ISSUE 18 | May/June 2016

INTERVIEW
Beth West talks HS2 contracts
page 3

INSIGHT
The outsize potential of small modular reactors
page 10

ANALYSIS
Weighing up London's river crossing plans
page 6

INFRASTRUCTURE Intelligence

Produced for the industry by the Association for Consultancy and Engineering

Powered up

Where and how devolution is happening

page 14

INFRASTRUCTURE Intelligence

Produced for the industry by the Association for Consultancy and Engineering
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MESSAGE FROM THE EDITOR

London's new mayor may still be in his honeymoon period, but it won't be long before businesses and the public start looking for gaps between words and actions. And Sadiq Khan has certainly some minor miracles to perform to narrow that distance: his policies on housing and infrastructure are more aspirations than anything approaching well thought-out, deliverable strategies. Transport experts are sceptical whether the sums work on the transport front. A four-year fare freeze largely paid for by catching ticket dodgers, cancelling new Routemaster buses and efficiencies at TFL seems overly optimistic without cuts to capital programmes. Much rests on the abilities of a good transport deputy to pull off the seemingly impossible – Lord Adonis was being touted for a big job at City Hall as we went to press.

Miracles are required on the housing front, too, where Khan has pledged 50,000 new homes a year for London, half of them affordable (see John Hicks, p12). Are these targets at all credible? Demanding that 50% of all new homes be affordable could put the brake on development altogether. There's also the not insignificant question as to how it squares with starter homes as the government's new vehicle of choice to fulfill section 106 agreements. And just who will build them?

Of course, a booming housing market is the kind of problem many regional conurbations yearn for. And those recently granted greater autonomy by the Chancellor may well feel confident of tackling them more successfully than London. However, the omens to date are mixed. Manchester is well down this route already, and some firms are seeing an increase in investment, particularly from city areas (p14).

This may well encourage consultants to re-target themselves towards supporting local authorities in navigating their way through the transition. But to do that, consultants will want to see less fighting and more unity at town halls around the county – real success will require far greater collaboration across regions. As we report on p19, political divisions between the east and west in the Midlands Engine mean it will be some time before this particular motor gets into gear.

There are certainly more questions than answers across both these exciting political shifts. But as Khan settles into City Hall, let's hope he and his team will quickly reach out to our sector to do what we do best – solve problems.

Denise Chevin,
editor, Infrastructure Intelligence

Contents

How to book your HS2 ticket

Denise Chevin asked Beth West to give us the inside track on the £520m of contracts for phase two of the high-speed line

Life must be one long beauty parade for Beth West, commercial director of HS2. With contracts and appointments coming through thick and fast, there are CVs to study, bids to read and presentations to sit through as the cream of the engineering and contracting world vie to design and build the £50bn train line.

The project is expected to receive royal assent in December, and construction is due to start in 2017. The team behind the project is going all out to ensure that it will be full speed ahead once the whistle has blown, pursuing the political and procurement processes in tandem.

HS2 has confirmed a joint venture between Atkins, CH2M and SENER as its engineering delivery partner for phase one from London to Birmingham, including assisting with the procurement of the £11.8bn of civils packages. Meanwhile, seven teams have been shortlisted for £900m enabling works.

Most recently, HS2 has published details of engineering design work worth up to £520m for developing the detailed plans for phase two B, ahead of a formal decision on the route in the autumn. The first part, between the West Midlands and Crewe, will open in 2027, six years ahead of the rest. This will be subject to its own hybrid bill, which the government hopes to deposit in parliament in 2017.

This latest consultancy work up for grabs is for a development partner to lead phase 2B of the project through the hybrid bill process, worth around £170m, as well as three professional services contracts for consultants to design three of the main civils packages for the route north of Birmingham to Leeds and Manchester, worth around £350m.

