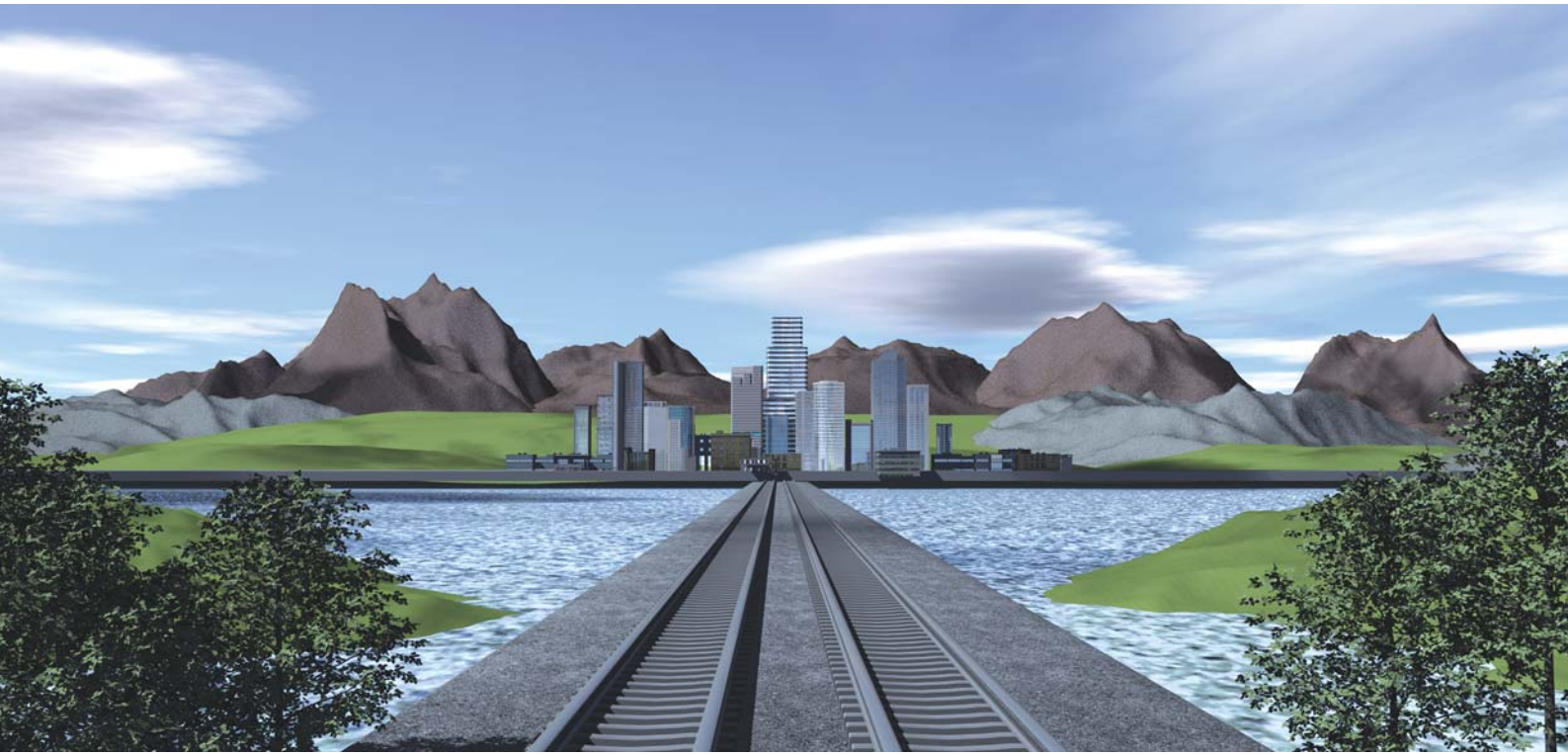
Department for Transport

# Rail Technical Strategy



Summary
July 2007

## The Rail Technical Strategy and the Rail White Paper 2007

The Department for Transport (DfT) has led the development of this first version of the Rail Technical Strategy (RTS) through an open process of engagement with the rail industry. Network Rail, passenger and freight operators, rolling stock companies (RoSCos), the Railway Industry Association (RIA), the Rail Safety and Standards Board (RSSB), the Office of Rail Regulation (ORR) and the devolved administrations have all contributed. The RTS is published with and should be seen in the context of the 2007 Rail White Paper – *Delivering a Sustainable Railway* – which identifies the future needs that the railway is likely to meet over a planning horizon of 30 years. Over this period the railway will have to expand its capacity to meet demand, reduce its environmental impact, meet increasing customer expectations for reliability, comfort, safety, security and information, whilst at the same time continuing to improve its cost efficiency.

## RTS themes for change

The RTS brings together a long-term vision of the railway as a system, creating a target for development to meet these challenges, seeking to optimise the use of existing technology and predict the impact of new technology. The RTS identifies the following long-term themes for change, which the industry should start working towards now:

- **Optimised track–train interface:** Light but strong rolling stock running on precisely-engineered, accurately-maintained track, reducing energy demand, track maintenance cost and noise;
- **High reliability, high capacity:** World-class reliability of both infrastructure and rolling stock. Infrastructure designed on lean principles with minimal trackside equipment. Intelligent infrastructure and intelligent rolling stock, each able to monitor the other and predict incipient failure;
- **Simple, flexible, precise control system:** Communication-based cab signalling to reduce infrastructure complexity and cost, as well as improve flexibility, combined with an intelligent management layer to offer precise control of train movement through the network, allowing energy efficiency to be improved and full potential capacity to be realised;
- **Optimised traction power and energy:** Regenerative braking on all trains, whether on the electric network or through onboard energy storage. Better use of existing electrification and selective extension where justified by business need. Bi-mode trains capable of running on or off wire, based on energy storage and with on-board power only where needed;
