



How our PR13 efficiency assumptions for Network Rail were derived

October 2015

Introduction

1. Efficiency is very important as improvements in efficiency reduce the costs of the railways to passengers and funders. Therefore, efficiency is a fundamental part of how we set a price control and we report on it in our annual efficiency and finance assessment.
2. We set out how we derived our efficiency assumptions for control period 5 (CP5)¹ in our Periodic Review (PR13) final determination. To aid transparency, we are publishing a short high level summary of our approach to accompany the publication of our 2014-15 annual efficiency and finance assessment.
3. This note includes:
 - a. a summary of our PR13 CP5 expenditure assumptions;
 - b. a summary of our PR13 CP5 efficiency assumptions;
 - c. a description of our overall approach to determining efficiency assumptions for support costs, network operations costs, maintenance costs and renewals costs; and
 - d. the relevant consultants' reports.

¹ CP5 runs from 1 April 2014 to 31 March 2019.

PR13 summary expenditure and efficiency assumptions for Great Britain in Control Period 5

4. The PR13 core business expenditure assessment covered:

- a. support costs;
- b. network operations costs;
- c. maintenance costs; and
- d. renewals costs.

Collectively, these costs are known as core business costs, or 'SOMR' costs.

5. The expenditure assumptions for these cost categories are shown in Table 1 below. This note does not cover enhancement expenditure.

Table 1: PR13 expenditure assumptions for Great Britain in CP5

£m (2012-13 prices)	2014-15	2015-16	2016-17	2017-18	2018-19	CP5 total
Support costs	468	445	417	403	386	2,119
Network operations	425	412	395	378	358	1,968
Traction electricity, industry costs and rates	496	586	602	653	719	3,056
Network maintenance	1,091	1,074	1,033	1,001	966	5,166
Schedule 4 & 8 costs	207	219	225	204	203	1,058
Total operating expenditure	2,687	2,735	2,672	2,640	2,633	13,367
Renewals	2,508	2,575	2,477	2,357	2,190	12,107
Enhancements	2,797	2,921	2,730	2,672	1,699	12,818
Total capital expenditure	5,305	5,496	5,207	5,029	3,888	24,925
Total expenditure	7,992	8,231	7,880	7,669	6,521	38,293

6. The efficiency assumptions are shown in Table 2 below.

Table 2: PR13 SOMR efficiency assumptions for Great Britain in CP5

Expenditure	2014-15	2015-16	2016-17	2017-18	2018-19	CP5 total
Support	9.0%	4.9%	6.2%	3.3%	4.3%	24.9%
Operations	1.9%	2.9%	4.3%	4.2%	5.4%	17.4%
Maintenance	3.7%	3.3%	3.5%	3.5%	3.6%	16.4%
Renewals	8.4%	3.6%	3.8%	2.7%	3.2%	20.0%
Weighted average efficiency	6.8%	3.6%	4.0%	3.1%	3.6%	19.4%

Note: The CP5 total is the cumulative efficiency assumption over CP5, and is calculated by compounding the annual rates

Overall approach on core business efficiencies

7. In broad terms our approach was:
 - a. review Network Rail's bottom-up analysis, e.g. its planned volumes of work;
 - b. review Network Rail's top-down analysis, e.g. Hackett benchmarking of support costs;
 - c. carry out top-down benchmarking of Network Rail's efficiency for SOMR compared to companies in Great Britain and in other countries, e.g. econometric (i.e. statistical) work comparing Network Rail's maintenance and renewals expenditure to the levels in railway infrastructure managers in other countries; and
 - d. make a judgement on the level of efficient expenditure taking into account the overall package (all the elements of our determination) and the achievable pace of change on efficiency (i.e. how quickly Network Rail can deliver efficiency improvements).
8. The analysis was carried out for each area of expenditure. But there were some potential savings – the management of inflation, input prices, frontier shift, employment costs and occupational health – that could apply to all areas of expenditure. Our treatment of these cross-cutting issues is discussed below.

