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HS2: lessons for future infrastructure projects

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About this report

This report draws on the discussion at a recent Institute for Government roundtable on lessons from High Speed 2 for future infrastructure projects. With Boris Johnson's government having ambitious plans to increase spending on infrastructure, the report argues for better decision making, scrutiny, implementation and evaluation if future projects are to be a success.

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Summary

Boris Johnson's government has ambitious plans for infrastructure, publishing a national infrastructure strategy in November 2020[1] and pledging "around £640 billion of gross capital investment" by 2024/25.[2] But with the construction of High Speed 2 beset with delays and increasing costs, it is important that the government learns lessons from this project to make sure that extra money for infrastructure is spent well.

In July 2021, we brought together senior civil servants, academics and other experts, many of whom were involved with or had direct experience of scrutinising the decisions around HS2, to discuss what lessons can be learnt from HS2 for future major infrastructure projects. Our virtual roundtable of 15 attendees took place under the Chatham House rule. The discussion was also informed by a paper written by Stephen Glaister, emeritus professor of transport and infrastructure at the Centre for Transport Studies at Imperial College London.[3]

Introduction

The government has made its ambitions to improve UK infrastructure clear – with the publication of the national infrastructure strategy, the creation of the UK Infrastructure Bank and a pledge to sharply increase infrastructure spending. However, major projects are long, expensive and complex to manage. They can be beset by delays and cost overruns and, when they go wrong, can end up delivering poor value for money.

To design and implement major infrastructure projects well, the government must learn lessons from recent experiences, good or bad. One of the highest-profile ongoing major infrastructure projects is High Speed 2 (HS2), for which the Johnson government issued the notice to proceed – the formal order to begin construction – in April 2020.

HS2 is a proposed high-speed rail line connecting London with the north of England and the Midlands. Construction has been split into three phases: Phase 1, from London to Birmingham; Phase 2a, from the West Midlands to Crewe; and Phase 2b, which will extend the line in the north-west from Crewe to Manchester, and also build an eastern leg from the West Midlands to Leeds.

Figure 1 **HS2 proposed route and phases**

Source: Department for Transport, various ESRI shape files of preferred routes, 2016.

HS2 has been years in the making, with interest in a new high-speed line continuing since the construction of HS1 (which links London to the Channel Tunnel) in 2003. The proposal for HS2 was explored in detail in a paper on high-speed rail published by the Labour government in 2010.[1] In spite of its political popularity – being backed by successive governments of different parties and multiple transport secretaries – HS2 has been beset by issues with spiralling costs[2] that have led many to become sceptical of the project.[3] As such, while HS2 may well deliver wider economic benefits once built, it is a useful case study in how major infrastructure projects can be difficult to plan and deliver effectively.

This Analysis paper summarises the main points we drew from the July roundtable, focusing on aspects of the project planning and delivery process:

- How decisions are made
- How decisions are scrutinised
- How projects are delivered
- How projects are evaluated.

It then offers recommendations for improving decision making around major infrastructure in future. While the paper was informed by the roundtable and would not have been possible without the time and expertise of the attendees, all conclusions are the Institute for Government's alone.

How decisions are made

Given how difficult, and politically and financially costly, it can be to row back on a major infrastructure project once it is in progress, one of the most important points in the life of a project is the initial decision on whether and how to proceed.

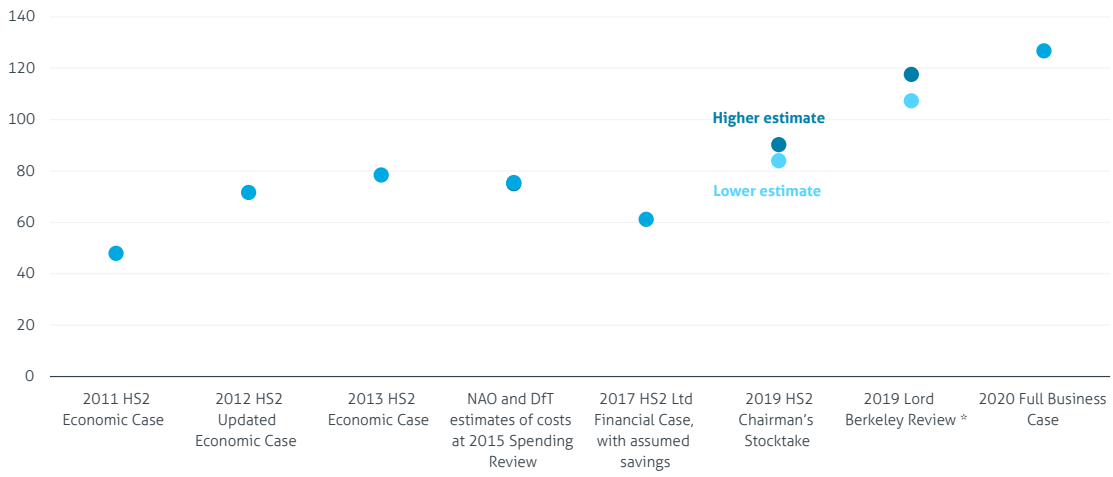
Attendees at the roundtable identified three sets of issues – **analytical**, **political** and **institutional** – that can affect the quality of this initial decision.

