

Transport 21 Consultancy

Barking to Gospel Oak Line User Group

Network Rail Network RUS - Electrification Strategy

Response to the Draft Electrification RUS

Network Rail's Draft Network Route Utilisation Strategy - Electrification Strategy is widely welcomed and seen by many as an essential development for a viable future for the Railways.

The need for a long term electrification strategy to increase significantly electrified route mileage and electric train haulage has been long supported throughout the industry and the rail lobby.

A real increase in the use of electric traction for both passenger and freight operation has been an objective missing from rail planning since the early 1990s, an unfortunate consequence of the privatisation process. Government advisers wrongly assumed that the railways would continue to decline, whereas traffic has of course grown.

A comprehensive network electrification plan that is deliverable and affordable, and minimises use of diesel multiple units (DMUs) or locomotives 'under the wires' is now essential. This will deliver network benefits through more effective deployment of existing rolling stock, as well as pursuing policies to reduce emissions from fossil fuels by a greater use of electric traction, particularly if it can be from sustainable sources, rather than coal, gas or oil.

Infill electrification can also facilitate a viable cascade of usable electric rolling stock where new trains are introduced on existing routes, such as the Thameslink project.

The White Paper - *Delivering a Sustainable Railway*

The last statement from Government on electrification, was in the 2007 White Paper, ***Delivering a Sustainable Railway***. The Government's position was unclear, suggesting '... it would not be prudent to commit now to *all-or-nothing projects* such as network wide electrification ... which could delay tackling the current strategic priorities such as capacity ... between now (July 2007) and 2014, which will deliver benefits in the slightly longer term ...' This was missing the core point of the Government's High Level Output Statement setting out '... the improvements in safety, reliability and capacity the Government wants to buy to 2014 ...'

The Department for Transport's unwillingness to promote even a modest infill electrification programme shows a fundamental lack of coherent planning and inability to grasp the concept of network benefits. Despite a change of heart towards electrification in principle, this objective remains largely unfulfilled. While NR has made a major step towards promoting electrification, it has not presented a viable infill programme that could be introduced before 2014 or even afterwards.

The White Paper speculated on alternative technologies, biofuels or fuel cell technologies, against the known benefits of electrification (s11.20 et seq). Was this a delaying tactic or a just the basic failure to grasp that fuel cell technology was, and still is, in its infancy, and that electrification was the only viable way forward?

The White Paper dismissed electrification before 2014, effectively delaying any meaningful progress into Control Period 5 (2014 - 2019), because it was '... expensive ... If it were pursued in 2009 - 2014 (CP4) it would be at the cost of more urgently (sic) needed investment in increased carrying capacity, which will deliver a greater level of benefit...' (s11.27).

This view was not shared by the industry or many professionals involved with the railway.

Few argued for commitments to '... all-or-nothing projects such as network wide electrification ...' when an infill strategy was wanted and needed, and some strategic thinking on future main line projects.

The DfT assumed wrongly that other technological advances might progress at a faster rate than has been the case in the ensuing two years from 2007. Biofuels are a controversial substitute for fossil fuels and may have a role, but their viability is questioned by the environmental lobby, and fuel cell technology has made only limited progress in cars and buses.

Many openly questioned the DfT linking future electrification to the '... migration of radio-based cab signalling ...', even in 2007. Was there sufficient understanding of the network benefits of infill electrification schemes by authors of the White Paper? The benefits were clearly endorsed by various organisations, including the Association of Train Operating Companies, Passenger Focus, freight operators DB Schenker and Freightliner, the Rail Freight Group and bodies such as Chartered Institute of Logistics & Transport, and independent sector lobby and user groups.

Without a coherent position on electrification, has the DfT's change in heart been influenced by the established Rolling Stock Leasing Companies (ROSCOs) being reluctant to finance any significant new fleets of DMUs or locomotives? New DMU fleets are being procured at the taxpayer's expense.

This was reinforced by a joint letter from then ATOC Chair, Adrian Shooter and NR Chief Executive Ian Coucher, writing to the DfT's Director General, Mike Mitchell in October 2007, urging a change of policy. Also many within the industry were asking serious questions on the long term viability of a diesel powered Inter-city Express Project, the HST replacement, now the Hitachi 'Super Express'.