Support costs

9. Support costs include expenditure on activities that 'support' Network Rail's business. These are mainly administrative costs, such as costs related to finance, but include other running costs such as utilities and insurance.
10. In summary, the approach we took was to decide on a base year and 'roll forward' expenditure for that year through each year of CP5, applying an efficiency challenge to progressively reduce our assumption for this type of expenditure over the control period.
11. More specifically the approach was:
 - a. select a base year, for PR13 this was Network Rail's PR13 strategic business plan (SBP) forecast for 2013-14;
 - b. adjust the base year to remove any atypical or inappropriate expenditure;
 - c. assess the capitalisation of support costs and recharges to capital expenditure to ensure the consistency of Network Rail's SBP and our determination;
 - d. roll forward the base year for each year of CP5 to give the pre-efficient expenditure;
 - e. review Network Rail's bottom-up analysis and top-down benchmarking that supported its forecast expenditure;
 - f. carry out top-down benchmarking of Network Rail's overall efficiency for support costs compared to companies in Great Britain and in other countries;

- g. decide whether we use Network Rail's efficiency assumptions or our own and decide whether we use bottom-up efficiency assumptions or top-down assumptions; and
 - h. apply efficiency assumptions to the pre-efficient expenditure.
- 12. The overall support costs efficiency assumption was derived by applying a combination of both top-down and bottom-up approaches. Where Network Rail provided robust analysis of its business unit costs, e.g. for Human Resources, we used Network Rail's forecast. However, where Network Rail did not provide a robust analysis, we applied our own efficiency assumptions to our view of Network Rail's pre-efficient expenditure.
- 13. More specifically, the efficiency assumptions were based on:
 - a. our detailed review of Network Rail's support function SBP submissions, including Network Rail's own studies, e.g. Hackett benchmarking and Oxera efficiency estimates;
 - b. top-down comparison of Network Rail support & operations costs against other companies (CEPA);
 - c. international support and operations benchmarking (Civity);
 - d. pace of change study (PKF/CEPA);
 - e. insurance costs (Willis); and
 - f. employment costs (Incomes Data Services (IDS)).
- 14. The overall efficiency assumption was calculated at a disaggregated level across the sub-categories of expenditure (e.g. Human Resources, Insurance, Utilities, etc.), but the efficiency assumption was presented at the overall level of 'support costs and not for the sub-categories of support costs.

Network operations costs

- 15. Network operations costs are costs incurred in 'operating' the rail infrastructure such as expenditure on signallers and control staff.
- 16. Network Rail's SBP set out its plan to deliver a reduction in network operations expenditure over CP5 primarily through the implementation of a new way to run its infrastructure, known as the network operating strategy (NOS). This strategy would reduce Network Rail's operations costs as it would reduce the number of signallers required to operate the network.
- 17. We reviewed the business case and concluded that it represented value for money. We also agreed with Civity's review of international benchmarks showing that, compared to a group of European peers, Network Rail will be at a leading position on signaller costs once the strategy is completed in terms of expenditure and staff productivity².

² The assessment of whether the strategy could deliver the proposed benefits was based on an RM3 (Rail Management Maturity Model) assessment of the management case.

18. Network Rail's proposed costs for non-signaller network operations activities (e.g. operating managed stations) were above benchmarks with other UK regulated industries. For our assessment of these non-signaller costs we took account of domestic benchmarks.

19. Our decisions on network operations efficiency were also informed by:

- a) CEPA/OXERA review of catch up and frontier shift; and
- b) IDS review of employment costs.

Maintenance and renewals

20. Maintenance and renewals expenditure is the cost of the activities that sustain the condition and capability of Network Rail's existing infrastructure. Maintenance work may be either planned (for example, routine or visual inspections) or reactive (for example, responding to asset failures). Renewals expenditure relates to activities where an existing infrastructure asset has deteriorated so that it can no longer be maintained economically but has to be replaced in whole or in part. Such expenditure does not result in any change or enhancement of the performance of the original asset.

21. Maintenance and renewals expenditure was forecast and assessed for each of the following main asset categories: track, civil structures and earthworks, signalling, electrification, telecommunications, buildings and plant and machinery.

22. In summary, we carried out both a bottom-up and top-down assessment of efficiency, including:

- a. a detailed review of Network Rail's plans, including an audit of its benchmarking work and SBP efficiencies;
- b. bottom-up benchmarking and efficiency studies;
- c. review of previous studies (for example those carried out for the Periodic Review 2008 (PR08) and for the McNulty study) and cataloguing of remaining efficiency opportunities; and
- d. top-down econometric (i.e. statistical) analysis of the efficiency gap to the frontier (i.e. most efficient) rail infrastructure manager.

