

INFORMED SOURCES e-Preview December 2015

just when you think the long running Great Western Electrification Programme (GWEP) saga must have run out of surprises it comes up with a new shocker. The latest revelation forms the basis of this month's column.

GW electrification cost reaches £3 billion

GWEP cost explosion - 'ignore the headlines'

Late GWML electrification exposes bi-mode limitations

New TPWS ahead of Crossrail ETCS

McLoughlin speaks

Just two hours before Network Rail Chief Executive Mark Carne, Office of Rail & Road Chief Executive Richard Price and Department for Transport Permanent Philip Rutnam were due to give evidence to the Commons Public Accounts Committee (PAC) on 21 October, its Chair Meg Hillier received a letter from Mark Carne revealing that latest forecast for the cost of GWEP is between £2.5 billion and £2.8 billion at 2012 prices.

Inflated to current money that is £3 billion which pays for just the electrification. At today's prices British Rail's modernisation of the East Coast Main Line (ECML) cost just under £2 billion, including electrification, resignalling plus a fleet of 140 mile/h electric trains.

Not surprisingly, the PAC's questioning was pretty brutal and the answers unconvincing. Particularly noticeable throughout the hearing was the lack of awareness among the three witnesses of what electrification should cost.

Obviously, the cost per single track kilometre (stkm) is going to be more than the ECML scheme for various reasons. On the other hand, the £40 million HOPS OHLE installation train was supposed to reduce costs.

I must confess to being a boiling frog until I produced my comparison between GWEP and the ECML electrification (Modern Railways September 2015). At that time GWEP was budgeted at £1.7 billion - equivalent to four times the cost per stkm of ECML at 2014-15 prices

Which brings me to the quart of skimmed milk price test.

A quart of skimmed milk costs £1.10 in our local Sainsbury's. The question is how much would it have to cost before you thought 'hell's teeth, that's ridiculous?'

Well, the GWEP scheme was meant to have better kit all round than the ECML so £1.50 for a quart of full fat organic Jersey milk might have got by. But over £2.00 a quart would have to be in 'you've got to be joking' territory.

However, when challenged by the PAC Richard Price said 'We established the cost of £1.6 billion for this programme (GWEP) last year and we stand by that as the cost of what it would take to deliver the project efficiently'. So, applying my new test, Mr Price is adamant that £4 is a reasonable price for a quart of milk.

This confirms my view that no one in Network Rail, ORR or the DfT has the first idea of what electrification ought to cost. Or, I suspect, any other railway investment for that matter.

Sometime?

What about delivery? Over to Mr Rutnam. 'I'm afraid I'm not in a position to give you a schedule for Great Western electrification'. He added 'it is clearly highly likely that there will be delays against that [the original] schedule'.

Mark Carne concurred. 'At this moment in time it would be unwise for me to give a more precise time frame'. And so we wait for NR Chairman Sir Peter Hendy to complete his enhancements review.

Cost increases explained

In his evidence to the PAC Mark Carne gave three principal reasons behind the cost increases 'across the electrification portfolio'. In the case of GWEP the first factor was inadequate planning and scope definition of the project in the early phases. This was compounded by poor cost estimating.

He added that since the railway has not carried out any electrification of any significance for 20 years, 'the cost base was out of date'. On top of that, today's railway 'bears no resemblance in some respects, to that of 20 years ago'.

Mr Carne's third reason for the cost increase was that the intended flexibility of the regulatory regime has changed following reclassification of NR's debt onto the Treasury's books. 'Intended flexibility' refers to NR's ability to borrow against its Regulatory Asset Base (RAB).

This created a classic money-go-round, known as the 'Network Rail credit card'. NR borrowed on the market to fund enhancements. When a project was completed its 'efficient cost' was added to the RAB. At each Periodic Review ORR calculated a return on the RAB and added it to NR's income. This return paid the interest on the borrowing.

NR could also borrow to fund cost over-runs. But, following re-classification the credit card has been cut up and NR has to live within its loan agreement with the Department for Transport capped at £30 billion over CP5.

Grass roots

A view from the sharp end on GWEP cost increases came in a message to staff from Mike Gallop, Director Route Asset Management (Western) following the PAC revelations.

He highlighted 'developing the OHLE system from an early stage to final design'. Series 1, intended to remove as many of the failings of the BR Mk3b OHLE equipment as possible, was developed with Swiss manufacturer Furrer+Frey. However because the applications had been

limited to Swiss railways 'considerable work was required to develop the design to a standard usable on our network'.