- **An integrated view of safety, security and health:** Improved detection of obstruction, intrusion and abnormal behaviour at all boundaries of the system, combined with better management of response to both safety and security threats and, in the long term, recognition of the need to reflect public health concerns in the rolling-stock surface materials and air conditioning;
- **Improved passenger focus:** Exploitation of ticketing, passenger flow, train movement and train load data to give high-quality information to passengers throughout their journey. Use of the same data to optimise controller response to abnormal traffic or passenger-flow conditions;
- **Rationalisation and standardisation of assets:** A rationalised approach to asset specification, with greater use of modular and ‘commercial off-the-shelf’ (COTS) equipment, covering industry-specific assets such as rolling stock based on a whole-life, whole-system cost approach across all industry partners;
- **Differentiated technical principles and standards:** Application of differentiated technical principles and standards to railway routes based on predicted traffic

type and usage, allowing cost efficiency to be optimised whilst maintaining interoperability for passenger trains and access for commercial freight to all areas of the network where there is a reasonable expectation of need.

## Delivering the change programme

Many of the changes, particularly in the customer-facing area, will be realised through 'natural' incremental change mechanisms in response to current incentives and business needs. However, successful implementation of the RTS will depend upon Government and industry together taking a whole-life, whole-system cost approach in exploiting the opportunities presented by renewal of major assets and major enhancement projects.

The RTS includes a route map of change that not only identifies the major opportunities in terms of asset renewal and enhancement over time but also shows the research and development needed to support those opportunities, bringing together the themes for change into a change programme that can be actively managed.

The major opportunities that arise are those in which the industry is already active: in the rolling stock area, the Intercity Express Programme (IEP) being led currently by the DfT, the New Generation Multiple Unit programme which is currently still in its inception stage and the possibilities for use of existing tram–train technology for lightweight urban routes.

Research has already started to influence change to train and track characteristics through the Vehicle–Track Interaction Strategic Model (VTISM) sponsored by the Vehicle–Track System Interface Committee. European research (LITE and INNOTRACK projects) supported by all UK industry parties will further inform future specifications for both track and train from about 2009 onwards. Rolling stock reliability will build on the base established by National Fleet Reliability Improvement Programme (NFRIP).