23. The efficiency assumptions for maintenance and renewal drew mainly, on (a) to (c) with (d) used as a sense check.

24. The evidence base for the work included:

- a. Network Rail's SBP, our review, and review by independent reporters:
 - i. ORR review of Network Rail's SBP (pre-efficient plans & projected efficiencies);
 - ii. AMCL review of Network Rail's signalling, level crossings, telecoms and electrification plans. This covered: policy, modelling, outputs, volumes and costs;

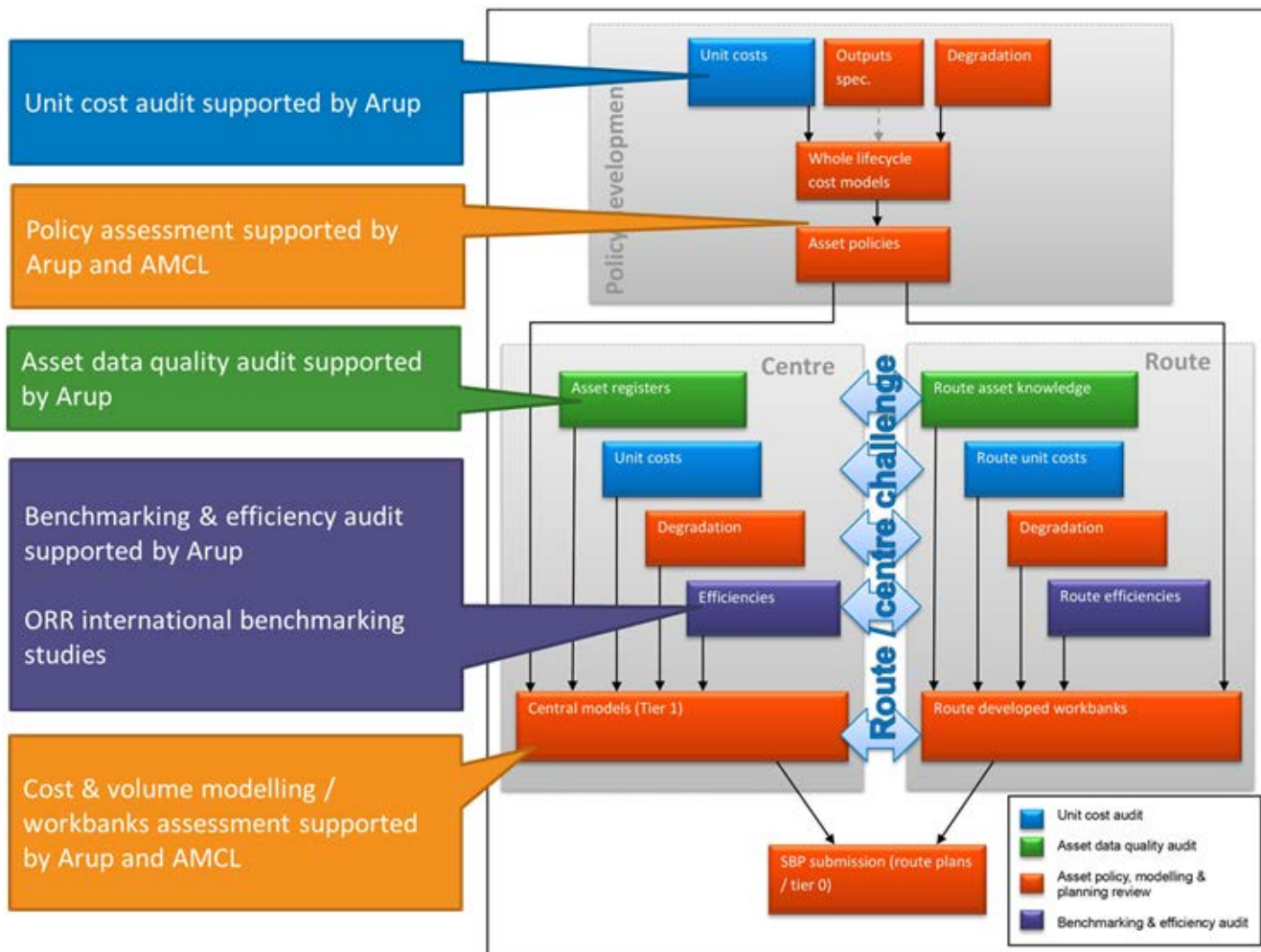
- iii. Arup review of Network Rail's track, civils, buildings, fleet and drainage plans. This covered: policy, modelling, outputs, volumes and costs;
- iv. Arup audit of Network Rail's unit costs;
- v. Arup audit of Network Rail's data quality; and
- vi. Arup audit of Network Rail's benchmarking and efficiency.

b. Benchmarking studies (national / international):

- i. AMCL asset management capability review;
- ii. RailKonsult Innovation benchmarking study;
- iii. RailKonsult / AMCL best practice inspections and maintenance, international benchmarking study;
- iv. Lloyd's Register Rail possessions management benchmarking study;
- v. Halcrow project and programme management benchmarking study;
- vi. Civity supply chain management benchmarking study; and
- vii. econometric (i.e. statistical) analysis.