On the piling delay, Mr Gallop confirms that in many cases test pits are having to be dug by hand to ensure that the pile will not cut buried signal cables. According to independent figures this has reduced expected OHLE mast installation rates dramatically.

#### Local concerns

A further source of extra cost is the consultations and consents process which has been 'much broader and more involved than planned'. Mike Gallop explains that GWEP includes 'over 2,000 consents across 250 miles of track, through three areas of outstanding natural beauty, a UNESCO world heritage site plus over 150 bridges and other structures which need to be rebuilt'. In this situation 'costs mount up quickly'.

But, he concludes, 'What we are building is historic and will benefit generations to come long after the work itself is complete. So ignore the headlines; we're doing the right thing with the right team. Let's press on'.

#### 2017 GWR timetable – short on grunt

Something I have been battling throughout the procurement of IEP is DfT's belief in the magic power of multiple powered axles. This was propounded in a 2008 Question & Answer sheet. This explained that 'despite the long (10 car) bi-mode train (in self-powered mode) having less installed power than an existing HST, train running times will be comparable on the non-electrified sections as the bi-mode IEP train is much more capable of deploying its power at the rail during acceleration than an HST. Even the non-electrified section between Edinburgh and Aberdeen should be slightly faster'. In vain over the ensuing years have I run mini O-Level physics tutorials explaining that the simple formula 'Power equals Speed times Tractive Effort' means that a good big-un will always beat a good little-un. But from May 2017 DfT will run head on into Sir Isaac Newton. Had GWEP gone to plan, the 2017 GWR timetable would have seen IEP Class 800 bi-modes zipping along at 125mile/h under the wires, then firing up the engines to run at up to 100mile/h on GWR's un-electrified routes. But with electrification at least a year late, the self-powered performance of the Class 800 has become of prime importance.

While the Class 800 can run at 125mile/h under diesel power, whether it can match IC125 timings is another matter. Because of the DfT's obsession with initial acceleration, the five car Class 800 has 25% more starting tractive effort than the two power cars of the IC125.

So it will accelerate like a Class 313, but that acceleration lasts only up to 13 mile/h when Newton takes over cuts in and the tractive effort falls. While the Class 800 starts the stronger, a bit like Usain Bolt racing Mo Farah over a mile, the IC125 soon catches up. Note that Virgin have doubts about the ability of their bi-modes to keep to current IC125 timings on climbs north of Edinburgh.

As already reported, DfT has confirmed it is discussing with Hitachi the option of having the 21 nine car Class 801 EMUs for Great Western supplied as bi-modes. Since these are the last of the GWR fleet to be delivered (during the first half of 2018) this suggests that in its heart of hearts DfT suspects that GWEP is going to be really, seriously, late.

#### Timetable

At the beginning of November in a Parliamentary written answer DfT said that it is 'analysing the impact of Great Western electrification delays on the configuration of the IEP fleet. The analysis is looking at the timetable implications including journey times and capacity'. It looks as though DfT is at last conceding that Sir Isaac is likely to win. But it's not just speed. Since IC125 entered service Great Western has morphed from an InterCity route into an outer suburban service generating still-growing demand at intermediate stops. A long thin tube with narrow doors and a vestibule at each end like the Mark 3 is not what you want for commuter traffic. And the 800 series vehicles are longer than the IC125's Mk 3 coaches.

While we talk of GWR's new electric timetable starting in May 2017 it is not that straightforward. In fact it is a lot more complex. The first two Class 800 units don't become available for service until 8 June 2017. Delivery then runs at one unit a week, with two more sets being available for service at fortnightly intervals.

So the 2017 'electric' timetable would have been based on a diminishing number of IC125s. With a five car Class 800 costing DfT £325,000 a month it is clearly in everyone's interest to replace IC125s as soon as Class 800s become available, whether the wires are up or not. But if the Class 800 can't keep to IC125 timings, the timetable is going to have to be re-written.

There is a solution. Remember that when GWR's order for a separate batch of Class 802 Hitachi bi-modes to replace IC125 on West of England services was announced we found out that the Class 800 units are running with the engine output set below the nominal maximum in the interests of reliability? The West of England Class 802 bi-modes engines will be rated at 700kW rather than the 560kW in the Class 800.

Tweaking Class 800 engine control electronics to the nominal maximum will put the five car bi-modes on a par with IC125. But will up-rating invalidate the IEP contract. And would it be free-issue? Expect more on this in a future issue.

