when ORR gives its assessment of our expenditure.

We therefore propose that we work with ORR, informed by consultation with the NSIP National Programme Board/Joint Stations Board and ISG as relevant, to ensure that the charges decided upon by ORR in October are as reflective as possible of condition, planned activity and expenditure. In any event, as set out in our letter referred to above it is appropriate to allow for contingency and we will consult the appropriate industry group regarding our proposals for this.

In its February 2008 document, ORR stated that it intends to provide its final decision on the new portfolio charge approach in its draft determinations in June 2008. As such ORR advised that it expects Network Rail to continue to work closely with stakeholders, and will also speak directly to stakeholders itself. We will continue our ongoing discussions with the industry and keep ORR involved and informed in the lead up to June.

Updated proposal

Following our discussions with train operators and ATOC, Network Rail has proposed to include a 'Fixed Stations Charge' that is explicitly identified in the Track Access Agreement for franchised stations in CP4. This charge would be expenditure-based – i.e. it would provide train operators with a reasonable expectation of spend for each portfolio of franchised stations.

Property Rent paid by train operators will continue to be netted off the Fixed Track Access Charge for each operator as single till income, but will not be netted off the new Fixed Stations Charge. This will mean that the Fixed Stations Charge will be related in the round to a reasonable expectation of expenditure while also preserving the principle that train operators should receive the benefit of the charges they are already paying when charges are set for CP4 (albeit that both the Fixed Stations Charge and Fixed Track Access Charge are in any event subject to franchise provisions to hold franchised operators neutral to the effects of a periodic review).

Our revised expenditure projections in the SBP Update are profiled so as to remain steady over CP4, and once efficiency is applied this shows a declining profile of expenditure. Accordingly we propose that the Fixed Stations Charge should be in line with the post-efficient cost projections (as determined by ORR in October 2008).

As noted above, it is possible that issues may arise that mean that we need to adjust the allocation of proposed expenditure between portfolios or, in extremis, to reallocate spend to other areas of the business. It is proposed that the process and methodology of contingency management will be one of the issues to be consulted with a sub-group of the Joint Stations Board.

The Long Term Charge at all stations would be set to zero. This would affect how the abatement process in the station access regime currently works; in the SBP we set out a number of options for addressing this, which would now be simplified by having a separate Fixed Stations Charge. An intrinsic part of this charges proposal is that the principles of contractual remedies against breach of obligations in the station access regime should be preserved, although the mechanism may change. We are working on a proposal for this and will discuss this with ATOC, Transport for London, train operators and ORR.

As noted in our October 2007 SBP, we plan to report the expenditure we incur in much more detail than in the past so that customers and other stakeholders have more visibility of the costs incurred at each portfolio of stations. We reported that over the year from October we would develop our cost reporting and coding procedures, to enable us to report each year in our Annual Return:

- expenditure at stations aggregated for each SFO; and
- overall station expenditure disaggregated by 8 main work categories.

Methodology

Our proposed methodology for calculating the Fixed Stations Charge is that we should translate our projected expenditure (as set or adjusted by ORR in its final conclusions in October 2008) directly into a charge in order to provide a reasonable expectation of spend.

It should be noted that whilst the proposed Fixed Stations Charge would be expenditure based, our overall revenue requirement will be unaffected. In other words, whilst the stations charge will be based on expected expenditure levels, for the purpose of Network Rail's revenue requirement calculation we will still be capitalising relevant station expenditure. However, such capitalisation will not be reflected in the Fixed Stations Charge thereby preserving this as a meaningful cost-reflective charge, i.e. reflective of expected expenditure across the portfolio concerned.

Managed station costs would be treated in the same way as other route costs and allocated accordingly in the Fixed Track Access Charge. Retail income at managed stations will be allocated and therefore netted off at the same level of disaggregation.

Updated costing and charges

Our SBP Update expenditure projections for franchised stations allocated by train operator SFO are set out below. We propose that these projections, as adjusted to reflect any changes in ORR's final conclusions and to take account of any assessment of condition as appropriate, would be directly translated into a Fixed Stations Charge. However, improved condition information could be used to inform the allocation of projected expenditure between operators before the charge is set in October 2008. Similarly, any charge will be reflective of the outcome of our consultation with Joint Stations Board as to the treatment of contingency.