The Draft RUS Document - Developing a core electrification strategy

This is a complex, comprehensive document where its authors have sought to make an extensive evaluation of inter-city, inter-urban, cross-country and several more significant rural routes. However without a coherent strategy from NR, with support from Government, this could be seen as a wish list, it must not become one.

An infill strategy is missing from the Draft RUS. There is little analysis of how infills might develop the connectivity between existing disjointed networks. It sets out how major schemes might develop, but it should also show how these projects could deliver full network benefits through connectivity.

This will emerge from analysing and carefully staging these schemes, mainly in the English regions, in particular sections of the Trans-Pennine networks. With refinement it could become the basis of a carefully developed, costed strategy for both essential infill and main line schemes. Also NR needs to set out time frames for schemes, most importantly from funding approval to commissioning.

While welcoming the initiative for two major main line schemes, electrifying both the Great Western and Midland main lines, many professionals and commentators, are a little surprised at how few infill electrification projects have been prioritised in the draft strategy. The failure to identify modest local network schemes is surprising. The benefits are significant and these schemes will enhance the strategic secondary route networks as electrification progresses.

The one infill proposal mooted in the Draft RUS, Gospel Oak - Barking, is particularly welcome as it covers an operational gap, enabling major freight operators to increase electric haulage, using some currently stored locomotives. More importantly it would also give a significant boost to London Overground passenger services, based initially on a simple cascade of some existing EMUs.

Network benefits - synergy between schemes

It is crucial to create networks, not just electrified routes. NR should set out a comprehensive 'infill' package to fill operational 'gaps'. Evaluating gaps on the basis of whether it fulfils certain criteria to benefit passenger or freight operations may have distorted NR's analysis.

Synergy will be achieved if a coherent investment strategy is developed not just for core routes, but also local areas, around Leeds or Birmingham, or regions such as central Scotland or the North West conurbations. Historically many electrification schemes developed around a line of route, the West and East Coast Main Lines, or piecemeal investment in routes such as from London to Cambridge and Norwich, under various schemes started as early as the late 1940s (Shenfield) but mainly from the 1960s and 1970s.

Even the Southern Region's 1967 Bournemouth electrification scheme followed a single route. 20 years later BR added the extension to Poole and Weymouth, with just one infill project from Cosham (Portsmouth) to Southampton and Eastleigh.

This piecemeal approach is detrimental to effective network operation, hence the present dilemma of running many diesel services 'under the wires' or 'over the third rail'.

The Main Line Strategies

Proposals for major electrification of two core strategic routes are welcomed and endorsed. These main lines have heavy inter-city passenger flows, along with both commuter and regional passenger flows, and significant freight movement. However the principle of electrifying just core routes means many subsidiary flows remain diesel operated. Network benefits are invariably not achieved.

This suggests the proposal for setting up just two electrification work production units may be flawed, and that specialist infill units will be needed to complement the core main line packages, developing network synergies in the West Midlands, the North West, Yorkshire and the North East.

The Midland Main Line

NR's proposals are as expected, taking the 'wires' north from Bedford to Corby, Leicester and Nottingham, then to Derby, Alfreton, Chesterfield and Sheffield (Gap 19A). But what then, and with what rolling stock? Does the reference to cascaded vehicles imply the East Coast Main Line Class 91/Mk4 fleet will be displaced from ECML the by the Inter-city Express Project? What happens north of Sheffield? The Draft RUS is not only unclear, it seems a little confused. Logically some MML services should continue on to Leeds, a few possibly beyond.

Leeds, as a major regional centre has a pivotal position as the focus for an area infill strategy. If IEP were to start service on the ECML, then routes east of Leeds (from Neville Hill to Hambleton Jct. and Selby, and to Colton Jct.), are a priority so all ECML Leeds / York / Bradford workings can benefit from electric traction. This approach is not even discussed! This connectivity could improve and extend the Leeds local electric network while making the ECML a more coherent route for full electric operation with the first tranche of electric IEPs. This should not alter benefits accruing to the Trans-Pennine project, it just changes priorities.