Analysis

Initial cost estimates are often not realistic

As shown in Figure 2, the cost estimate for HS2 has spiralled from £48bn in 2011 to more than £125bn in 2020.*

Figure 2 **HS2 costs (£bn, 2021 prices)**



Source: Institute for Government analysis of HS2 Ltd, *Economic Case for HS2* (2011); HS2 Ltd, *Economic Case for HS2: Updated appraisal of transport user benefits and wider economic benefits* (2012); HS2 Ltd, *The Economic Case for HS2* (2013); House of Commons Library, *High Speed 2: the business case, costs and spending* (2019); HS2 Ltd, *HS2 Chairman's Stocktake* (2019); Lord Berkeley, *A review of High Speed 2: Dissenting report* (2019); DfT, *Full Business Case: High Speed 2 Phase One* (2020). * denotes an independent estimate; all other estimates are based on government sources.

Cost overruns typically happen for two reasons. First, they can be caused by changes to the scope of the project over time – when a project grows or changes to include elements not specified in the original scope. This issue can be compounded where the original scope was not clearly defined, as many attendees felt was the case with HS2 (for example, the decision on HS2, made during the passage of the hybrid bill, to extend tunnelling through the Chilterns). We discuss further below the issue of setting clear objectives given the political nature of infrastructure decisions. Second, they can result from unrealistic initial cost estimates due to optimism bias.[1]

* These figures and all other monetary figures later in the paper are expressed in 2021 prices. Earlier years' figures are inflated to 2021 prices using the GDP deflator, a measure of growth in economy-wide prices.

Optimism bias is a perennial problem that governments have already tried to address with supplementary guidance from the Treasury in *The Green Book*.[2] The Department for Transport (DfT) also issues transport analysis guidance (TAG), including on reference class forecasting – that is, providing information on the cost of other similar projects to help in estimating costs. However, it is not clear how much this guidance has really improved the accuracy of cost estimates.[3]

At the roundtable, attendees questioned whether there was sufficient scrutiny of initial cost estimates by people who really understood them. Some felt that, while the government – and particularly the Treasury – had lots of people with an economics background, costs of major infrastructure projects were better understood by civil engineers or those from other relevant branches of engineering. While it may not always be feasible to have people with the right sort of engineering expertise in-house, bringing more people with this skill set into government on secondment – including into Treasury spending teams, who scrutinise departments' cost estimates – would allow for a more rigorous interrogation of initial cost estimates.

Another possible solution to the issue of unrealistic cost estimates, suggested by the National Audit Office (NAO) in its 2020 report *Lessons Learned from Major Programmes*, is to publish cost estimates as ranges, rather than point estimates, to capture and publicly communicate the uncertainty that inevitably surrounds the likely cost and delivery date of a project. This is particularly important in a project's early stages – before, for example, ground surveys have been done and any conversations with potential suppliers have taken place.[4] One attendee noted that there has been particular uncertainty about how much it would cost to build the eastern leg of HS2, partly due to the unpredictability of ground conditions on some areas of the route that were previously used for open cast mining.[5] The width of any estimated cost ranges would be expected to narrow as the details of the project design and delivery are fleshed out.

Estimated ranges are now being used. The full business case for Phase 1 of HS2, published in April 2020, gives a cost range of £35bn–£45bn, with services between London and Birmingham predicted to start sometime between 2029 and 2033.[6]

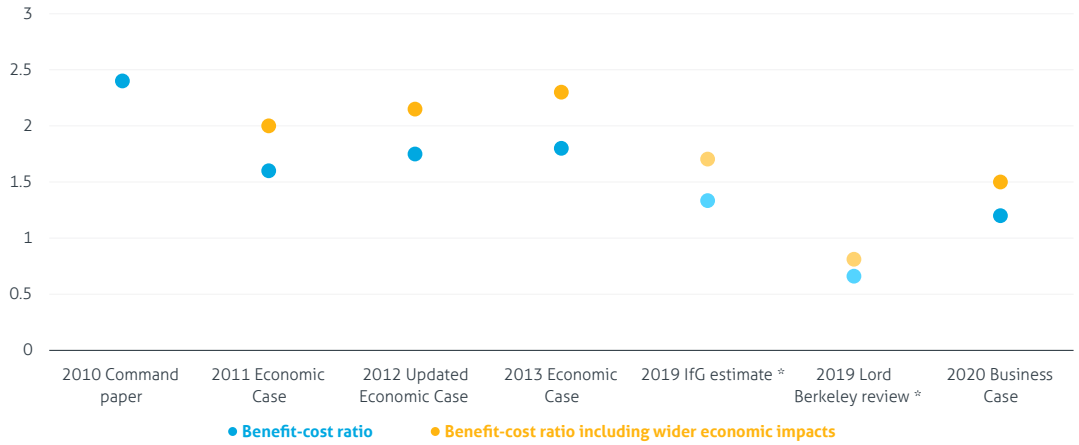
This approach helps ensure that decisions are made about the merits of proceeding with a project on the basis of the plausible range of cost and timing, rather than just one central estimate. However, as the NAO report notes, programmes have in the past exceeded the top end of their range, suggesting that – before basing any decisions on the estimates – senior decision makers still need to robustly scrutinise the assumptions underpinning them.[7]

The benefit-cost ratio may be less useful for large-scale projects

A common way to assess the value of infrastructure projects is to calculate a benefit-cost ratio (BCR), which shows the ratio between the value of future benefits and the value of future costs. Both are 'discounted' – that is, costs and benefits that occur further into the future are weighted less heavily than those that occur sooner. A BCR of 2, for example, would mean that the discounted future benefits are expected to

be twice as high as the discounted future costs. Through the life of HS2, as the scope and design of the project has changed and cost estimates have evolved, the project's BCR has declined from 2.5 in 2012 (representing high value for money) to 1.5 in 2020 (medium-to-low value for money).

