Railfuture Infrastructure & Networks Group

Railway Electrification and Route Modernisation

Key Points

1. In strategic terms, further electrification is going to be required to meet long-term environmental targets and public expectations, as well as providing a network no longer dependent on fossil fuel.
2. Whilst the Government has suspended most of the future programme because of escalating costs and the potential of bi-mode trains, Railfuture believes that the programme needs to be reconsidered as described below, and a fresh start made at an early date.
3. Electrification is just part of the programme needed to modernise the network for the future, and needs to be planned carefully so that track layouts and signalling are renewed prior to the erection of wires and installation of electrical supply systems.
4. Bi-mode trains have value in allowing early introduction of new rolling stock on routes that are partially electrified, or to serve destinations off the electrified network. They also provide flexibility to allow diversion of trains over non-electrified routes during engineering work. Class 769 units would seem to offer similar benefits for local and regional services that the class 800 series does for long distance.

The five key reasons for electrification are:

Sustainability. The electrical supply system for trains can draw from any energy source including renewables. An electrified railway will always be able to run, regardless of future oil prices or availability. Neither road nor aviation can match that at the moment. An holistic approach is required that looks at the total effects of transport – whole life emissions of carbon, NOx and particulates.

Environmental. Electric trains produce no harmful emissions at the point of use, particularly valuable in polluted urban areas. Emissions at the point of generation depend on the fuel source. With no diesel engine or fuel to carry around, the trains are lighter and so require less energy to move.

Passenger benefits. With their superior performance characteristics, electric trains are more comfortable without the vibration and noise of an on-board diesel engine, and do not produce the smell of fuel oil or the dirt associated with diesel emissions.

Competition. For freight, electrification offers the ability to reduce unit costs by increasing trailing loads, essential to maintain competitiveness with road. Faster acceleration and sustaining higher speeds on gradients also helps to improve route capacity by reducing speed differentials between freight and passenger trains.

Efficiency. Electric Trains are cheaper to maintain than diesel trains, while regenerative braking enables even greater fuel economy.

With this in mind, Railfuture believes that in the long term, a much larger proportion of the railway network should be electrified than the current 40% (which carries 60% of the traffic).

In terms of priority, the most cost-effective electrification schemes should be tackled first. These will tend to be on the busier routes, and may also connect the gaps between existing electrified lines, allowing greater flexibility in deploying electric trains and freight locomotives. We also believe it will be necessary to electrify routes serving city centres to avoid unacceptable levels of diesel emissions in the future.

The Government's proposal to phase out diesel-only trains by 2040 will require new energy to revitalise the electrification programme. We believe there is a place for hydrogen cell fuel and battery power technology on some feeder routes, but the present state of development of such new technology points to extensive further electrification if the 2040 objective is to be delivered.

Lessons Learned

The lessons from the current electrification schemes that have exceeded both timescale and budget, include:

- The need for long-term planning for electrification to embrace total modernisation of the route.
- Better asset knowledge.
- The need to build and retain a pool of expertise within the rail industry which over time will provide a body of experience gained through each successive project, with Network Rail improving its role as informed buyer.
- This implies a continuing programme of route modernisation with electrification, replacing the piecemeal approach of the past.

Railfuture believes that the priority is to complete electrification of the bulk of the network before giving consideration to any plans to convert the existing lines using the third rail system to overhead line. This recognises that, at the interface, some short sections of dual electrification may be required.

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