The Great Western Main Line

The core scheme proposed is also as expected, taking the 'wires' west from Hayes Jct. to Maidenhead under the Crossrail scheme, moving west towards Reading and Oxford as quickly as possible. This completes the Paddington inner and outer suburban networks.

These services could start limited operation from an improved Paddington ahead of the completion of Crossrail (A13-1b).

Electrification would progress to Bristol via Bath and Parkway; with Cardiff and Swansea a logical continuation. The Draft RUS does not discuss how a synergy might develop with the Cardiff Valley Lines or other local routes around Bristol, including Weston-super-Mare.

More important is the Cross-County route to Birmingham. The notion is fine, but when will that link up? Is this 10 or 20 years ahead, and how does the electrification tie in with rolling stock renewals? Might relatively new diesel-electric multiple units have a life extension through the insertion of a pantograph and transformer trailer? Or will Cross-Country also have a fleet of IEPs? If so, when?

The proposal to include Newbury and the Berks and Hants Line to Cogload Jct. (A12-1/2) and on to Plymouth and Paignton, is presented as a relatively straightforward next phase, but it is major step forward for the railway system as some elements are almost as complex as on the main Bristol route.

Thus the extent of this project has major ramifications for the railways, as this scheme is proposed without a parallel rolling stock strategy beyond an outline commitment to the IEP principle and the 1300 (or maybe fewer) still unspecified new or cascaded vehicles.

Gospel Oak - Barking - the Infill Scheme proposed in the Draft RUS

In North-East London, the non-electrified Gospel Oak - Barking route is an operating constraint. Surprisingly this line is listed primarily as a freight network gain, but the passenger service benefits are also quite significant, more far reaching in the longer term.

There is considerable momentum in the industry to wire the GO-B line and associated routes. The Draft RUS specifically identifies two small related freight projects, sidings and new facilities near Dagenham and the Thameshaven branch to the new London Gateway container port east of Tilbury. Several other short link lines, used mainly for freight or stock transfers around North and West London are also not wired. The Dudding Hill branch, some links around Willesden and Acton, and from South Acton to Kew Bridge and Brentford, ideally should also be included.

The GO-B line has recently benefited from DfT and NR funded investment, upgrading to W10 gauge for high cube box container movements. But the benefit of completing all upgrade works in one programme has not been achieved. This investment programme has failed to develop synergies on two fronts; bridge clearance works and ongoing trackwork and resignalling. Why has electrification not been included? Considering the route's significance to both national freight services and London Overground networks, this again shows a fundamental failure in strategic planning.

Had the North London Railway Improvement Project been planned more strategically, the GO-B line could have been fully upgraded and electrified before the NLRIP route restrictions were introduced during April 2009. This would have ensured greater flexibility, alleviating many operating problems now occurring; these will intensify during the four month blockade from December 2009 to April 2010. The proposed quarter hourly GO-B line service could have started sooner than May 2010.

Concern is expressed locally and nationally about the ongoing delay to authorise this simple scheme, now the subject of a Commons Early Day Motion. Local users cannot understand the reticence to fund this scheme, probably costing little more than £25m - £30m. By mid 2009, this had apparently become a stand-off between the London Mayor and the Secretary of State. Network Rail states that it has no funding allocated for this electrification, so it is matter for the DfT and TfL to resolve.

Electrification would permit a cascade of eight serviceable overhauled LOROL class 313 EMUs to enhance passenger capacity, virtually doubling it at a stroke. This is important as

the still unquantified effect of Oyster, the TfL fare structure, and marketing and branding with the LT target logo has released suppressed, latent demand. Demand levels will continue to grow as the service frequency and train capacity improves, as part of the Overground Network; as TfL and BGOLUG had hoped.

The planned Barking to Clapham Junction service, first promoted in the 1974 London Rail Study, supported by BGOLUG and other lobby groups, and endorsed by TfL and local authorities, was also part of the original Overground proposals. This service could offer major passenger benefits linking districts in North East London to the Royal Free Hospital at Hampstead, other developments around Willesden and the West London Line, promoting local regeneration.

Another strategic benefit is the easier transfer of Thameslink rolling stock between depots, as this electrification would provide a necessary link between First Capital Connect's Thameslink Bedford route and Cauldwell Walk depot, and its Hornsey depot. It now appears that electrification between Carlton Road Junction and Haringay Junction is to be part of the Thameslink project for these regular stock movements. Why can the DfT not bring this funding stream forward to 2009 - 2010?