Figure 3 **HS2 benefit-cost ratio**



Source: Institute for Government analysis of DfT, *High Speed Rail* (2010); HS2 Ltd, *Economic Case for HS2: The Y Network and London–West Midlands* (2011); HS2 Ltd, *Economic Case for HS2: Updated appraisal of transport user benefits and wider economic benefits* (2012); HS2 Ltd, *The Economic Case for HS2* (2013); HS2 Ltd, *HS2 Chairman's Stocktake* (2019); Lord Berkeley, *A review of High Speed 2: Dissenting Report* (2019); DfT, *Full Business Case: HS2 Phase One*, 2020. * denotes independent estimates; all other estimates come from government sources. 2019 IfG estimate based on costs in *HS2 Chairman's Stocktake*, 2019.

At the roundtable, attendees discussed the appropriate role of BCRs in assessments of project proposals, and whether the BCR methodology needs to be improved. On the one hand, calculating a BCR is useful because it requires officials to quantify costs, as well as working out who will be affected by a project and how. On the other hand, multiple attendees commented that the conventional BCR approach was never designed to assess projects on the scale of HS2, with very long time horizons and benefits that are intrinsically hard to measure.

The issues mentioned above on the difficulties of estimating costs also affect BCRs – and the range of cost estimates proposed above – should also be fed into providing a range of estimated BCRs. But difficulties also arise in estimating benefits and other aspects of the BCR methodology.

One of the problems is discounting – converting benefits and costs in future to their equivalent value now. For example, one attendee referenced a project where they found that completing the work more quickly would reduce the BCR because the costs would be realised sooner and thus discounted less heavily, which (according to the BCR methodology) outweighed the benefit of the project being open for use more quickly.

A second problem that was mentioned was that *The Green Book* allows projects to count benefits that accrue only within the next 60 years. For projects like HS2, which take many years to build but are expected to last for decades, this can ignore years of potential benefits.

The high degree of uncertainty involved in trying to quantify benefits beyond this time horizon means it is probably not appropriate to try to factor anything beyond 60 years into a formal BCR. But DfT has considered other ways that such long-term effects could be part of decisions about projects with such long timelines. It has proposed changes to its TAG that would allow certain schemes to apply a sensitivity test, in which benefits and costs are extrapolated beyond 60 years. The results of this would not form part of the BCR for the project, but would be considered when assessing the project's overall value for money on a case by case basis.[8]

Despite the shortcomings of the BCRs, attendees concluded that tweaking the methodology would not address these issues in a meaningful way. Having some formal assessment of a project's value for money is important, as it encourages officials and ministers to think carefully about what is likely to drive the costs and benefits and to spell out the assumptions underlying those estimates. Using a cost range rather than a single estimate also helps express some of the uncertainties. But for major projects, attendees stressed that BCRs must be considered alongside the other elements of the business case and that those other elements – particularly the strategic case – needed to be made more robust.

Major projects need better strategic cases

The government can and does approve projects with low BCRs,* and so tweaking the BCR methodology will not in itself improve the way decisions are made about major infrastructure projects. In 2018, economists Coyle and Sensier argued that BCRs should be used as a 'sifting test', but not as a tool for prioritising across different broad objectives; in other words, that the government should set high-level priorities such as productivity growth and then use BCRs to differentiate between different projects that could achieve the same objective.[9] However, attendees felt that setting broader strategic objectives was an area of weakness in many current projects.

Some attendees praised the Treasury's five case model,[10] which puts BCRs alongside other considerations when developing the business case for a project. The model includes:

- **Strategic case.** Making a case for change and showing how the proposed intervention will achieve the desired outcomes and fit within other projects and programmes within the government's strategic portfolio.

- **Economic case.** Appraising a range of realistic options, including through cost-benefit analysis, to show that the preferred option has public value.

- **Commercial case.** Showing that the preferred option has a viable procurement strategy and will result in a well-structured deal between the public sector and its service providers.

* The UK is not the only country where this happens. An Institute for Government report found that in Sweden, Germany and the Netherlands there was also a weak relationship between a project's BCR and whether or not it was approved. See Baldwin A and Shuttleworth K, *How governments use evidence to make transport policy*, Institute for Government, 26 February 2021, www.instituteforgovernment.org.uk/publications/transport-policy, p. 46.

- **Financial case.** Showing the affordability and funding of the preferred option.

- **Management case.** Showing that there are arrangements in place to deliver, monitor and evaluate the scheme.

However, other attendees had concerns about the way that strategic cases are developed and scrutinised. One problem raised at the roundtable was the separation of work on the strategic case from other parts of the project. In the case of HS2, for example, one attendee reported that the different strands of analysis for the economic case and the strategic case were largely separate. This meant that the strategic case, which involves setting broad objectives and project scope, could not guide other parts of the project.

A further problem reported was in the construction of the strategic case itself. As one attendee put it, the strategic case is often more a "statement of aspiration" than actual analysis. More analytical work needs to be put in to develop proper strategic cases that, as another attendee said, help decision makers to sort genuinely transformative projects (such as the Docklands Light Railway) from those that end up having far less impact (the Humber Bridge). In a recent blog, the NAO set out how strategic cases can contribute to effective decision making in major infrastructure projects,[11] stating that they should:

- **Be easily understandable so effective trade-offs can be made.** This helps translate objectives into a clear programme scope, explaining what will be required and when.

- **Help prioritise cross-government objectives.** Where objectives are in tension, the strategic case should give a clear idea of which is more important.