Table 7.1 Expenditure projections for franchised stations by station facility owner (indicative Fixed Station Charge values)

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	CP4 total
Arriva Trains Wales	8	8	8	7	7	**38**
c2c Rail	3	3	2	2	2	**13**
Chiltern Railways	2	2	2	2	2	**11**
East Midlands Trains	5	5	5	4	4	**23**
First Capital Connect	8	7	7	7	7	**36**
First Greater Western	12	12	11	11	11	**56**
First ScotRail	15	14	14	14	13	**70**
First/Keolis TransPennine	3	3	3	3	3	**13**
London Midland	9	8	8	8	8	**41**
London Overground	1	1	1	1	1	**6**
London Underground	1	1	1	1	1	**6**
Merseyrail	5	5	4	4	4	**22**
National Express East Anglia	11	11	10	10	10	**52**
National Express East Coast	3	3	3	3	3	**15**
Northern Rail	15	14	14	14	13	**70**
Southeastern	14	14	13	13	13	**66**
South West Trains	16	15	15	14	14	**73**
Southern	11	11	11	10	10	**54**
Virgin Trains	5	5	5	5	5	**24**
Other	0	0	0	0	0	**1**
Total	**147**	**142**	**137**	**133**	**131**	**691**

Summary implications

There appears to be broad industry agreement to our charges proposal as part of a wider set of station issues, noting that we need to continue to work with Transport for London to resolve some outstanding issues.

There is further work to be carried out with the industry, which will need to inform the ORR's draft conclusions document. Network Rail will:

- Make a proposal regarding the impact of the proposal on beneficiaries (including treatment of abatement) for discussion with the appropriate groups.
- Continue discussions with Transport for London and London Underground.
- Consult a number of issues around station planning, condition and charges with the NSIP National Programme Board, Joint Stations Board and ISG as appropriate.

8 Fixed charge

Summary of previous proposal

The fixed charge is calculated as a last step and recovers the residual revenue requirement from franchised passenger operators. We set out our proposed methodology for the Fixed Track Access Charge (FTAC) in the SBP. This is to use the ICM to build up the charge for each operator according to three components:

- directly attributable costs. These are costs modelled at the SRS level where the operator is the only one within that SRS and also includes any major TOC-specific investments;
- costs modelled at an SRS level. These are allocated between operators where there are more than one operator operating in that SRS; and
- costs modelled at a more aggregated level than SRS. These are first allocated to the SRS level, then split between the operators operating within that SRS as appropriate.

Further consideration

We have used the approach set out in the SBP to calculate our CP4 proposals. A detailed exposition of our approach is set out in Appendix 7. The document outlines our approach to the key issue around the choice of allocation metric.

The choice of metric is based on our own judgement and knowledge of cost causation within the company. In a number of instances this means we have continued to use the historical approach. We have developed the model capability to be extremely flexible in terms of the choice of allocation metric.

Stakeholder feedback

We presented a first cut of FTAC numbers at our structure of charges industry seminar in November 2007. Parties seemed comfortable with our approach. The queries we have received from ORR related to further detail about the operation of the model, as well as an interest around the basis of allocation metrics.

The Leeds University Institute of Transport Studies (ITS) peer review[26] agreed with our argument that:

> "…the approach taken to this issue in the report by AEAT (2005) aimed at measuring avoidable cost relies too much on subjective judgement…"

However, they believe that there would be some benefit in further modelling and research on objective statistical methods of estimating avoidable cost. ITS believe that:

> "Aligning fixed charges to avoidable cost would allow transparency between what Government and the media perceives groups of individual rail services to cost the taxpayer and the true opportunity cost of such services, and provide funding agencies with valuable information."

These are clearly longer-term suggestions and we can evaluate them in greater detail in subsequent review processes. No specific comment is provided in relation to our own proposed approach, or how the suggested avoidable cost approach would be an improvement. As we have set out previously, one of the issues with an avoidable cost approach is that it allows a calculation of what costs would cease if an operator ceased operation completely.

In practice this appears to be a question of fairly limited interest to funders.