Another important reason to electrify this line is to maximise flexibility for all freight movements. It also provides greater flexibility for passenger service operations. This could permit stock movements from Willesden to Stratford, also diversion of North London Line trains towards Stratford in an emergency through South Tottenham and Lea Bridge.

This is not the way to promote electrification or develop a coherent programme for infill schemes. Approval for Gospel Oak - Barking would show a political commitment and a belief in electric traction and the associated technology as the way forward over the next decade.

Developing synergies - Networks around Regional centres

The problem is far worse at regional centres electrified at 25kv since 1960. While some main lines into city centres were electrified, relatively few suburban routes benefited from these schemes.

In one significant regional example, the Draft RUS identifies several routes radiating from Cambridge for further electrification. But it does not consider synergies of how a wider Anglia region network plan might emerge; a strategy to electrify all significant regional routes, building on the importance of the established radial routes from London. Presently one service continues to Ely and Kings Lynn, but others could continue to March and Peterborough, even Wisbech if the line were restored as suggested by ATOC, providing an effective cross Cambridge regional network.

How might further electrification around Cambridge tie into the important enlargement of Cambridge station, including a new 12-car island platform, and a planned parkway station near Chesterton? How might these works relate to the Peterborough - Ely electrification (Gap B5.1), which many consider a priority infill primarily for diversions and new services, while the Haughley Jct. to Ely route delivers primarily freight benefits.

In which order could the cross country links, for both passenger and freight services, and the sub-regional links serving the principal centres, including Norwich from Ely, follow? East Anglia was one of the first areas to eliminate steam trains in the early 60s; could it be the first network north of the Thames that is virtually all-electric?

Therefore these sections of route must be dis-aggregated for separate assessment when setting investment priorities. NR needs to rethink some elements of its strategy very carefully, in particular analysis of route benefits versus area network planning, which needs greater consideration.

The final RUS must consider area strategies as an alternate method of planning

coherent networks. These could provide the synergy and connectivity, between existing routes radiating from regional centres and emerging local or regional networks. These must progress in parallel with other investment policies for rolling stock or infrastructure. Some lead must be taken by NR in liaison with regional and local authorities to give some cohesion to joint funding packages through Regional Finance Assessments (RFAs) which may have increasing importance.

The Southern DC Network

The former Southern territory shows the benefits of a coherent network where virtually all routes are electrified on the common 750v dc 3rd rail system. Operators are frustrated that several short sections remain un-electrified, restricting both passenger services and certain freight movements.

Operationally, these lines are isolated and require special DMU passenger stock. The electrification of just two routes, Ashford - Ore and Hurst Green - Uckfield, 52 route miles, about 70 track miles would eliminate Southern's need for a special fleet of Class 171 DMUs, a desirable objective before rebuilding London Bridge, since diesel units are not permitted at Victoria's sub-surface platforms. This would demonstrate network planning and connectivity.

The two other former Southern lines, Reigate to Shalford and Ash to Wokingham, about 30 route, 60 track miles, would benefit existing passenger services between Gatwick and Reading, and develop a further link between Guildford, Redhill and Croydon, continuing on to London. The present service could transfer to Southern or South West Trains. It is only a First Great Western service because the rolling stock allocated to it since BR days are class 165 DMUs; these could happily be used elsewhere!

Boosting the supply and installing the short section from Kew Bridge and Brentford to South Acton would enable freight operators to use modern stored class 92 dual voltage locomotives. This also creates a further Overground passenger opportunity restoring a service between Willesden and Kew Bridge or Brentford. What is so complex in re-electrifying less than three miles of double track?

Why is it so inordinately difficult to justify electrification of just about 135 track miles to complete the entire former Southern Electric network? Would £100m, and hopefully rather less, be too high a price for completion of a major regional network? This issue may go beyond NR's remit, but some leadership is needed from our national network provider.

It seems the Draft RUS has ignored the possibility of freight transits on the North Downs route, even if limited movements involved a reversal at Redhill. There is little commitment to, or understanding of, the need for these infill schemes, or other changes such as a flyover or dive-under at Redhill, that could facilitate around London freight operations. Is this another example of a lack of synergy?