- **Be measurable (where possible).** The easier assumptions are to quantify, the easier it is to assess progress. The NAO found in an early review of HS2 that the strategic case included limited evidence on forecast passenger demand, which meant it was hard to demonstrate success.

Alternatives are often not seriously considered

One downside of a poorly formulated strategic case is that the alternative ways of delivering an objective are not adequately considered. A 2017 Institute for Government report, *What's wrong with infrastructure decision making?*, found that less than one third of project development time is devoted to the early stages of appraising different options.[12] At the roundtable, attendees agreed that major infrastructure projects often do not consider the full range of alternatives on which money could be spent instead. This can lead to ministers and civil servants too quickly settling on preferred projects, overlooking better solutions.

In the case of HS2, one of the problems was the separation of the serious appraisal of other options from the rest of the project by the creation of HS2 Ltd. The purpose of HS2 Ltd was to establish the case for a high-speed rail line, but this was never

compared to other transformative transport projects such as expanding the M1 motorway[13] or carrying out incremental improvements to railway capacity.[14] The consideration of major alternative options was instead done by DfT. The separation of these two strands meant that there was not a serious consideration of all the alternative options on a level playing field.

In the roundtable, one attendee compared the institutional set-up of HS2 Ltd with the Airports Commission, which reviewed the UK's aviation capacity between 2012 and 2015. The commission was tasked from the start with considering all the possible ways of expanding airport capacity, whereas HS2 Ltd (right from the beginning) only really had scope to consider one option – that is, the Y-formation high-speed line.

Many attendees felt in principle that it was a good idea to create an independent body like HS2 Ltd for the planning and delivery of major infrastructure projects, but the lesson here is that – if such a body is set up in the early stages of deliberations – it should have a full role in long-listing and seriously considering a wide range of alternative options before committing to delivering a single scheme.

An overarching transport strategy would help ministers pick the right projects

Attendees felt that picking the best infrastructure project from a range of alternatives would be made easier by a national transport strategy. Such a strategy would give a sense of what the UK's transport needs actually are, and how different projects align with them, which is something some attendees felt was lacking in the initial decision around HS2, when there was no overarching government strategy for infrastructure investment.[15]

Since then, the government has taken a step forward by producing a national infrastructure strategy, published in 2020,[16] but at the roundtable some attendees felt that there was still a need for a dedicated transport strategy as well, something that the Institute for Government has previously called for.[17] The integrated rail plan,[18] which will co-ordinate Phase 2b of HS2 (from Crewe to Manchester and Leeds) with other investment in the northern rail network, is another positive sign of the government trying to do more to put major projects in their broader context. However, attendees noted that the publication of this plan has already been delayed – it was due to be published in early 2021 but at the time of publication has still not yet been released.

Politics

Politics can get in the way of setting objectives

Decisions about major infrastructure projects are unavoidably highly political. Some attendees felt that politicians can chase "splashy announcements" of large projects, without fully considering the strength of the evidence behind these projects. One attendee noted that we should not assume a "rational world" where outcomes of major transport projects depend only on the business case. Governments may support projects for any number of reasons, including prestige and a project's popularity with the public.

It is right that, in a democratic system, governments are able to proceed with projects that have a popular mandate – especially those that are manifesto commitments. However, these decisions should be taken on the basis of a clear objective for a project (even if that objective is national prestige) and full evidence of the project's risks and costs.

Some attendees felt that HS2 was an example of a project that was approved without a clear set of objectives. Since HS2 was first mooted, many different objectives – from time savings to improving capacity to 'levelling up' – have been cited as its main benefit.

A lack of clarity on objectives makes it harder to weigh up the choices that will be required over the course of a project. One attendee noted that even though HS2 was now being built, it is difficult for officials to make decisions on, for example, whether to prioritise the speed of trains over cost, because there is still a lack of consensus about what the project is really for. This lack of clarity also hinders parliamentary and public scrutiny of projects because the criteria for their success are not clear.

Political commitments need to be able to evolve as the evidence changes

Another problem with the politics of major infrastructure projects is that governments can find it hard to back out of flagship policies even when the analysis of costs and benefits changes. The political importance of HS2 to David Cameron's Conservative government is evident in Philip Hammond's comment that, when he became transport secretary in 2010, Cameron told him: "Get HS2 done. Get out there and promote it like mad, get it done, get it through, that's your only task."[19]

Especially for projects like HS2, which may well take decades to construct, new evidence may come to light, or unforeseen risks may emerge (such as Covid permanently altering demand for rail travel on particular routes). But as the government has already sunk so much political capital into the project, there are real political costs to being seen to change its mind. This might well be the reason why, even as cost estimates for HS2 were revised significantly upwards, successive governments did not feel they could renege on commitments to it.

One attendee noted that this problem – of the relationship between political announcements and changes in analysis – is a thorny one to solve, especially in a democracy where politicians are often held to account for broken promises. However, this is an especially important lesson from HS2 to bear in mind for the Union Connectivity Review,[20] which will assess transport connectivity between the nations of the UK, possibly including aspirational transport schemes. Political announcements backing particular major projects need to be accompanied by a clear objective and supporting analysis that demonstrates that the project will deliver on that objective. That ought to help politicians to reassess decisions and potentially change course if the underlying business case does change.

Institutions

Some attendees cited the changes to the devolution landscape in the UK as an important factor in how decisions are made about major infrastructure projects.

Part of the issue is overlapping responsibilities for transport policy between central government and the devolved administrations. Transport policy is devolved, but this creates a risk that strategies are not well co-ordinated between the four nations, especially when it comes to cross-border links. The UK government has made moves to develop more coherent UK-wide transport policy, though the devolved administrations mistrust these efforts.

