

INFORMED SOURCES e-Preview March 2019

I've been directly involved in two campaigns to establish a rolling programme of electrification. First was the joint British Rail/Department of Transport review in 1981. This led to the electrification of over 900 routes miles under the Thatcher administration.

However, the 1991-92 recession followed by privatisation took electrification off the agenda and by 2007 it was regarded as obsolete within Government. Time to start a new campaign, including my petition on the 10 Downing Street Website which, thanks to readers' support, forced a policy statement from Government. This was wholly negative but eventually pressure from Network Rail and the train operators forced a rethink.

Electrification was once again seen as the way forward. But soaring unit costs and late delivery, particularly the Great Western Electrification Programme (GWEP, forfeited political goodwill. Existing schemes were curtailed or cancelled and it was back to 2007 with all sorts of alternatives to electrification being proposed.

Here's an example of the current policy from a parliamentary answer. 'We have no plans to refresh the business case for electrification of the full Midland Main Line, as passenger benefits are being provided through other means, including a new fleet of bi-mode trains, allowing passengers to benefit from new trains sooner. Rapid delivery of value for money passenger benefits whilst minimising disruption will always be our priority, and we will continue to work closely with industry to prioritise schemes that deliver this'.

Time to launch the third campaign.

Making electrification affordable – the fight-back starts

Myths and misapprehensions challenged

Waterloo derailment – a system failure

New train TIN-watch

On 28 February the Railway Industry Association (RIA) will release the findings of its Electrification Cost Challenge. A joint venture with Network Rail and DfT, the report is expected to show that electrification can be delivered cost effectively.

Separately, last year the DfT commissioned Professor Andrew McNaughton to carry out its own independent review of electrification costs. As a reminder of current costs, Prof McNaughton's report quotes 'upwards of £3.5 million/stkm' for GWEP and £1.25million to £2.0 million in Scotland and the North West. European electrification schemes average around €1 million/stkm (£880,000).

However this report is concerned not with 'why is it costing so much?' but rather 'what should it cost and what is necessary to make it so?'

What should it cost?. With consistent application of best practice from current schemes, plus the adoption of the recommendations in the Report, electrification of an 'averagely complex' line should cost £1.0 million to £1.2 million/single track km (stkm). This includes the necessary bridge and station alterations.

According to the report, there are opportunities to reduce costs 'at every point in the lifecycle from operational specification through engineering standards and design, construction techniques, contract form, alignment of incentives and the treatment of project risk through to schedule realism'. A rolling programme of 150-200 stkm a year should generate further efficiencies which could reduce the cost to £800,000-£1.0 million/stkm.

Both the McNaughton and RIA reports suggest that electrification costs can be brought back to affordable levels. But this will require major changes within both industry and government, not least, argues the McNaughton Report, the re-establishment of an 'authoritative national engineering centre of excellence' covering equipment, standards and production techniques.

Scheme sponsors and engineering teams must also work closely together to specify and control the development and oversee delivery of each scheme. Delivery teams should work within a clearly defined commercial and technical 'envelope'. As GWEP has demonstrated, defining and then fixing the scope before starting work is vital.

Persuading a sceptical DfT and the Treasury that the lessons of GWEP have been truly learned will not be easy. In effect current policy, based on enthusiastic support for bi-modes, batteries and hydrogen fuel cells, will have to be halted and then reversed.

Enter the Trans-Pennine Challenge. At £2.9 billion the Trans- Pennine Route Upgrade (TRU) is the biggest enhancement to be funded in Control Period 6 (1 April 2019 – 31 March 2024).

Because of the GWEP experience, partial electrification of Trans-Pennine has been assumed as a way of reducing short term costs. In particular bi-modes have been promoted as the alternative to providing electrical clearance in tunnels, notably Standedge tunnel between Stalybridge and Marsden at the Western end.

On the basis of the McNaughton report Network Rail has been set a challenge: to see if the Trans-Pennine Route can be electrified throughout within the proposed budget for partial electrification. According to Informed Sources, Network Rail is up for it and is taking the challenge very seriously: an inaugural workshop was held at York as the end of January.

There is an important caveat with this third electrification revival. Implementing the recommendations in the two reports is going to take time. This will not suit politicians who live on instant gratification. Those of us who believe a modern railway is an electric railway face a long slog – but this time the railway has to get it right.

## Technical issues reviewed

In his report to the DfT Professor McNaughton analyses a number of the technical issues identified as increasing costs of current schemes and provides some cost-saving proposals.

