



National Audit Office

Report

by the Comptroller
and Auditor General

Department for Transport and Network Rail

Modernising the Great Western railway

Key facts

18 to 36 months

minimum delays to electrification to destinations along the Great Western route compared to Network Rail's 2014 plan

£1.2bn

increase in the estimated cost of electrification since 2014. The cost of the wider infrastructure programme, which includes electrification, has risen by £2.1 billion since 2013

Up to £330m

the Department for Transport's current estimate of the increase in its net costs caused by delays to electrification

£5.58 billion current total estimated cost of the Great Western Route Modernisation infrastructure programme including cost increases since 2012-13 (2012-13 prices)

£4.1 billion cost of new Intercity Express trains procured by the Department for Transport (the Department) for the Great Western route over 27½ years (2014 prices, present value)

21,200 the Department's forecast, in 2012, of the increase in passengers arriving at London Paddington per day during the peak period, between 2013-14 and 2018-19 (an 81% increase)

2.4:1 benefit–cost ratio expected by the Department in March 2015, before the electrification programme was reset

1.6:1 our estimate of the benefit–cost ratio taking into account the current forecast cost of the programme and additional costs to the Department

Summary

1 The Great Western Route Modernisation involves complex infrastructure works, new trains and service changes. These aim to improve services along the rail route, which connects London with west and south-west England and south Wales. Trains travelling to London Paddington at peak times are consistently among the most crowded in the country. The Department for Transport (the Department) forecasts that demand along the route will continue to rise. Modernising both infrastructure and rolling stock is intended to increase capacity and provide fast and reliable journeys for passengers.

2 The modernisation is made up of several important, interdependent elements, which were only brought together as an integrated programme in 2015 and are known as the Great Western Route Modernisation ‘industry programme’:

- Network Rail is responsible for the infrastructure programme, including electrification of the main line between London and Swansea. Electrification of a major section of the route, between London and Cardiff, is due to be completed by December 2018. Works on other sections are currently expected to continue until later in the period 2019 to 2024. Other infrastructure works include upgrades to signalling, tracks, stations, bridges and tunnels. Together, these will cost £5.58 billion. Network Rail must also coordinate the works with other railway improvements and keep the tracks available for train services to run.
- The Department for Transport is responsible for setting high-level requirements for rail infrastructure and for funding the work.
- The Department is responsible for commissioning new Intercity Express trains to replace ageing fleets on the main line by the end of 2018, at a cost of around £4.1 billion.
- The Department is responsible for the award and management of the franchise to run train services on the route, and for plans to re-deploy trains from Great Western to other routes.

3 In 2015, the Department and Network Rail identified that the nationwide rail investment programme for 2014–2019 was costing more than planned and taking longer. The most significant cost increases were on the project to electrify the line between Maidenhead and Cardiff, a key part of the Great Western Route Modernisation programme. The Committee of Public Accounts found that the nationwide programme was not deliverable. In large part this was because over half of planned spending was on projects where cost and scope were highly uncertain at the start of the period. The regulator, the Office of Rail and Road, had scrutinised parts of the programme, but the Committee of Public Accounts found that its approach was not robust enough. Borrowing arrangements in place before 2014 meant that Network Rail had only a weak incentive to get initial cost forecasts right.

4 In late 2015 and early 2016, as part of a broader review of its investment programme, Network Rail set a new cost and schedule for electrification. The Department now expects electrification of the route from London to Cardiff to be completed in December 2018, 18 months later than Network Rail planned in September 2014. This had consequences for the plans to introduce new trains on the route and to provide benefits for passengers across the network. The regulator has recently reduced its level of concern about the electrification programme, as Network Rail is currently making progress as planned.

Scope of the report

5 This report looks at the causes of difficulties delivering the programme so far, particularly the reasons for cost increases on electrification. We examine the extent to which the Department and Network Rail are improving their management of the programme and report on the remaining risks to delivery.

Key findings

The case for the Great Western Route Modernisation industry programme

6 **There is a good case for increasing passenger capacity on the Great Western route.** In autumn 2013, three of the 10 most overcrowded train services in England and Wales were Great Western services into London Paddington. The Department forecasts that passenger demand on the route will grow by 81% between 2013-14 and 2018-19 (paragraph 2.10).