There are also overlaps between the responsibilities of central government and metro mayors in parts of England. Metro mayors have a remit to develop joined up economic strategies for their regions and some responsibilities for transport within that. But these intersect with transport policy decisions made by central government.

This accentuates the importance of close relationships between central and subnational governments to achieve infrastructure goals. But one attendee noted that often this relationship "immediately goes into a political register", with a lack of trust between the different organisations making it difficult to have open, honest discussions about possible projects. This attendee felt that what was needed was a higher degree of trust between the different levels of government, and clearer channels for officials in different levels of government to work together.

One example of where trust is eroding over infrastructure, which is closely tied to the overlapping responsibilities for transport of different levels of government, is the Levelling Up Fund, announced by the UK government at the spending review in 2020. This £4.8bn fund for infrastructure projects will involve the UK government spending money across the UK, and has drawn criticism from the devolved nations. The Welsh government accused the UK government of "taking decisions on devolved matters in Wales without being answerable to the Senedd on behalf of the people of Wales",[21] while the Scottish government has said that "making spending decisions based on a UK Government, rather than a Scottish, agenda, only adds to the complexity of the funding landscape, and creates a confused, incoherent policy framework and financial inefficiencies".[22]

Improving relationships between central and subnational governments will not be a simple task. One attendee suggested that, for the elected mayors, trust in central government might naturally increase as more money filters through for infrastructure projects outside London and the UK government seems more "on their side". However, money alone might not be sufficient. In the past, the Institute for Government has argued for central government to work more closely with local government to realise the national infrastructure strategy.[23] But this must be a more equal partnership – doing things *with* local areas rather than *to* them. Giving subnational governments more of an influence over infrastructure priorities would be one way to try to generate more of a political culture of trust and partnership.

How decisions are scrutinised

Many attendees expressed concern that the decisions around HS2 were not subject to proper scrutiny and that this contributed to poor outcomes. Transparency and accountability should be improved in future major infrastructure projects to ensure that parliament and the public can engage in an informed debate about these projects.

There needs to be more transparency about costs

One of the main concerns that attendees voiced about the scrutiny of HS2 was a lack of transparency about costs. Between 2015 and 2019, the official estimate for Phases 1 and 2 of HS2 was £63.3bn. This was raised to the current estimate of £127bn in April 2020 when the government issued the notice to proceed. However, as Glaister details in his paper, ministers and officials were aware for some time that the 2015 estimate was unrealistically low, but that as late as 2019 ministers were still assuring parliament that the 'budget' for HS2 was still £63.3bn.

This careful wording was used by Bernadette Kelly, the permanent secretary of the Department for Transport, in evidence to the Public Accounts Committee, to distinguish the latest estimate of the expected 'cost' of the project (which she did not talk about) from the notional 'budget', which factored in assumed cost savings from yet-to-be-identified efficiencies. As Kelly later explained: "I was actually quite careful in my remarks in 2019. I did not say that the project was coming in on budget and schedule. What I said was that the budget... had not been changed... In reality... we were aware that significant cost pressures existed."[1]

A lot of the problems with parliamentary and public accountability stem from this fundamental issue: if there is not transparency about the true costs and timescales of a major infrastructure project, parliament and the public cannot make informed decisions about it. MPs should have been able to challenge ministers on the rising costs and their assumptions about efficiency savings. But the lack of transparency – from both ministers and senior civil servants – about revisions to the cost estimates made this very difficult.

One attendee highlighted that the public consultation on HS2 took place in 2011, when the costs for the project were estimated at £48bn. This makes it hard to know how to weight responses to the consultation now that the cost estimate has been revised upwards significantly. We do not know, for example, whether the public would have responded favourably to HS2 if it had been first proposed with a headline cost of more than £120bn.

One way to solve the issue of cost transparency is by making improvements to how costs are calculated and overcoming optimism bias, as discussed above. However, even by improving the initial estimates, there may still be delays and setbacks in a project, and it is a barrier to scrutiny if ministers and officials hide these from parliament and the public.

Some attendees felt that ministers and officials were slow to announce such delays for fear that making these public would jeopardise the delivery of a scheme. In particular, one issue identified by Glaister is the exact purpose of HS2 Ltd. Initially, the company was meant to advise ministers on the physical form and the case for constructing a line, but it arguably later saw its job as delivering the scheme. Fear of jeopardising the organisation's central role in delivering the project may have led senior officials within HS2 to be less than fully transparent about rising costs.[2]

This, then, is an issue closely linked to the one of adapting political commitments as the business case for a project changes. It also relates to the issue described above, of the need to ensure that any independent advisory body is set up in such a way that its future is not tied too early on to the success of only one option.

While politicians may think that transparency around cost increases could result in their flagship project being cancelled, obfuscation also runs the same risk. It is in the long-term interest of major projects to embed support for their budgets as well as for the principle, and this is undermined by trying to spin the numbers to win a political argument. Arguably support for HS2 has suffered because the public have not trusted government's estimates of the costs, giving ammunition to opponents seeking to undermine support for the project. It is a positive step in terms of transparency that the government is expected to report on HS2's progress to parliament every six months, including giving updates on costs.