North West

The main push to bring electrification to the North-West was no less than 50 years ago, when trials started on the Styal Line. The main line links moved southwards from Manchester and Liverpool to complete the southern half of the West Coast Main Line by 1967.

The local network development around Manchester was limited to converting two existing routes to 25kv. One line, Altrincham, was later converted back to DC as Metrolink, the other retained 25kv operation but at the expense of a core Trans-Pennine link - Woodhead. With extensions only to Hazel Grove and Trafford Park, this was never a comprehensive network, as sought by GMPTE.

This was reinforced by service restructuring to serve Manchester Airport and separating out certain suburban routes into Metrolink, a substitute for the Picc-Vic sub-surface crossrail link

proposed in the 1970s. This would have operated at 25kv, expanding six local services into a cross Manchester network, abandoned following the 1976 sterling crisis.

Therefore any Trans-Pennine network development must focus initially on linkages west of Manchester towards Liverpool and the WCML, towards Preston and probably Blackpool. Linkages from Liverpool could follow Merseytravel's aspiration to upgrade the St Helens to Wigan route alongside the Chat Moss route through Earlestown, where the junctions are already wired. NR must work up a local network which will complement the Trans-Pennine scheme through a series of incremental line infill packages, which can be achieved at a viable cost.

Merseyside

Liverpool's suburban 3rd-rail electric network expanded during the late 1970s with the 'Loop and Link' and extensions to Kirkby and Hunts Cross, and later to Chester and Ellesmere Port. The Draft RUS discusses growth and service expansion, and the prospect of a stock cascade of class 508 EMUs to expand services or introduce route extensions. There is the longer term prospect of new stock.

This very positive approach from Merseytravel and NR is welcomed, and should help develop some synergy between the existing network and new schemes. But this is hindered by uncertainty as to which system, 750v dc or 25kv, should be used for extensions. This conundrum that could delay two relatively small essential extensions for up to five years, longer if new stock were delayed.

Network Rail is not currently undertaking any third rail electrification; the East London Line works are being undertaken by TfL. However some new techniques are emerging, including use of the higher conductivity Brecknell Willis composite conductor rail. NR needs to evaluate 3rd rail installation systems to see what simple economies can be achieved in maintenance and installation efficiencies, particularly conductor upgrades and signalling immunisation.

The similarities with the Southern infills suggests that NR must take its 750v dc operations seriously, particularly as it resisted vertical integration for Merseyrail, and then produced a gargantuan estimate for the Wrexham - Bidston electrification.

Scotland - Growth from the Glasgow Suburban networks

The aspiration for greater connectivity in central Scotland is shown by the enthusiasm for both re-opening and electrifying disused rail routes; a synergy absent for half a century.

Outside London, only Glasgow had any significant 25kv suburban electrification with several expansion phases in the 1960s. The Argyll Line restoration followed in the late 70s, to Ayr in the 80s and most recently to Larkhall. Nevertheless an obvious simple extension, from Rutherglen to Whifflet, shows a lack of understanding as to how network benefits are assessed. This example is particularly ironic as the original service route was to Central Low Level!

The Draft RUS shows some synergy between schemes, although thought might be given to the working order for undertaking these, possibly putting the Whifflet line first. Strategic planning also suggests that greater prioritisation of the Fife network may be important because of the Forth Road Bridge conundrum. Promoting rail with park and ride could relieve pressure on the regional road network. Otherwise prioritisation of the Edinburgh - Glasgow - Dunblane 'triangle' proposal has general support, but this must add Allloa, Kincardine and Longannet for coal train movements from Hunterston. Infills covering the Cumbernauld and Shotts routes complete an important regional network from which significant operational benefits will follow.

West Midlands

When the WCML was electrified in 1966 - 1967, only three 'main line' suburban routes were included. Access to two freight facilities, Bescot and Landor St Freightliner terminal were wired, but under BR locomotive changes were not seen as a cost constraint. The busiest suburban passenger route to Lichfield was cut from the original scheme as it was not part of the main line network. This route was not electrified until 1992, by then part of the enlarged Cross-City scheme linking Lichfield and Sutton Coldfield to Longbridge and Redditch, a major success story.