7 **Cost increases and recent changes to the new trains order mean that the value for money of the programme needs to be reassessed, and the extent of electrification reconsidered.** In March 2015, the Department assessed the programme benefit–cost ratio at 2.4:1, representing ‘high’ value for money in the Department’s methodology. This did not include the cost increases which have become clear since. We estimate this would reduce the benefit–cost ratio to around 1.6:1, which is within the Department’s ‘medium’ value-for-money range. The Department’s decision in May 2016 to procure all the Intercity Express trains as ‘bi-modes’ (capable of either diesel or electric operation) also calls into question whether the full extent of electrification under the programme is still value for money, as all the new trains will now be able to run on non-electrified route sections (paragraphs 2.11 to 2.14).

Programme management prior to 2015

8 Before 2015, the Department did not plan and manage all the projects which now make up the Great Western Route Modernisation industry programme in a sufficiently joined up way. In 2007 the Department decided to buy high-speed diesel trains for the route under its Intercity Express Programme, to replace ageing trains and increase capacity. This changed in 2009, when the Department announced that the line would be electrified and that it would buy a combination of electric and bi-mode high-speed trains. The Department's objectives could only be met by working with Network Rail and the train operator, to complete the electrification and other infrastructure works and introduce new trains. The Department did not produce a business case bringing together all the elements of what became the Great Western Route Modernisation industry programme until March 2015. This was more than two years after ordering the trains and over a year after Network Rail began work to electrify the route (paragraphs 2.2 to 2.4 and 2.9).

9 The 2012 schedule for the infrastructure programme was unrealistic.

Network Rail has had to carry out a complex set of infrastructure works, on a working railway that passes through heritage areas and areas of outstanding natural beauty. When the Department entered into a contract to buy the Intercity Express trains, creating fixed deadlines for electrification, Network Rail had only just identified that it would need to develop a new type of electrification. The electrification timetable was not based on a bottom-up understanding of what the works would involve (paragraphs 2.6 and 2.7).

10 In 2015 Network Rail replanned the infrastructure programme after it became clear that costs were increasing and the schedule could not be met. Electrification between Maidenhead and Cardiff is now expected to cost £2.8 billion. This is an increase of £1.2 billion (70%) against the estimated cost of the programme in 2014 (£1.7 billion against Network Rail's 2013 estimate). The cost of other elements of the programme has also increased. The estimated cost of other Great Western projects that were in the programme's scope in 2013 has increased by £446 million (28%), to £2.0 billion. This in part reflects the fact that 2013 plans were at an early stage of development, and the expected costs of work were therefore uncertain (paragraphs 1.5, 3.2 and 3.3).

11 The cost increases arose, in part, because assumptions in Network Rail's 2014 cost estimate were unrealistic. Network Rail was too optimistic about the productivity of new technology. It underestimated how many bridges it would need to rebuild or modify. It also underestimated the time and therefore costs needed to obtain planning permission and other consents for some works, for example those which could affect protected species or listed buildings. It needed more than 1,800 separate consents for such works (paragraphs 3.6 and 3.7).

12 Failings in Network Rail's approach to planning and delivering the

infrastructure programme further increased costs. Network Rail did not work out a 'critical path' – the minimum feasible schedule for the work, including dependencies between key stages – before starting to deliver electrification. It failed to manage the technical challenges and risks of using new technology, specifically a new design for the electrification equipment and a new 'factory train' for installing the equipment and its supporting steel structures. Network Rail did not conduct sufficiently detailed surveys of the locations for the structures, which meant that some design work had to be repeated (paragraphs 3.7, 3.8 and 3.11).

The impact of delays

13 Delays to the electrification programme will cost the Department up to

£330 million. The Department intends to vary its order of Intercity Express trains so that they can operate under both diesel and electric power. The Department will also receive less income from the Great Western franchise between September 2015 and March 2019. This is because the train operator will bear the costs of providing extra trains and leasing depots, as well as higher running costs from operating diesel trains for longer, while receiving less revenue from passengers than expected (paragraphs 4.1, 4.8 and 4.11).