Parliament should play a more active role in scrutinising decisions

In part as a function of a lack of transparency, some attendees felt that parliament did not play enough of a role in scrutinising decisions about HS2. A hybrid bill seeking powers for Phase 1 of HS2 was laid before parliament in 2013,[3] but Glaister has argued that parliament was never greatly engaged with "the big-picture strategic debate" around HS2.[4] Some attendees noted that some parliamentary select committees have written reports on HS2[5] but these do not seem to have had any particular influence on the project; Glaister has expressed doubts that public consultations on the scheme would ever have meaningfully changed the outcome.[6]

This reflects a broader pattern of a lack of parliamentary and public scrutiny of infrastructure decisions. A 2021 Institute for Government report explained that because transport policies rarely require legislative change, parliament has limited opportunity to scrutinise decisions.[7] The report recommended a greater role for the Transport Select Committee in carrying out regular 'evidence checks' on the evidence used by the transport department for major polices. Another Institute for Government report also recommended the creation of an infrastructure committee in the House of Lords to improve parliamentary scrutiny.[8]

The Transport Select Committee has also recently argued that if major projects set a cost and delivery date range, as soon as a project falls outside this range it should trigger by default further scrutiny of the project from the appropriate select committee.[9]

Incomplete delivery of major projects can affect the business case

Major projects like HS2 may well be built in stages and parliamentary approval is often sought in successive phases. Currently, parliament has approved only the first phase of HS2. Managing the hybrid bill was easier for the government if the project was split into phases.[10] But it raises the problem that the whole project may not in fact be completed as originally conceived. The government has recently hinted that it may not complete the full 'Y' of HS2, dropping the eastern leg between Birmingham and Leeds in favour of a rail project between Leeds and Manchester known as Northern Powerhouse Rail.[11]

While the 2020 business case for HS2 did separate out the BCR of the first phase from that of the scheme as a whole, the decision to proceed with construction of Phase 1 clearly took as given that the whole scheme would eventually be completed. The accounting officer assessment says that "while Phase 1 as a standalone project represents 'low' value for money, it is a step to the full HS2 network that contributes to an overall positive of 'low to medium' value-for-money position".[12]

When major projects are broken into phases for delivery, the government should produce separate business cases for each phase, and be explicit about which benefits are dependent on the full realisation of a scheme. MPs and peers will then be in a better position to hold the government to account for whether or not it delivers the full intended benefits of the overall scheme.

Policy makers should also do more to help the public engage with and scrutinise infrastructure projects

Attendees also felt that the general public were not sufficiently able to scrutinise infrastructure projects. Involving the public from an earlier stage in making decisions on major infrastructure projects should help to reduce the chance of the project being derailed by local opposition at a late stage in the process, causing unnecessary delays and additional costs. It would also help improve the design of major infrastructure solutions by ensuring that decision makers take account of rich local data.

To improve public engagement, the Institute for Government has previously argued for the creation of a Commission for Public Engagement, modelled on the French Commission Nationale du Débat Public (CNDP). Such a commission would give local communities more of a role in shaping infrastructure decisions.[13]

Ministerial and official churn can harm accountability

Major transport projects take a long time to complete. Initial planning on HS2 began in 2009, but the full line may not be open until 2035–40. Crossrail, the new railway connecting the Great Western and Great Eastern Main Lines across London, will take even longer from initial planning to completion.[14] One attendee noted that such projects will see through dozens of secretaries of state, permanent secretaries and other responsible officials. This can pose a challenge for accountability, as ministers or officials can end up being blamed for unrealistic cost estimates they might have inherited from their predecessors, while those who originally made the decisions or signed off cost estimates are never held to account.

In a previous Institute for Government report on the use of evidence in transport policy, we suggested that one solution to this was making sure that ministers and officials in charge of infrastructure projects (known as senior responsible owners) retain responsibility for evaluation of policies and large projects after delivery. We also suggested that the Transport Select Committee should be able to recall people to discuss projects they have been responsible for, even after they have changed role.[15]

How projects are delivered

Major infrastructure projects are complex to manage and can take decades to complete. Delivering these projects well is not easy and attendees highlighted several problems that can make the process harder.

Early planning can be seen as waste of money, but is essential to keep costs down

One attendee noted that a lack of early planning on the delivery of HS2 caused substantial problems. In their view, the project planning was at a very immature stage when officials attempted to invite private contractors to tender for the work. Because the full risks and costs of the project were not understood, this tender failed. This example underscores the importance of spending enough time on planning a project before trying to start construction.

One of the suggested fixes for this issue in our discussion was for the public sector to spend more time and effort designing schemes and planning how to deliver them before bringing private sector contractors in and starting construction. Some attendees noted that such time spent on planning can often be seen from the outside as waste, because money is being spent on administrative costs but nothing is yet being built. But time spent planning at the beginning of a project can in fact reduce costs later on.[1]

Projects can last for decades and it might not be sensible to plan everything over that timescale

Some attendees felt that, even after addressing some of the issues raised above about planning for projects, it might not be possible to anticipate everything over such long timescales. They felt that the system needed to be able to accommodate the natural evolution of a business case, even after the decision in principle.

One solution suggested was to re-test the problem statement – the initial assessment of what it is the project is actually trying to achieve – on a periodic basis to review how circumstances might have changed. One attendee suggested that, instead of leaving evaluation to the end of a project, it should be an ongoing process, based on thinking about the plausibility of a project – effectively asking the question, "What do I have to believe for this project to be worth doing?"

For example, at a session of the Transport Select Committee in July 2021, the transport secretary, Grant Shapps, was questioned about the effect of Covid on HS2. Committee members asked whether his department was taking the longer-term effects of the pandemic on travel into account in their decisions about HS2 – for example, if there was likely to be a permanent rise in home-working. Committee chair Huw Merriman pointed out that a fall in passenger demand would lead to a lower BCR for HS2.[2] Shapps

resisted the idea that the case for HS2 would look substantially different following the pandemic, but this is one example where re-examining the problem statement of a project (in this case, assumptions about rising demand and capacity constraints on the rail network) might be useful.