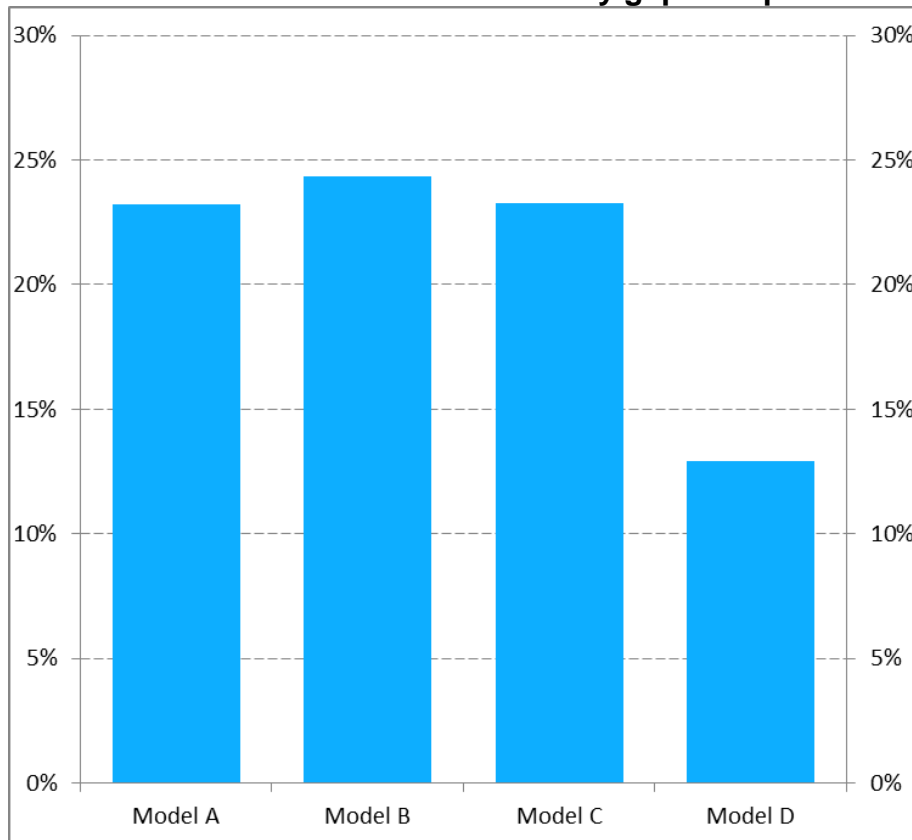
25. Figure 1 on the next page shows how some of these studies fitted together.

Figure 1: Example of how studies fitted together



26. The top-down econometric benchmarking used the Lasting Infrastructure Costs Benchmarking (LICB) dataset compiled by the International Union of Railways (UIC). At the time of the determination there were 14 European rail infrastructure managers participating in this dataset, of which ten were used in our analysis. The dataset covers the period 1996 to 2010, and analyses a large variety of cost drivers.
27. The benchmarking considered total maintenance and renewals expenditure as a function of track km, passenger train density, freight train density, the proportion of single track on the network, and time. It was based on economic and engineering analysis along with checks against a range of models. We also tested additional cost drivers, but generally found them to be insignificant or inconsistent with theory.
28. We used this data to construct some econometric models to identify the efficiency gap against the comparator organisations in the study. We stress tested these models against various factors to ensure they were robust. Figure 2 below shows the results of this work for the four main models.

Figure 2: Estimates of Network Rail’s efficiency gap with preferred models



29. In short, the econometric work was used as a sense check for the maintenance and renewals efficiency assumptions, which were mainly based on bottom-up studies. As the econometric work gave a broadly similar result, this supported the bottom-up efficiency assumptions.

Cross-cutting efficiency assumptions

30. We carried out an analysis of possible savings for each area of expenditure. But there were some potential savings – the management of inflation, input prices, frontier shift, employment costs and occupational health – that could apply to all areas of expenditure. We have termed these ‘cross-cutting’ issues and this section explains how we have treated these issues.
31. Our decisions on each cross-cutting issue were taken in the round with our other efficiency assumptions and in particular with the other cross-cutting issues.

