Expected Cost of Network Ownership: Network Rail and Key LICB Comparators: Initial Results

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OFFICE OF RAIL REGULATION

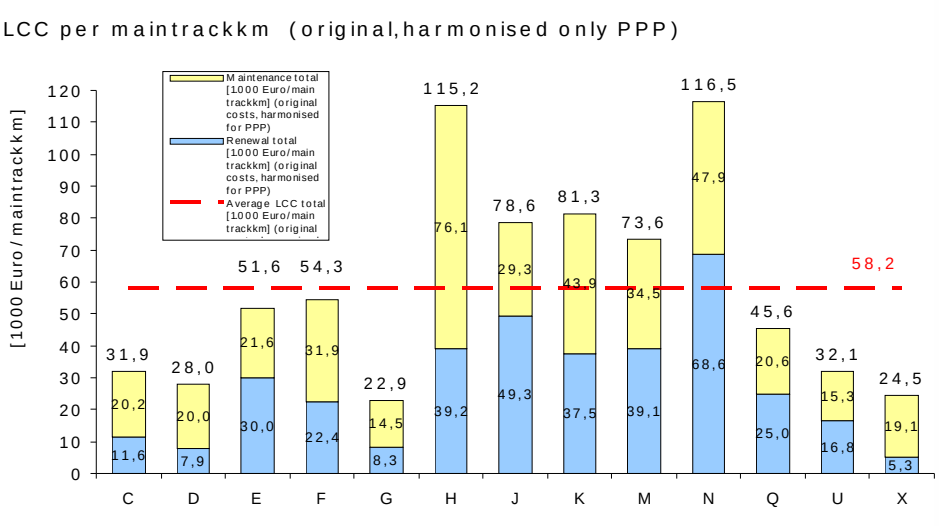
Context and objective

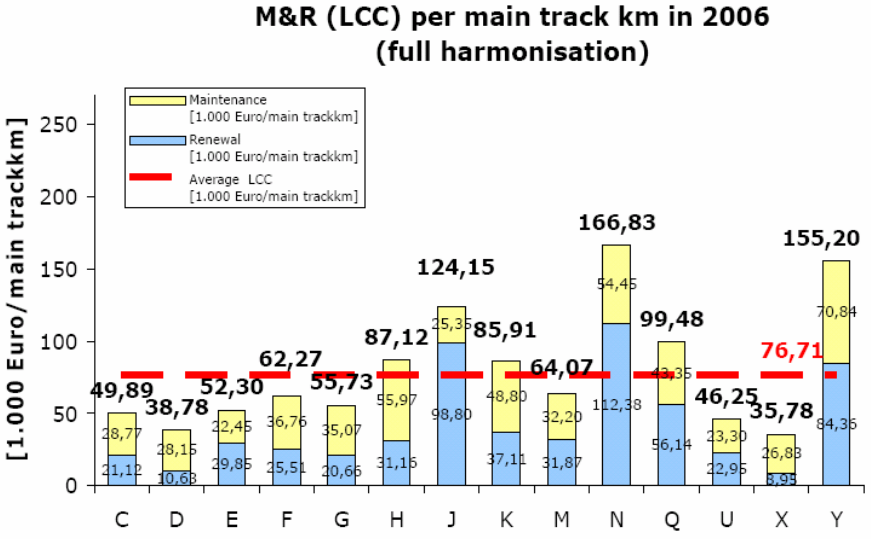
- International benchmarking requires normalisation for underlying differences
- The harmonised unit costs and the econometric analysis show a significant gap between Network Rail and other infrastructure managers – it is important to understand this gap
- This work is a potential input to the BSL work, and a further piece of analysis to take into account in understanding the gap
- Objective is to take an informed view on how the cost of owning key comparator railways should differ to GB Network
  - (Railway, not broader economic, institutional or political factors)
  - Chose European best practice comparators because " We believe that European railways are (much more) similar and have focused our own benchmarking activities in Europe" (Network Rail)
  - Considerable gap between state owned Western European railways and world best practice in North America