The idea of ongoing assessment, especially if circumstances have changed, is part of the government's guidance for accounting officers who are scrutinising major projects. This guidance requires accounting officers to revisit the programmes they have assessed when there are significant changes.[3]

However, when a project is already under construction, this re-testing might throw up issues that are difficult to solve without inducing further expense. An alternative suggested by one attendee was to avoid going for the most complex solutions in the first instance. Instead, projects could start with the minimum viable plan and build from there, which would allow greater flexibility if it later turns out the more complex solution is no longer feasible or desirable. In the case of HS2, for example, ministers locked themselves into a decision early on that HS2 trains should run at a speed of 360km/h, making it one of the fastest lines anywhere in Europe. This, though, necessitated more expensive tracks than if they had instead been willing to accept a slightly slower speed of 320 km/h (still faster than, say, Eurostar).

Projects need the right cost incentives to ensure they remain on time and within budget

Depending on who exactly pays the price for cost overruns and delays, ministers and officials may have different attitudes to a major project's costs. This issue of accountability for costs should be factored into how projects are designed to help ensure timely, on-budget delivery.

One attendee compared the experiences of Crossrail and HS2. Crossrail is funded by the UK government, the mayor of London and London businesses – and the latest nominal terms cost overruns have fallen on the mayor of London, who passes them on to London businesses through a business rates surcharge. This gives the mayor an incentive to keep costs down and minimise delays. This attendee compared this to the funding arrangement of HS2, which will be funded through general taxation. There are many differences between the circumstances of Crossrail and HS2, which could explain the different scale of cost overruns, but this attendee felt that one contributing factor was that the financing arrangements meant that – in the case of HS2 – there was no figure equivalent to the mayor of London on Crossrail who feels as accountable for the costs of the project.

The delay in the work on and opening of Crossrail meant that the cost rose in nominal terms and the cash contribution pledged by the Treasury stretched less far. As a result, the GLA had to make an additional contribution, which may ultimately be covered by higher taxes on London businesses.[4] But this cost increase was far less substantial than the HS2 cost overrun: the nominal cost of HS2 was 2.9 times larger by 2020 than it was originally predicted to be in 2011 (or 2.6 times larger in real terms). All of this additional cost will be met from general taxation.[5]

Delivery teams need the right skills

Both the Transport Select Committee and the Public Accounts Committee have commented in recent reports on the lack of appropriate skills in the Department for Transport and HS2 Ltd. The Public Accounts Committee has repeatedly expressed concerns that DfT and HS2 Ltd did not have the skills or capability needed to successfully deliver HS2 and other major infrastructure projects.[6] Meanwhile, the Transport Select Committee cited work from the Institute for Government showing that skilled individuals within DfT are spread too thinly across projects.[7] While DfT's appraisal and modelling teams have advanced capabilities, capacity is an issue, with teams overstretched and therefore unable to make meaningful contributions to policy making.[8]

DfT is due to refresh its skills strategy and the Transport Select Committee has recommended that this is done in consultation with public and private sector employers to best understand where skills gaps are and work to address capability and capacity issues.[9]

How projects are evaluated

In the words of one attendee, possibly the most important change that the government should make in its approach to major infrastructure projects is increasing the profile of evaluation. Many attendees expressed concern that lessons were not being learnt from the successes and failures of past major projects, and this means new projects are likely to repeat the same mistakes, for example in how they forecast costs and benefits.[1] While this problem is also common across other advanced economies, changes could be made to better embed evaluation into the process of designing and implementing major projects.

In the case of HS2, better evaluation of its predecessor, HS1, might have helped the project in its planning stages. The first phase of HS1 was completed in 2003, linking the Channel Tunnel to north Kent. The second phase, extending the line to London St Pancras, was completed in 2007. While there were two economic impact studies of HS1 (in 2009 and 2015), these did not come to any definitive conclusions about the impact the project had. The full evaluation in 2015 was commissioned by DfT only after criticism from the Public Accounts Committee in 2012 about the way the government evaluates major projects – suggesting an unwillingness to do serious project evaluation at the outset.[2] A fuller and more timely evaluation of HS1 may well have drawn applicable lessons for HS2, especially as the former was delivered on time and within budget.

One attendee suggested that the government should create a national infrastructure board that oversees and evaluates major projects. Another suggested that evaluation should be an ongoing part of projects, rather than something done at the end. They felt that ex-post evaluation was often time-consuming and not always useful because when projects take such a long time, there is always a defence for benefits not being realised due to changing circumstances – another reason benefits should be reassessed during the course of major projects to take account of any economic and societal changes that might affect them.

This benefits management is especially important in projects that take a long time to deliver, where underlying assumptions are most likely to change.[3] Such a reassessment of expected benefits would ensure that any changes were visible and acted on during the project rather than just assessed afterwards. The Infrastructure and Projects Authority (IPA) has recognised the importance of this ongoing management of benefits and has released guidance for major project teams to help with this.[4]

A 2018 Institute for Government report suggested that the IPA should collate information on major projects centrally, including on cost outturns against estimates and delivery times against estimates. The IPA could then encourage departments to use this information to improve planning in other projects.[5] The Transport Select Committee should also take a greater role in ex-post evaluation, ideally by working with the Public Accounts Committee and the NAO to set up joint inquiries.[6]

Conclusion and recommendations

Boris Johnson's government has ambitious plans to increase infrastructure spending. But to ensure the money is spent well, the government must learn from past mistakes. Some improvements have already been made since HS2 began but there is more to be done.