The successful bidder will join HS2's in-house team to manage the progress of the hybrid bill application through parliament, with royal assent expected for 2022. A shortlist is due this summer, with the successful bidders appointed once the route has been announced. Additional work covering stations and railway systems will follow next year.

> We don't expect bidders to show up with all the innovative ideas in the bid process. What we want is for them to demonstrate how they innovate

Talk us through the different scopes of the consultancy contracts.

The engineering delivery partner is supporting mainly our design and construction activities – working with us on the tendering process for the main works, and for the other contracts as well; looking at design assurance, and really supporting us whilst we go through the construction process.

We've got this two-stage design-and-build process for the civil engineering works, and the first stage of that is very design-driven. So we really need support on that design process.

And then our job is also very much to be the systems integrator for the railway, so they'll help us with the assurance for that as well.

The development partner and the professional services contracts for 2B will be working with us to prepare the bill material. It's a much earlier stage of design. What goes into parliament is not as detailed as we need for construction, but it's detailed enough that we understand the environmental impacts.

Why did the Atkins/CH2M/SENER consortium win the phase one engineering delivery contract?

Right across the board, they were able to provide higher-quality responses to all of our questions.

Do fees charged come into the decision-making process?

Yes, of course. But the approach that we've taken has been to focus more on technical ability. Cost follows quality, and so what we look at is people who can actually deliver. And because we're able to do a lot of benchmarking across the entire project, we can always challenge costs if we see things are looking odd compared with other prices.

For the delivery partner and the PSEs, it's day rate-based. We look to see where we might be able to do things on a work package, on an output basis, but especially for some of this early design work it is difficult to scope that out

You say you were impressed with the quality of the bids, yet you've also said bidders need to be more innovative. Are they hitting the mark?

We don't expect bidders to show up with all the innovative ideas in the bid process. What we want is for them to demonstrate how they innovate, then we can look for them to bring that through into the contracting process.

What you've read is my experiences on other programmes. I'm trying to be a bit provocative to see what their

response is, because the construction industry is incredibly conservative.

Are there things that people aren't grasping yet?

I always plug HackTrain [an initiative to revolution the rail industry] because I think they're doing some really good stuff at the front edge of the thinking on this. They have gone out to see what modern technology can do for the railway industry. And I'm not seeing anything similar in construction yet. There's all this amazing new technology and different kinds of thinking, but we're still stuck in a world of middle-aged white guys doing the same thing as they've always done – and I say that to middle aged white guys as well!

If we don't capture all the new technology, I think we'd really be missing a trick. We'd be losing a whole generation of intelligent people who are going to do something totally different, because we're not seen as modern.

How do you expect the design partners to look at increasing productivity or reducing costs?

There are numerous elements to that. One is that we do need to be looking at cost-led design, rather than what has traditionally been done – to design it and then knock cost out later – so that it's more: "This is our budget, how do we deliver the product?"

And that does go to productivity, but it also goes into materials, into how innovation can actually lower costs. Which is why we're so keen on off-site manufacturing. But we also want to work very collaboratively in that regard, because we don't think we know everything. Our suppliers have a much broader breadth of information and knowledge, but we also think they don't know everything.

So there's a whole world out there that we need to explore, and make sure that we understand that and ensure that we're open to different ideas.

We do have this opportunity, because there is so much infrastructure spend now, to develop a generation, but if we do it the same old way, it won't be attractive to new people coming in. We won't get the productivity benefit, and government will take its toys and go home. They'll say, "This wasn't really a good use of our money," if there are cost overruns or if things are late, because we haven't progressed as an industry.

From my experience, there is always a massive tension between doing things to save money and what designers want. I think that there's creative tension, and

"We have this opportunity to develop a generation, but if we do it the same old way, it won't be attractive to new people coming in. We won't get the productivity benefit, and government will take its toys and go home"

Beth West, HS2 commercial director

I think the question is, can we find an answer that's not mutually exclusive? For me, iconic does not need to be expensive. But it's getting past that inherent conservatism, and asking, "What can we do differently?"