Network Rail has the tools to establish the long-term target reliability for both future trains and future infrastructure and has started to apply this to major projects such as Crossrail and Thameslink. This work needs to be expanded to cover routes such as Great Western.

The Network Rail Intelligent Infrastructure initiative, to which RIA members have contributed many ideas, is also important, and this links in with the new engineering data centre being developed at Derby. Better timetabling based on an accurate data model of the network is also being addressed by Network Rail.

As far as control systems are concerned, the European Rail Traffic Management System (ERTMS) is the key supporting technology, and the National ERTMS Programme, which has been developed by Network Rail into a model for cross-industry collaboration, is planning to fit all high-speed lines and many lesser routes within the timescale of the RTS. However, ERTMS is not yet fully consistent with the vision and needs development both to add the driver advisory speeds function and to progress Level 3, which further reduces the need for trackside infrastructure.

The immediate opportunity in power and energy is the implementation of regenerative braking for vehicles which are already capable, and the industry's positive response to this challenge over the past few months has been heartening. For electric railways, energy metering is the next important step, and DfT and the Association of Train Operating Companies (ATOC) are working together in this area on a trial project with active support from Network Rail. Biofuels are being pursued by several TOCs and present few technical challenges. In the medium term, hybrid (energy storage) traction development is a more important area. The hybrid HST power car developed for use on Network Rail's New Measurement Train is one example of several industry initiatives in this area that need to be developed rapidly to the

stage of useful products in order to meet deadlines for new rolling-stock delivery. In the longer term, decisions on further electrification will depend upon the relative rate at which the carbon footprint of electricity generation declines and the rate at which options become available for low-carbon self-powered trains. Research into hydrogen technology is best pursued at European level, with the UK continuing as an active partner in collaborative European research.

The issues of safety and security have historically been separated in the railway industry's psyche, but success in reducing operational risk, so that the largest residual safety risks arise from intrusion, together with the increase in the security threat, are driving convergence. Network Rail is actively investigating the reduction in level-crossing risk through obstacle detection, and surveillance technology has obvious applications in both advance detection of safety failures and in detection of abnormal behaviour. These technologies are advancing rapidly.

Initiatives in passenger and train flow data need to be better co-ordinated. DfT and ATOC are taking forward smart ticketing, Train operating companies are working individually on passenger loading and information systems, and Network Rail is developing a new train location system in an initiative supported by ORR. This area will change very rapidly over the next 10 years, and the need is for agreement of common requirements and structures rather than technological research, as the technology already exists.

The planned application of differentiated railway principles and standards is a difficult initiative, both because industry culture does not support this kind of planned change and because there are potentially divergent interests involved, particularly in terms of open freight access to rural lines. The key first step is to gather the compelling evidence that illustrates the relationship between whole-life cost, axle load and speed, and then to develop solutions (for example tram–train) that are capable of exploiting the benefit and inter-operating with normal traffic.

## Role of the Technical Strategy Advisory Group

Overall the RTS demonstrates how the future demands and key drivers may be addressed though a combination of existing and future technology that will meet changing passenger expectations by improving the attractiveness of the rail mode and improving its environmental performance to maintain its advantage over less environmentally-friendly competition. The DfT will continue to engage with all industry partners and stakeholders to encourage and support research, encourage alignment of incentives through the ORR and facilitate cross-industry programmes and projects that move the industry in the direction of minimised whole-life, whole-system cost. The RTS is intended to be a living document, owned and updated by the industry in response to future technology development and results of ongoing research. The agreed vehicle for this is the Technical Strategy Advisory Group, the remit for which has already been approved by the RSSB Board and which will include senior technical representatives from the DfT, Network Rail, passenger and freight train operators and suppliers, as well as RSSB, ORR and academia.

This summary provides a brief overview of the *Rail Technical Strategy*. If you would like to view the whole document or the White Paper itself, they are available as free downloads from our web site, **www.dft.gov.uk**, or as priced publications from **www.tsoshop.co.uk.**

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