Management of inflation risk

32. Credo, our consultants, carried out a study into Network Rail’s management of inflation risk (both general inflation risk and input price risk). The study included both a qualitative assessment and quantification of the efficiency of Network Rail’s approach to managing inflation risk.
33. Based on the results of this study, we applied a 0.2% per annum efficiency assumption across SOMR expenditure.

Input prices

34. Forecasting input price inflation is subjective and the results are uncertain. Given this, it was important that we took our input price decision in the round and in particular our decision took account of our other decisions, particularly in relation to efficiency and our treatment of risk and uncertainty.
35. Network Rail did not provide any robust evidence to support its views on input prices. We assumed that input price inflation is zero in CP5. This was consistent with the approach of largely not providing Network Rail with upfront funding for financial risks.

Frontier shift

36. As part of the analysis undertaken on our behalf by CEPA, our overall estimate for frontier shift is 0.3% per annum. We did not apply an additional frontier shift assumption to SOMR expenditure because of the difficulty of separating this effect from the existing efficiency assumptions; however we did include a 0.4% per annum frontier shift assumption for enhancement efficiency.

Employment costs

37. The IDS report showed that Network Rail’s employment costs, for the areas covered by the report, are between 9% and 36% above market rates.
38. As we discuss above we looked at efficiency in a number of different ways, e.g. top-down and bottom-up. Our overall efficiency assumptions for support, network operations, maintenance and renewals expenditure would have included potential employment cost savings as labour costs are a large component of these costs and

we thought these assumptions in total were already challenging but achievable. Therefore, we did not include an additional efficiency assumption for employment costs.

Occupational health

39. We assumed SOMR efficiency could be 0.07% per annum higher across SOMR to reflect the improvements that could be made in occupational health as poor management of occupational health issues has a detrimental effect on the individuals who suffer ill-health and it creates inefficiencies and costs within organisations.

Annex 1: Relevant consultants' reports

- Impact of business change on a firm's support, operations, maintenance and renewal costs (report by BDO), July 2013.
- Standards efficiency study summary (report by Nichols), July 2013.
- Assessment of Network Rail's management of inflation (report by Credo), June 2013.
- Scope for improvement in the efficiency of Network Rail's expenditure on support and operations: supplementary analysis of productivity and unit cost change (revised final report by CEPA), June 2013.
- Update report on the scope for improvement in the efficiency of Network Rail's expenditure over CP5 (report by CEPA), June 2013.
- Network Rail bottom-up benchmarking review - 2012 update (report by Arup), June 2013.
- PR13 review of Network Rail CP5 efficiency proposals (executive summary by Arup), June 2013.
- PR13 review of Network Rail's maintenance and renewal unit costs used in planning (report by Arup), June 2013.
- PR13 maintenance and renewals review - policy and WLCC model review (report by Arup), June 2013.
- Benchmarking employment costs at Network Rail (report by IDS), May 2013.
- PR13 maintenance and renewals review (summary report by Arup), May 2013.
- PR13 maintenance and renewals review (report by AMCL), May 2013.
- Asset management maturity assessment Strategic Business Plan update (report by AMCL), May 2013.
- Audit of asset data quality (report by Arup), May 2013.
- Independent review and assurance of Network Rail's buildings & civils transformation programme (summary report by Arup), May 2013.
- International benchmarking of Network Rail's operations and support functions expenditure (report by Civity), April 2013.
- Review of asset management best practice (summary report by RailKonsult), March 2013.
- Innovation efficiency study (summary report by RailKonsult), March 2013.

- Econometric benchmarking and its uses by ORR: a review (report by Jon Stern, CCRP, City University), January 2013.
- Operating Strategy Programme - Management Case Review - RM3 Evaluation of the capability of Network Rail to deliver its Operating Strategy Programme, (report by ORR), September 2012.
- Assessment of Network Rail's CP4 and CP5 savings - Asset Management Segment (report by Civity), July 2012.
- Review of Network Rail's supply chain management (report by Civity), May 2012.
- Scope for improvement in the efficiency of Network Rail's expenditure on support and operations: Supplementary analysis of productivity and unit cost change (final report by CEPA), March 2012.
- Network Rail bottom up benchmarking review: benchmarking of operations costs (final report by Arup - Executive summary), March 2012.
- Efficient expenditure benchmarking of Network Rail against North American Railroads (report by RailKonsult), January 2012.
- Network Rail bottom-up benchmarking programme audit (final report by Arup), January 2012.
- International materials costs benchmarking Study (report by Arup), August 2011.
- Relative Infrastructure managers' efficiency Study (report by RailKonsult), July 2011.



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