#### Short reports

Thanks for the many suggestions for a title of my new shorter items. I'm still pondering - meanwhile 'short reports' does what it says on the tin.

#### New TPWS ahead of Crossrail ETCS

First up is an issue which I see of growing importance: what happens when a train has to switch from cab-display based signalling to multiple aspect (heads-down/heads-up)? Crossrail will have metro-style Communications Based Train Control (CBTC) from Siemens. Early on, Crossrail decided that the important thing was to get the tunnel sections signalled with proven equipment and working, and then see how far Network Rail had got on with ETCS on the surface sections.

ETCS was expected to be available by the time Crossrail's Class 345 EMUs running started running beyond Paddington in May 2018. Meanwhile, Network Rail has just awarded an 18 month £3 million contract to Amey, to design and install a 'bespoke' Train Protection & Warning Systems (TPWS) for Crossrail between Heathrow and Airport Junction.

Coincidentally, a few weeks back I was at an excellent conference on ETCS organised by the Railway Division of the Institution of Mechanical

Engineers. In the refreshment area, I came across a small stand with a little equipment case on display. A chat with the chap on the stand revealed that this was an elegant solution to what happens when a Class 345 bursts out of the Western portal under CBTC and wonders what happens next.

The ETCS technical specifications include provision for what is known as a Specific Transmission Module (STM). The aim of the STM is to provide a standard interface between national train protection systems and ETCS. Bombardier is supplying the Class 345s with ETCS already installed and while you could fit new trains with separate conventional AWS and TPWS systems, the Class 345 will have Mors Smitt's TPWS+STM control unit, which is what caught my eye at the conference.

So in the changeover zone between Crossrail and Network Rail signalling, the Mors Smitt kit picks up the first ETCS 'grid' and tells the STM which tells ETCS that it's running under a national system and the Driver Machine Interface (DMI) reconfigures appropriately.

Illogical captain.

As you all know, I am dedicated to spanking those who for political or ideological purposes, rubbish the achievements of British Rail. So when Transport Secretary Patrick McLoughlin got in a tizz under pressure during transport questions on 29 October it was time for the editor to get out the ironic bold typeface.

Here is what McLoughlin said. 'We are seeing record investment in our railway because of how we are running it. At the time it was fully nationalised we saw a declining railway, a useless railway, a railway that was not fit for purpose — something the Labour party wants to go back to'.

Note that from July 1989 to July 1992 Mr McLoughlin was a junior minister at the Department of Transport and from this privileged position would have seen at first-hand how useless and unfit for purpose British Rail was. Some examples are quoted, with a sting in the tail

Roger's blog

Well, as you have read above, the Public Accounts Committee hearing was far from premature, as I suggested in last month's blog! And the same week we had a good turnout for the Rail Future awards judging with some excellent entries.

In the first week of November I was able to spend the morning at the Rail Research UK Association's annual event. Even better, my fellow research sceptic Ian Walmsley was able to join me. In the breaks you could visit the 'Blue-sky village' - a mini-exhibition with stands from ten universities.

Overall it was a worthwhile visit. Both exhibits and presentations seemed to be divided between one third really interesting and useful, one third reinventing the wheel and one third off-the-wall. Which is probably not a bad hit rate.

Otherwise November has been quiet as expected. So I have completed the analysis for the Spanners Awards this coming Friday and last week saw the trophy production line set up in our conservatory. And there will be a big surprise for one depot with a brand new award.

Hitachi had to defer the Old Oak Common depot inauguration mentioned last month. I'm hoping to get along to the rescheduled event next week. After that there are a couple of social outings.

Despite not being a railway officer nor retired I have been elected an associate of the Retired Railway Officers' Society and will try to get to the December meeting. The same week there is the Railfreight Group Christmas which is blur of meeting old chums and scribbling in my notebook.

After all the suggestions for the headline for my over-view in our annual publications I finally settled for '2016 - Year of frustration'. The choice reflects the contrast between the industry's opportunities and the inability to deliver the infrastructure improvements to exploit this potential.

Meanwhile, thanks to those readers who both directly and through letters to the editor added their experience to my article in last month's issue on the decline of Britain's railway manufacturing industry. There is a letter from the RSG in the latest issue responding to the article. Actually, 'reacting' is a better word since it doesn't address any of the points I raised but urges the merits of togetherness. Publication of RSG's Strategy has been put back to the New Year.

Now to get my presentation ready for the Spanners awards ceremony.

Roger