[26] ITS (2008). Accessed via the ORR website: http://www.rail-reg.gov.uk/upload/pdf/cnslt-ITS_rev-NR_charg-props.pdf

Our approach takes the viewpoint that all operators continue to operate, and that what is necessary is a cost-reflective way of allocating those costs. As can be seen from the table at the end of this chapter our approach reduces the amount of 'common cost' allocated across funders as a residual.

Updated proposal

We believe that our proposed methodology delivers improved cost-reflectivity and useful information for funders and operators. It successfully leverages off the more detailed information contained in the ICM modelling approach.

The following table sets out the calculated TOC charges for each year of CP4. The final calculations will need to take into account decisions around the approach to Government Grant.

Table 8.1 Fixed Track Access Charges

£m (2006/07 prices)	Control period 4					
	2009/10	2010/11	2011/12	2012/13	2013/14	CP4 total
Arriva Cross Country	315	334	347	359	365	1,720
Arriva Trains Wales	235	248	258	268	273	1,283
c2c	48	51	53	55	56	264
Chiltern Railways	53	56	58	60	61	288
East Midlands Trains	205	218	228	236	240	1,127
First Capital Connect	141	150	152	158	162	762
First Great Western	364	385	400	414	423	1,986
First ScotRail	475	504	533	548	554	2,614
First/Keolis TransPennine	131	138	144	148	151	712
Gatwick Express	14	15	15	16	16	77
London Midland	166	177	185	193	197	918
London Overground	21	23	24	25	25	118
Merseyrail	40	42	44	46	48	220
National Express East Anglia	254	268	277	287	292	1,378
National Express East Coast	216	226	245	252	256	1,194
Northern Rail	409	431	450	468	480	2,238
South West Trains	301	318	328	340	346	1,632
Southeastern	290	308	320	332	340	1,589
Southern	213	226	233	242	248	1,162
Virgin Trains	336	352	362	373	379	1,802
Total	**4,230**	**4,470**	**4,655**	**4,817**	**4,913**	**23,085**

We believe that our approach significantly improves cost-reflectivity and hence is 'fairer' and more useful in guiding funding decisions. Some sense of how much more cost-reflective our approach is can be seen by looking at Table 8.2.

It contains a description of the line-items within the FTAC calculation, and the basis on which these are attributed – either at the SRS level or national. A major improvement over past approaches is that maintenance is modelled and allocated at the SRS level.

In absolute value terms, maintenance, variable access charges and single till income are allocated at the SRS level and accounts for about 29% of the total. Opex is allocated on national basis (17% of total). The issue is about the treatment of the RAB. Much of the RAB is allocated at an SRS level – because this is how the picture of renewals and enhancements is built up. However some reflects the spreading of national schemes – for example the Access for All strategy. Taking a conservative view that 70% of the RAB can be deemed allocated at the SRS level, means that about **67%** of the FTAC is built up on a disaggregated SRS level basis.

Table 8.2 The geographical basis of allocation for FTAC components	
Cost category	**Level of allocation**
Controllable OPEX	
Signalling Staff Costs	National
All other staff costs	National
Pensions	National
Accommodation costs	National
Consultants, contractors, agency	National
Employee related costs	National
Insurance	National
IT costs	National
Other	National
Other operating income	National
Own work capitalised	National
Non Controllable OPEX	
Cumulo rates	National
EC4T costs	National
Other non controllable	National
Maintenance Costs	
Track - core	SRS
Track - national services	SRS
Track - off track	SRS
Track - other	SRS
Signalling and telecoms	SRS
Electrification	SRS
Civils inspections	SRS
Indirect - area	SRS
Indirect - MDU	SRS
Indirect - network	SRS
Indirect - territory	SRS
Other - commercial property	SRS
Other - engineering Other	SRS
Other - OCS	SRS
Other - plant and machinery	SRS
Other - telecoms	SRS
Other - utilities	SRS

Table 8.2 The geographical basis of allocation for FTAC components	
Cost category	**Level of allocation**
Other - NDS haulage	SRS
Other - Other	SRS
Other - SSSG overlay	SRS
Variable track access income	
Variable track usage charges	SRS
EC4T	SRS
Electrification asset usage	SRS
Capacity charge	SRS
Single Till Income	
Freight	SRS
Open access	SRS
Stations	National
Depots	SRS
Commercial property rentals	SRS
Commercial property sales	SRS
Other	SRS