14 Some passengers in the north and west of England may have to wait

longer to see improvements in services. Passengers across Britain will benefit from trains being reallocated once the new trains on Great Western are introduced, but the Department has had to revise its plans for train reallocations because of the delays to the Great Western Route Modernisation. The Department has worked hard to protect existing passenger services in the Thames Valley (branches off the main line between London and Newbury). But under the new plan passengers in the west may have to wait up to two years longer than expected to see improvements such as increased capacity. Passengers in the north may have to wait an additional nine months to see improvements due to a combination of the revised plans and delays to infrastructure works there. As at November 2016, the government had not yet confirmed the new plan (paragraphs 4.6, 4.7 and 4.10).

Improving programme and project management

15 Network Rail is implementing a major 'Enhancements Improvement Programme' to address systemic failings that it identified as contributing to the

cost increases on the electrification programme. In July 2016, the regulator reported that Network Rail was making 'good progress' in delivering these improvements. These include cost estimation, monitoring arrangements and governance. Network Rail is also taking steps to strengthen its collaboration with contractors and the wider rail construction industry (paragraphs 3.8 to 3.12).

16 The programme management arrangements that the Department and Network Rail began to put in place in 2015 provide a platform for better, more efficient delivery. In February 2015, the Department and Network Rail established a programme board, meaning key stakeholders in the infrastructure, new train and franchising elements of the programme can be involved in decision-making. The Department now has a clear senior responsible owner for the programme, who chairs the programme board. The board is supported by a Network Rail programme office. This has been in place since April 2014, and aims to provide an integrated view of the programme. The effectiveness of the programme management arrangements depend on transparency and collaboration between all parties (paragraphs 2.15, 2.17 and 3.10).

Future risks

17 Weak programme management information has undermined the programme board's effectiveness. Management information has not been of the standard we have seen on other major programmes. The information that the programme board has received about costs and schedule for the infrastructure programme has not been based on an earned value management approach, in line with best practice for managing major programmes. It has not fully informed the board about progress with delivery and has made it difficult to monitor risks. Network Rail has told us that it is developing earned value management measures, but it has not yet put these into practice (paragraph 2.16).

18 Network Rail has a challenging task to deliver the main benefits from the infrastructure programme, within the current schedule and budget. The schedule for electrification contains some ambitious assumptions, for example that piling and mast construction rates will increase significantly between August and November 2016. The budget for the electrification programme between London and Cardiff currently has less funding available to manage risk than Network Rail believes it needs (paragraphs 3.15 to 3.17).

19 Some passengers will have to wait longer to see the full benefits of modernisation because of budget constraints. The Department has decided to further delay electrification on some stretches of the route as the costs cannot be met within the current funding package. The Department currently intends to electrify these sections but not until the next rail investment period, which runs from April 2019 to March 2024 (paragraphs 1.7 and 2.18).

Conclusion on value for money

20 The Department's failure to plan and manage all the projects which now make up the Great Western Route Modernisation industry programme in a sufficiently joined up way, combined with weaknesses in Network Rail's management of the infrastructure programme, has led to additional costs for the taxpayer. The way in which the programme was delivered before 2015 cannot be said to have best protected value for money.

21 The modernisation of the route has potential to deliver significant benefits for passengers, but the Department's assessment of value for money does not reflect recent developments, particularly changes to the train specification, and needs to be revisited. The Department and Network Rail have begun to improve the management of the programme. They have more to do to protect value for money in the future.

Recommendations

22 To continue to improve delivery of the Great Western Route Modernisation industry programme:

- a** The Department should assess whether the full extent of electrification, as currently planned, is still value for money. We understand the Department is updating its March 2015 business case to support this assessment. It should complete this process as soon as possible, and use the business case to inform other important decisions such as the start of the competition for the Great Western franchise in 2018.
- b** The Department for Transport and Network Rail together should improve the quality of programme management information presented to the programme board, drawing on best practice on other major programmes such as Crossrail. To support this, Network Rail should accelerate its plans to introduce an earned value management approach across the business, and use this to monitor the infrastructure programme.

23 To improve the delivery of future major programmes:

- c** The Department should be clear about the benefits it wants to provide for passengers before beginning any future major modernisation projects.
- d** Network Rail should capture all of the learning from its experience of introducing both new technology and new ways of working on the Great Western infrastructure programme. It should use this to create more realistic plans for future projects, including the Midland Main Line and Trans Pennine Express electrification schemes.