The limit of electrification means a heavy dependence on DMUs remains, over many routes that are partly and even fully electrified, such as to Walsall, where modest 25kv extensions are urgently sought. Again greater priority needs to be given to infills and extensions. The Kings Norton - Barnt Green - Bromsgrove scheme shows the sensible way forward, particularly once the momentum of infill schemes brings unit costs down.

However the changes in freight operation means the major Birch Coppice freight facility near Coleshill is not connected to any electrified route, hence the call for wiring Birmingham - Nuneaton. This provides a further link to the WCML as a relief and diversionary route between Birmingham and Rugby. When the wires reach Leicester, further benefits will accrue to better regional services, which would culminate eventually in the electrification of the Birmingham to Stansted service.

How are these benefits quantified and prioritised; to passenger services between Birmingham and East Anglia, and freight transits between the Haven Ports and the West Midlands, and the North via presently two, and later three, core north - south electrified routes (Gap B19.10). These proposals must be assimilated carefully to assess priorities and network benefits.

Freight routes, Electrification and the Draft RUS

Developing a strategic network for freight involves electrifying many spurs, short links and sidings, not just main lines, or even infill routes. Many commentators are aware of the list produced by major freight operator DB Schenker, then EWS; Chief Executive Keith Heller explained at CILT's Robert Reid Memorial Lecture in 2008, their operations could make greater use of electric locomotives currently stored. With a surplus of diesel locomotives, changing engines in transit is inefficient.

Presently freight transits to yards adjacent to the main lines are included, but this still limits electric freight haulage. While the Draft RUS identifies many potential schemes, no packages are being suggested for delivery in either CP4 or CP5.

This aspect needs further thought, as several other relatively small schemes, not just the essential Gospel Oak - Barking route, could make a significant contribution to boosting electric freight haulage.

Another small extension, Ipswich - Felixstowe, could ensure various container services operating through London can be electrically hauled throughout making the GO-B infill more effective. The North London Railway Improvement Project offers little more capacity for freight than the present layout so the GO-B route alternative becomes an essential scheme.

However negotiations around funding of what are now privately owned sidings and yards could be contentious. Could this be a role for the Rail Freight Group to promote and assist negotiations?

Conclusions

The Draft Electrification RUS is a welcome step, showing recognition that electrification must be taken forward speedily, as the most viable motive power for long term traffic growth,

regardless of current economic problems.

Converting some stock with a 20 - 25 year life expectancy to bi-mode electro-diesels may yet offer a viable stock cascade where this mode offers benefits for through services that operate beyond electrified route. The Voyager and Meridian generation of trains have been identified as a possible candidate, installing an additional coach with a pantograph and transformer could be a practical solution during electrification programmes or operating beyond electrified routes, such as North Wales WCML services beyond Crewe or Chester.

The IEP Super Express project is to lead on electric traction on the ECML. A clear strategy for main line electrification must also be linked with a delivery strategy for this rolling stock. Much is being said about bi-mode trains, but this concept is not new. BR's Southern region introduced this system in 1966, with a simple control system that allowed diesel and electric locomotives and multiple units to work together. Modified diesel locomotives would pull or push unpowered trailer coach sets beyond the electrified route, such as between Bournemouth and Weymouth.

This system, based on then current technology worked well for over 20 years and a similar system for a further decade on Gatwick Express. The DfT should re-evaluate this approach rather than trying to 'reinvent the wheel' to make best use of existing stock and the most effective application of new trains.

Modest small 750v dc extensions on both Southern and Merseyside lines need early decisions to complete networks and develop services to logical traffic objectives. Costings must be reviewed to so these small extensions can be completed at a realistic price.

The impasse on funding a small scheme like Gospel Oak to Barking must not continue. Decisions are needed quickly on both main line schemes and essential infill projects, within the next twelve months.

Electric traction is the way forward for major fleet renewals, but there must be some co-ordination between electrification schemes, and rolling stock replacement and cascades.

While the two main line projects are crucial, developing infill schemes is equally essential, along with establishing a rolling stock policy which compliments the aspirations of principal main line and regional operators, as well as the continually expanding London Commuter services.

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