Adjustments are necessary

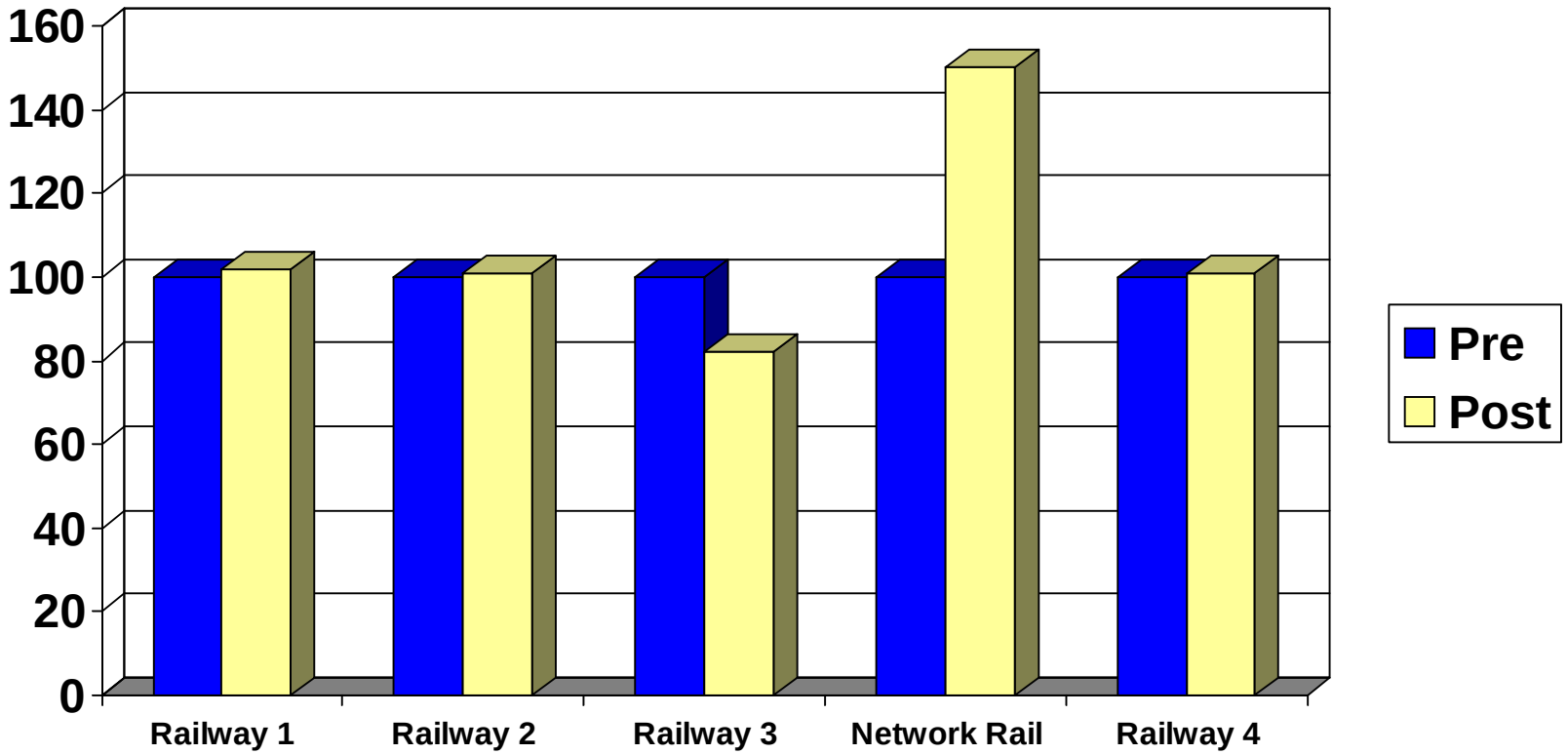
- Network design and capability
- Usage
- Vehicle types and designs
- Geography, topography (not made)
- Human factors such as population density, urban, workforce (not made)

UIC harmonisation





UIC Report attempts to harmonise based upon innate network capability



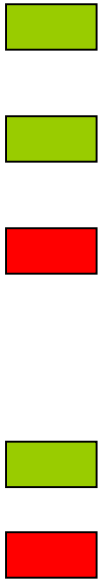
The above chart, based upon indexed UIC data, but keeping actual networks confidential, demonstrates that Network Rail's post adjustment cost per track km is far higher than its key comparators. This suggests a generally less capable, less heavily used railway.