What will be the clincher when it comes to securing a berth?

Skills, skills, skills! Having so much spend on infrastructure is absolutely amazing, a once in a lifetime opportunity. But because we've had shortages and lots of people imminently retiring, one of the big things is making sure that through our procurement process we're building people capability.

I worry that we don't have enough people coming into the industry, and that people aren't getting promoted in the right ways. I think there are some things worth looking at in terms of how consultancies, in particular, require people to go abroad for this period of time, that's how you get promotions, because it's not attractive to everybody. How do you retain people with children, or people who need more flexibility?

We need to make sure that we are attracting and keeping the best people in the business, and promoting them. What we don't want is people just nabbing other people's designers and engineers and pushing up costs.

So the big, big thing we'll be looking for on the design side is: how are you building your capability, and can you show us that it is going to be a solid platform? How are we going to get that confidence that the bidding companies have that pipeline of people, and a steady stream? Because it's not really in line with our values to flog people for 16 hours a day to get the job done.

And you'll be looking for that with your contractors too?

Yes, certainly. We have the great benefit of the National College for High-Speed Rail, which is one pillar of our strategy. We obviously want our contractors across the board to commit to using the college, but it's also how they're bringing through apprentices and so on. [HS2 will be looking for one apprentice per £3m spent.]

On the design side, would you expect a consortium to come together as they did in phase one?

I never expect anything! In phase one we had separate engineering and environment contracts, but for phase two we've recognised that there's such interaction between the two that it makes sense to group them together.

Whether or not companies have the capability to deliver the whole thing is a company issue, and I know that there are some consortia forming, but I think it's different from the construction side.

Companies form during ventures for two reasons: one, because they have got complementary skills; the other one is for capacity and risk. On this, it's not like we're asking them to take a huge amount of risk.

If there are complementary skills, that's logical. If it's a capacity issue, I would be slightly more concerned about what that means for your own resources. And what other contracts are you paying for?

You have already confirmed you're using NEC and you're not using project bank accounts. Are there any other details at this stage?

Fair payment is obviously extremely important to us, but we've done a lot of research into project bank accounts and we're not really convinced. I think we can get the same information without them, and the same transparency.

It's a cost that has to get built into the project, so we think we can live without them. If we don't get the behaviours we want, we might change our mind. But we're obviously very committed to making sure we've got predictable cashflow coming through the market, and also looking at how we might be able to improve that over the course of time.

NNA results in autumn

ICE president says "huge" response to national needs assessment got to the heart of factors affecting infrastructure over the next decades

ICE president Sir John Armitt: "The response has provided us with a wealth of evidence"

The national needs assessment for UK infrastructure will be published in October, ICE president Sir John Armitt has announced. The report will be provided to the National Infrastructure Commission to support its own needs analysis.

Well over 400 organisations and individuals from industry, business, environment, economic, academic communities and more have engaged with the NNA and contributed evidence. And 600 people from the wider built environment, legal, political and professional services, and members of the public have also engaged and shared views via Twitter, Armitt said.

"The response has been huge, and has provided us with a wealth of evidence and expertise. I am delighted the NNA has been embraced in this way," said Armitt, who claimed that the collaborative nature of the project had created a real a sense of excitement around the issue which would "benefit society, grow the economy and drive the shift to a low-carbon future".

Armitt said that the evidence sessions had got to the heart of core factors that would impact on infrastructure needs in the next 35 years. "Devolution, affordability, public acceptability, climate change, new technology, population growth – these questions and many more have to be tackled."

The evidence gathered is now being collated and analysed and academic research is also under way by the Infrastructure Transitions Research Consortium, led by the University of Oxford, and this will form part of the evidence base, along with other economic and environmental analysis.

Armitt said the evidence gathered so far showed three recurring themes. He said that first, there was a "strong sense that we need leaders who can operate on a local level but also grasp the bigger picture; our nation's strategic needs". The issue of leadership would be at the centre of the debate, Armitt claimed.