First is the proposal to run an electrically 'dead' section of contact wire under structures with restricted clearance to avoid engineering work. This is 'unlikely to be a sensible solution in other than very specific circumstances' concludes the report. It adds that the whole life operational consequences of such extended neutral sections 'will usually be disproportionate to the initial benefits'.

In particular, neutral sections represent a discontinuity in the contact wire. The transition to the reduced wire height under a low bridge or tunnel will also involve a gradient in the contact wire from the standard height on each side.

This gradient imposes a speed restriction to limit the force on the contact wire as it pushes the pantograph down. Subjecting a neutral section with in-line insulators to these increased forces would be 'undesirable and a risk to performance', notes the Report. Reducing the gradient to reduce the force would extend the length of the dead section.

As for true discontinuous electrification, where trains run under their own power between electrified sections, this may be appropriate in 'limited low-performance areas or where hybrid electric and self-powered trains have already been acquired'.

On the thorny issue of electrical clearances Prof McNaughton notes that in some recent schemes the differences in cost between providing 'desirable' or either 'reduced' or 'special reduced' clearances to the underside of bridges have been 'significant', while the risk-based evidence necessary to allow deviation from the 'desirable' values 'appears to have become misunderstood'. The Report notes that recent schemes in Scotland have shown that soundly-evidenced, risk-based clearance values can be agreed with the safety regulator.

Extensively covered in Informed Sources has been the impact on electrification costs of ORR's adoption of revised values of safe clearance from public locations to live equipment. The increase was from 2.75m to 3.5m.

This was attributed to the need to recognise new risks, for example, passengers with selfie-sticks or metal curtain rods and workers carrying metal scaffolding. In practice, argues the Report, the 3.5m clearance height is more about contact with a train's live pantograph, rather than the contact wire itself. The specific risk is of someone misusing a long selfie-stick, or carrying a scaffold pole inappropriately, immediately beside the pantograph of a stationary train or when standing virtually on the edge of a platform during the passage of a through train.

'It seems to me that improbabilities are being compounded and therefore the basis for a national risk-based challenge (to the increased clearance) may have potential', Prof McNaughton notes.

As the GWEP installation began, readers began reporting piled foundations for the OHLE masts protruding several metres above the ground. As reported previously, this was the result of a flawed method of calculating pile depth, instead of using the established ORE method. Some piles had to be driven in two stages to achieve depths up to 11m.

Analysis by Southampton University has now provided the 'compelling evidence' to support the 'empirically sound' ORE method. As a result, future schemes will revert to traditional piling depths of under 4.5m. With more experience it may be possible to reduce the depth nearer to the 2.5m used on the ECML electrification, where masts are still standing after three decades.

## Process failures behind Waterloo derailment

When I wrote my review of the technical aspects of the Rail Accident Investigation Branch (RAIB) report on the Waterloo derailment in the January column, I intended to follow it up with an analysis of the wider issues raised. However the detail in my analysis of new train deliveries scheduled for 2019 pretty well filled my page allowance for February.

As a result Waterloo Part 2 was held over, which was not a bad thing, since it meant I had to read the report again to get back up to speed. This further reading only heightened my concerns which, to judge from my e-mail in-box, are shared by many readers.

That Waterloo resulted in only some bent metal, rather than death and injuries, reflected the time and place and should not be allowed to minimise the incident. As the RAIB Report makes clear, the accident happened because of multiple failures to follow the processes put in place after the Clapham accident in 1988.

To recap: as a result of 'uncontrolled' wiring, added to the signalling system at Waterloo, the points were positioned incorrectly, allowing the departing train to collide with wagons parked on the adjacent line. The wiring was added to overcome a problem encountered while testing but without the safeguards required by signalling works testing standards.

This accident happened because 'competence management processes operated by Network Rail and some of its contractors had not addressed the full requirements of the roles undertaken by the staff responsible for the design, testing and commissioning of the signalling works', reports RAIB. And that is why we should be worried by Waterloo.

Running through the report is RAIB's concern about 'soft issue', defined as the 'depth of knowledge and the attitudes needed for signal designers, installers and testers to deliver work safely'. That competence depends on knowledge, skills and attitudes and includes both the technical and non-technical skills needed to undertake a job role.