- UIC harmonisation suggests that the British network, in railway terms, should be the cheapest to own; it is the most expensive

- 1. Review briefly UIC harmonisation
- 2. Apply different adjustment method

UIC Method

- Degree of electrification
- Switch density
- Single versus multiple track
- Track utilisation
  - a) density and renewals cost
  - b) gap between trains and maintenance cost



Concerns with UIC approach

- Single versus multiple track is based upon one SNCF analysis. Clearly working on a single line will be more expensive. But the 40% uplift used is far too high and discriminates against GB network excessively

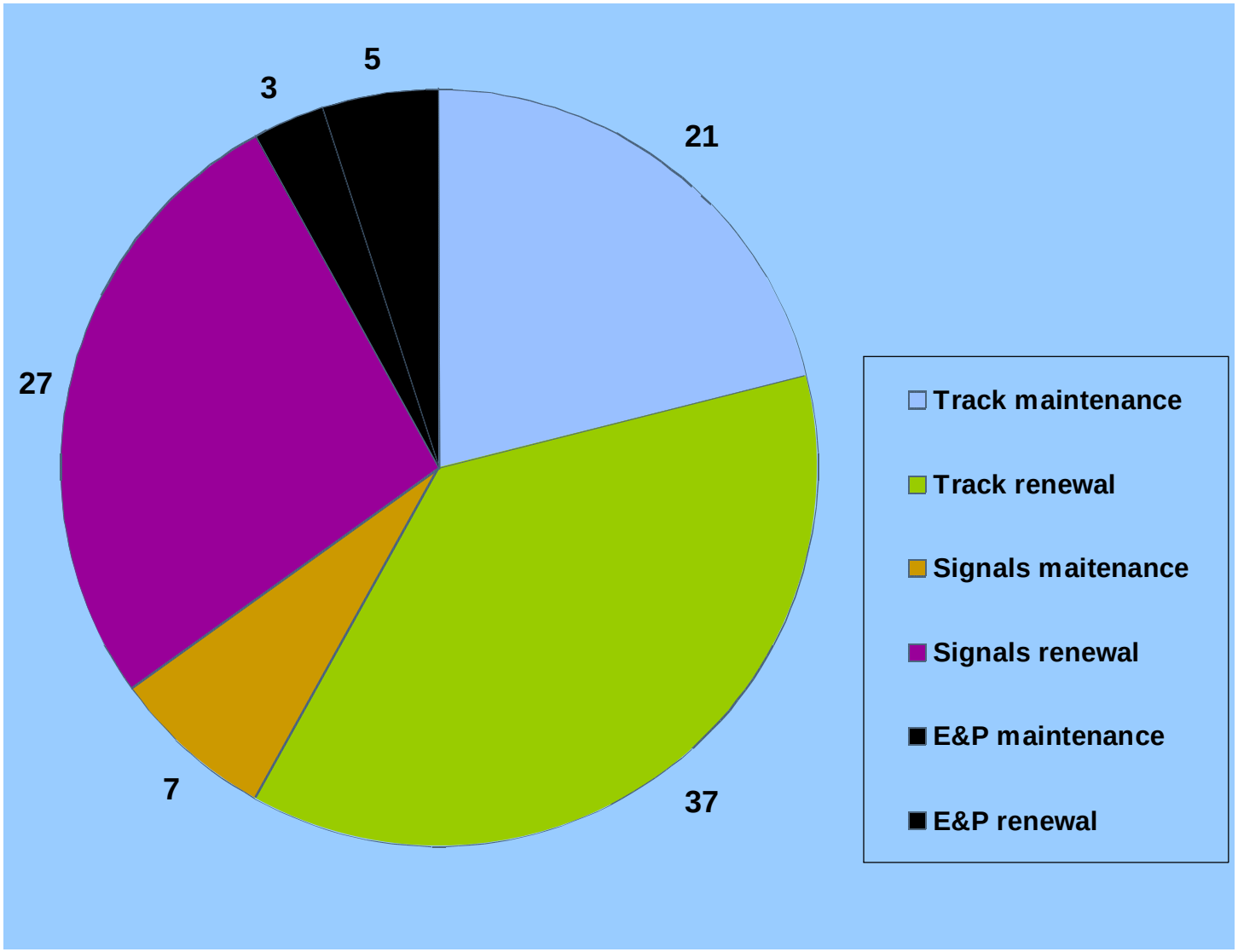
- Train frequency and maintenance cost. Network Rail is attempting to estimate the impact of this for work on North American benchmarking (having claimed that higher train frequency accounts for much of the cost gap)

Alternative approach

- Were Network Rail to operate the networks of its comparators what would happen to its cost per track km?