Second, he said that future technology would have a significant role to play in the way infrastructure is delivered and used. "We need to get on the front foot, providing flexible and adaptable infrastructure which can both accommodate and benefit from technology changes. The broad view is that we simply cannot afford not to."

And finally, Armitt identified the interdependent and vulnerable nature of infrastructure systems as being crucial. "The way the sectors interrelate is still largely misunderstood or unappreciated, and there are questions that keep coming up and need answering. For example, how will autonomous transport impact on the energy sector?"

See Robbie Owen, p13

BRIDGE DEATH

A construction worker has been killed on the Queensferry Crossing project, when he was hit by a moving boom in April. Another man was injured. Work has stopped for investigations. The £1.4bn bridge across the Firth of Forth is due to be completed by year-end.

NETWORK RAIL

Network Rail is to fast-track the £1bn sale of housing development land by setting up its own property company. It said the new structure would help generate £1.8bn to fund the national railway upgrade plan, increase focus on plans to deliver land for housing and generate income to reinvest into the railway. *Housing, p22*

SWEETT'S LOSS

The SFO investigation and bribery fine have cost the AIM-listed Sweett Group over £5m, it said in a trading statement. The statement said that as a result of the withdrawal from the Middle East & North Africa and the fine, audited results for the year to 31 March would include an exceptional charge of £5.1m.

HINKLEY DELAYED AGAIN

Reports indicate that the French energy company EDF will not make a decision on the Hinkley Point C nuclear project until the autumn. The £18bn plant was due to be delivering power by 2017, but it is now unlikely to be before 2026.

REGENERATION RETHINK

The way funding is made available to promote regeneration needs to change, according to a report by the Chartered Institute of Housing, Poplar HARCA and Sheffield Hallam University's CRESR, because it can more than prove its economic return. CIH believes the £140m loan fund announced by the prime minister will not be sufficient to deliver the scale of change desired.

Bridging the great divide

There's no shortage of ideas for new London river crossings – and with regeneration hopes riding high, the new mayor's on board. But will they happen? By *Jon Masters*

Connectivity between north and south of the Thames is a big, long-running issue for London, which does not have a good recent track record on building new river crossings. Among a raft of different proposals now tabled for new Thames bridges and tunnels, a couple look a little bit familiar – loosely similar to the Thames Gateway bridge that now outgoing mayor Boris Johnson cancelled in 2008.

Further east, Highways England's plans for the tunnels and connecting roads of a new Lower Thames Crossing, between Tilbury and Gravesham, are taking shape. HE has completed its public consultation and will now work towards applying for a development consent order for this "nationally significant" transport scheme.

Slew of plans for next decade

The estimated opening date for the Lower Thames tunnels is about 10 years from now, by which time Transport for London may have completed one or two bridges and tunnels of its own.

TfL's *Connecting the Capital* plan, published in December with the Mayor's Office, lists 13 different new Thames crossings.This figure however includes HE's proposal for Tilbury-Gravesham, plus the Crossrail and Crossrail 2 rail tunnels beneath the Thames – the latter won't be in use until 2033 or later.

Nonetheless, it seems bridge-building is back as a means of aiding development as well as solving problems of access and connectivity.

In addition to TfL's plans, architect Farrells has come up with its own proposals for a series of low-level bridges across the Thames in east London (see above). Farrell's plans come with the

The Farrells proposal for transforming east London: seven low-level lift bridges

Architect Farrells' proposal is for a series of six low-level lift bridges to boost regeneration in east London.Buro Happold, which has worked with Farrells on its *Bridging East London* plan, estimates that the crossings could open up land for 50,000 homes and bring economic growth to both sides of the river.

"Our proposal is not an alternative to TfL's plans," says Farrells partner Neil Bennett. "London needs a bigger network of bridges to support transport as well as local development. The ideas are not competing, but clearly London has very pressing needs for jobs and housing."