Non-technical skills are the 'social, cognitive and personal skills that can influence the way that individuals undertake technical tasks'. A good understanding of the principles that underpin the mandated procedures being followed is essential for staff to properly appreciate the consequences of the actions they take. In the case of Waterloo, RAIB says that the actions of the Functional Tester, Contractor's Responsible Engineer and the Project Engineer 'indicate that appropriate non-technical skills were not applied'.

RAIB's first recommendation, addressed to Network Rail, says steps should be taken to reinforce the attitudes and depth of understanding needed for signal designers, installers and testers to safely apply their technical skills and knowledge.

This should include education of existing staff, managers and new recruits, 'to promote a better understanding of industry processes, and an improved understanding of how the lessons learnt from previous accidents have shaped today's good practice'. Processes for the

assessment, development and on-going monitoring of non-technical skills should be enhanced and measures taken to monitor and encourage compliance with process and safe behaviours on projects.

Contractors OSL Rail and Mott MacDonald have recommendations on enhancing training in soft skills plus, in the case of OSL, enhancement of the skills needed for effective communication and safe decision making in complex project environments.

There are also some 'learning points'. These include the importance of signalling design, installation and testing staff 'at all levels' understanding why the processes established in the wake of Clapham must be followed.

To someone who reported on the storm which swept through the signalling profession after Clapham, RAIB's Waterloo recommendations and learning points do not seem proportionate to the fundamental shortcomings exposed. However, much will depend on the corporate approaches to the recommended education and training.

#### Traction & rolling stock update

Talking to Chris Green at the Modern Railways Golden Whistles awards, we discussed Class 700 reliability growth. This set me wondering whether an analysis of Period MTIN figures might be illuminating. In the column there is a chart of four-weekly Class 700 MTIN performance for the last 13 Periods. I think this shows where software upgrades ('drops' in the trade) have improved performance. Of course, correlation is not causation.

A similar analysis for the Great Western Railway Class 800 fleet is not so clear-cut. However the recent improvement is probably linked to the increased mileage being run on electric traction following energisation to Bristol Parkway.

My chums at Hitachi are getting quite chipper about overtaking the Class 700s in the TIN-watch Table of Truth. Period 11 will reveal whether my theories and Hitachi's expectations are fulfilled.

#### Deliveries 2019

I suspected that last month's extended analysis of new train deliveries would get me into trouble with operators complaining that I had been too kind on Siemens and Hitachi for at least getting all their Class 700s and Class 800 fleets into service, albeit a few months late. But, so far, no flak from GRT or GWR.

However the Scots were distinctly peeved by my generosity towards Hitachi's Class 385 delivery record. And I must confess to being guilty-as-charged.

When filling in my original data base I listed Class 385 service entry as 'from September 2017'. Prodded by Transport Scotland I went back to the original announcement which said that the first 24 trains would be in service from late 2017, which is a very different matter.

Obviously delays to electrification works meant that the trains could not have run at that date, but, as a Transport Scotland chum reminded me, with some asperity, the programme has been running seriously late.

#### Roger's blog

January ended with the Golden Whistles awards for operating excellence. This is the one awards ceremony in which I am not involved. As a result I get to chat to chums old and new, enjoy lunch, listen to the speaker and join in celebrating success.

There was also time to attend some of the papers presented at the morning conference, although a leisurely start meant that I missed the keynote address by Network Rail Chief Executive. Andrew Haines. We've published this forthright state-of-the-railway critique and statement of intent as an extended Editorial in this month's Modern Railways.

And while I was writing this blog I received details of the results of the '100 days review' Andrew instigated when he took over as Chief Exec. The central message is that devolution is being deepened with 13 smaller routes within five Regions. So back to the 1960s. And this important announcement arrived in time for the March issue so you can read all about the changes later this week.

Next week, it's the Guardian's George Bradshaw Address by Keith Williams of the eponymous Rail Review. He has admitted to being a gricer in his youth so if I get a private word I might test this claim by asking for his favourite Deltic.

Then we have the publication of the Railway Industry Association's electrification report on 28 February.

March starts with a briefing on a new approach to managing timetables and stock and crew – a variation on one of my specialist subjects Traffic Management. By coincidence, later in the month there is a lecture on signalling and traffic management at the iet at Stevenage. As it's being presented by an old chum I will try to go along.

At the end of March Waterfront are holding their Annual ETCS conference. This always provides an excellent combination of speakers and informed questions from the floor.

Meanwhile, it's back to my new spread sheet which is trying to reconcile the current cascades with last month's new train deliveries. But don't get too excited, the current emphasis is on 'trying'.

Roger