- Factors considered :
- Switch density
- Electrification (cost of assets only)
- Track density weighted by axle load
- Linespeed profile
- Bi directional signalling

Reference SBP average expenditure for CP4



Method to adjust NR CP4 spend in order to meet capability of each comparator

- Example 1 : signals renewals 27% of expenditure. If NR had 0% bi directional signalling and Germany 100%, and bi directional renewal cost 25% more than uni-directional .. Then NR's cost of delivering the German capability would be 7% more than at present (27% x 25%)

- Example 2 : track maintenance. 21% of expenditure. If NR's linespeed profile was expected to cost 20% more to maintain than Germany's.. Then maintaining German capability would be 4% less expensive (21% x 20%).

- The net result of both the above adjustments would be that we would expect the German network to be 3% more expensive to own.

Adjustment 1 : Track density weighted by axle load

- Assumptions :
  - Comparator networks experience density 65-125% higher than Network Rail, most have a higher proportion of freight
  - GB axle loads are highest in mainstream Europe, 25.5 versus 22.5t. Applying usage charge price list (adjusted for fewer trains) this equates to 8% increase in cost
  - Passenger axle loads have been excluded
- Applying Network Rail's current view of cost variability to the weighted tonnes suggests that individual comparator networks would be between 7 and 21% more expensive to own per track km

Adjustment 2: Switch density & bi-directional signalling

- Assumptions
  - The comparators retain between 25 and 105% more switches per track km. This is almost certainly due to the extent of bi-directional signalling and the relative shortage of multi track lines
  - S&C is the most expensive track asset, costing the same to renew as around 500m of European plain line or 700m of GB plain line
  - S&C costs about the same to maintain pa as 100m of plain line
  - Data on bi directional signalling is not yet available. NR has around 4% of its network thus signalled. It is assumed that the comparators maintain about 50%
  - Bi-di costs 25% more per km to renew and 20% more to maintain
- The net result of these two adjustments is that the comparator networks will be between 8 and 17% more expensive to own per track km

Adjustment 3 : Speed of conventional lines

Band	Cost factor	Belgium	Germany	Netherlands	NR	Switzerland
<60kph	0.7	**9%**	12%	9%	**12%**	**12%**
60-120 kph	0.95	**19%**	56%	19%	**56%**	**38%**
120-170 kph	1.1	**68%**	22%	68%	**22%**	**50%**
170-200 kph	1.4	**0%**	10%	**0%**	**10%**	**0%**

Adjustment 3 (continued)

- Linespeed data is incomplete but it appears that comparators retain fewer high speed conventional lines and fewer low speed conventional lines
- To date the analysis suggests that NR's speed profile is around 3% more expensive to maintain than most of the comparators

Adjustment 4: Electrification and Plant

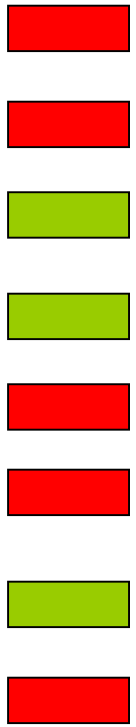
- Assumptions :
  - The benefits of electrification are experienced by train operators and the environment. It is pretty much a burden to the infrastructure manager
  - The comparator networks maintain between 50 and 145% more electrification
  - The cost of E&P is directly proportional to the quantity of those assets.
- The comparator networks are between 4 and 11% more expensive to own as a result of this adjustment

Summary of adjustments

	Density weighted	S&C and bi-di	Linespeed profile	E&P	Total
Belgium	107	112	99	109	127
Germany	108	112	100	104	124
Netherlands	115	108	99	111	133
Network Rail	100	100	100	100	100
Switzerland	121	117	97	105	140

Further adjustments

- Structures density
- Level crossings
- Earthworks, cuttings and embankments
- Fencing
- Single and multiple track
- Impact of train frequency
- Passenger usage charges and axle loads
- Access opportunity



(see Lloyds Register “Possession Benchmarking Exercise”)

Green indicates adjustments expected to reduce the cost gap, red those expected to increase it

Conclusion

- There are sufficient differences between the networks to justify significant adjustments
- The UIC harmonisation and this alternative analysis suggest strongly that Network Rail's railway should be between 25 and 50% less expensive to own on a track km basis than European best practice. It is about 30% more expensive.
- It is not clear whether the additional capability of the comparators contributes towards the cost gap or the efficiency gap
- Other factors can and perhaps should be considered although it is far from certain that they would reduce the cost gap