The experience of HS2, coupled with previous Institute for Government work on infrastructure and transport policy, points to the following recommendations for how major infrastructure projects could be planned and delivered better.

Improving the analysis underpinning initial decisions

- **Initial cost estimates** are often over-optimistic, despite renewed efforts to tackle optimism bias. The Treasury should bring a greater number of qualified civil engineers – and those with other relevant engineering expertise – in on secondment to scrutinise cost estimates from departments.

- **Benefit-cost ratios** often do not adequately capture the range of potential returns and outlays for large-scale infrastructure projects. Tweaking the methodology for calculating these would not avoid the problem entirely. However, civil servants should produce ranges of estimated costs, benefits and BCRs (as is becoming standard), rather than emphasising a central point estimate, to reflect the risk and uncertainties in planning major projects and help ensure these are factored into decision making from the start.

- **More analytical work** should be put into developing robust strategic cases for major infrastructure projects, which are clear about the assumptions being made and the range of possible outcomes, to ensure they are more than just a statement of aspiration. These strategic cases should also be subject to greater scrutiny by external experts to ensure they reflect high-quality, dispassionate analysis.

- More time should be spent in the initial phase of projects weighing up the **alternative options**, rather than committing too early to a preferred choice. The government's ability to do this would be helped by having an integrated transport strategy. The integrated rail plan is a step in the right direction but an overarching transport strategy considering all modes together would be more useful.

Managing political pressures better

- Politicians should be clear in **publicly communicating the objectives** they hope to achieve with new major projects. They should also communicate any risks or uncertainties, especially around cost and delivery.

- Big announcements should ideally be aligned with the development of a **full business case** for a project, so that political commitments are not made before the feasibility of a scheme has been demonstrated. This may also help politicians to change their stance on major projects when the business case changes.

Working more effectively across different tiers of government

- It is important that there are close relationships **between central and subnational governments within England** – both at political and official level – to achieve infrastructure goals, since their responsibilities for and insight on transport policy overlap. Central government could foster a stronger culture of trust and partnership than currently exists by giving subnational governments more of an influence over infrastructure priorities.

- It is also important for the UK government to foster better working relationships with the **devolved administrations**, who have responsibility for transport policy within Scotland, Wales and Northern Ireland. The UK government needs to address concerns from the devolved administrations that it is eroding their autonomy in areas of devolved competence and that UK government spending may duplicate devolved spending. It also needs to ensure there is proper partnership working on projects that span the divide between devolved and reserved functions to ensure that policy decisions are appropriately co-ordinated.

Improving how decisions are scrutinised

- For parliament and the public to be able to scrutinise decisions on major infrastructure projects, they need a clear picture of what projects will cost, and whether the appraisal of the benefits has changed. Permanent secretaries, as an explicit part of their role as departmental accounting officers, should **provide information on the latest cost estimates of a project to parliament** in a timely manner. The information provided should explicitly quantify any yet-to-be-identified efficiency savings that are factored into the estimates. They should also indicate what contingency budget has been provided to cushion cost overruns and external factors, such as exchange rate movements.

- **Greater transparency** about the evolving estimates of costs and benefits of projects – alongside a clearer statement of the objectives for major projects – may also help politicians to row back on some projects when the facts change, rather than feeling it would be too politically costly to do so.

- Relevant select committees (such as the Transport Select Committee) should carry out regular **'evidence checks'** on the evidence used by departments for major projects, ideally drawing on relevant external experts for more detailed scrutiny.

- A new **infrastructure committee** should be created in the House of Lords to improve parliamentary scrutiny.

- Select committees should be able to **recall ministers and officials** who had been in charge of major infrastructure projects to discuss them even after they have changed role.

- To improve public engagement, the government should create a **Commission for Public Engagement**, modelled on France's Commission Nationale du Débat Public. Such a commission would give local communities more of a role in shaping infrastructure decisions.

Improving project delivery

- The public sector must ensure it devotes enough time to **understanding the detail of the project before asking private sector contractors to tender** for the work. This can seem wasteful – spending time and money for no apparent output – but it should ultimately save the public sector money by ensuring that it does not pay over the odds by signing contracts at too early a stage when the uncertainties surrounding the project remain large.

- For projects that will take decades to complete, policy makers should take a **flexible approach to planning**. Rather than trying to plan for every detail over a long timescale, ministers and officials should consider starting with a minimum viable option and then adding to it over time. Evidence for and against a project, as well as updated cost estimates, should be evaluated on an ongoing basis.

- The government must ensure that the project team tasked with delivering major infrastructure projects contains enough people **experienced in writing long-term contracts**.

- Policy makers' **incentives to minimise cost and time overruns** can be sharpened by having a more direct line of sight between the project costs and the level of taxes people pay. This was achieved, for example, in the case of Crossrail, where cost overruns resulted in an increase in a specific, hypothecated levy on businesses in London.

Improving evaluation

- The **IPA should collate information on major projects**, including on cost outturns against estimates and delivery times against estimates. Departments could then use this information to improve planning in other projects.

- There is a need for more **systematic and rigorous oversight of project evaluation**. In the current system, select committees – although not always possessed of all the right expertise – are best placed to fulfil this role, and so relevant bodies (such as the Transport Select Committee) should take a greater role in ex-post evaluation. Ideally they should work with the Public Accounts Committee and the National Audit Office to set up joint inquiries on major infrastructure projects, drawing on external expertise where appropriate.

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