Analysis by London First has shown large areas fit for development, but all need better connectivity with central London and other employment centres, Bennett says.

"East London has turned its back on the river in the past. Our proposal is low-level bridges to allow the riverbanks to thrive, allowing east London development to face the river again."

The Port of London has voiced no objection, but the right balance must be struck between bridges' optimum height for pedestrians and cyclists, and practicality on the frequency of opening for smaller vessels using the river.

Farrells' idea has been well received in conversation with developers and local authorities, Bennett says. "There is a great deal of interest from public and private sector in capitalising on land values and there are clouds gathering to make it happen. London boroughs and the GLA are up for it. We just need to hit the sweet spot of engineering – to get bridges as low as possible."

Chances of success: ●●○○○

"The architectural side of bridge-building linked to development is re-emerging. Getting public buy-in is proving more of a challenge, partly owing to social media, and opinions are split on extravagant projects. But structures like this are a piece of engineering sculpture. They present fantastic opportunities to do something different"

Peter Curran, Ramboll

stated aim of boosting development along the river banks.

Ramboll international bridges director Peter Curran was lead designer for the Gateshead Millennium Bridge, which has helped to boost development of the Newcastle-Gateshead Quayside area. He says: "Plans in London show that the architectural side of bridge-building linked to development is re-emerging.

"Getting public buy-in is proving more of a challenge, partly owing to social media, and opinions are split on extravagant projects such as the Garden Bridge in London. But structures like this are a piece of engineering sculpture. If the money's around they present fantastic opportunities to do something different. Other schemes, like the bridge at Nine Elms, show there is still plenty of industry appetite for these prestigious projects."

Crossrail, ferries and rail bridge

Of the 13 crossings listed in the *Connecting the Capital* plan, one is an undeveloped, tentative proposal for a rail crossing to extend the London Overground line from Barking Riverside to Thamesmead – but the line must first reach Barking Riverside, for which TfL has just made a transport works order application.

Three others are the two Crossrail tunnels and Highways England's Lower Thames Crossing. A fifth is a proposed ferry service from North Greenwich to the Isle of Dogs.

Of the eight remaining, five are foot and cycle bridges. One of these, at Charlton, is "purely conceptual at this stage", TfL says, with the other four at various stages of development.

Finally, three road crossings are proposed – one tunnel and two bridges, all in east London.

Spectacular ideas for foot and cycleway crossings right across the capital

THE GARDEN BRIDGE

Arguably the highest-profile of the proposals, owing to its controversy. A pet project of outgoing mayor Boris Johnson, members of the London Assembly and others have been calling for it to be scrapped since some dubious procurement practice was revealed.

Among much protestation over how the mayor and TfL went about the design procurement, a final report by the GLA Oversight Committee says that architect Heatherwick Studio, with structural engineering by Arup, was given insight into the mayor's vision for a garden bridge, while TfL's invitation to tender specified only that it was looking for a pedestrian footbridge.

There have also been claims and counter-claims over how much of the cost will be met by the taxpayer. Promoter the Garden Bridge Trust claims to have £145m pledged towards the estimated total cost of £175m so far, including £30m each from the London Mayor and the Treasury, but the trust has said it will repay £20m of London's contribution and cover the £2m annual maintenance costs.

The scheme took a significant step in March with award of a construction contract to Bouygues and Cimolai. Construction is expected to start this summer and finish in 2018.

Chances of success: ●●●●○

ROTHERHITHE-CANARY WHARF

May take the chequered flag as the first new foot and cycleway bridge over the Thames. Consents has yet to be granted, but the plans are unlikely to meet much objection from Southwark on the south bank or Tower Hamlets – home to Canary Wharf – on the north.

The sustainable transport charity Sustrans has been promoting a crossing at Rotherhithe for a number of years and came up with a lift-bridge design, which Johnson criticised as ugly and rejected in 2008 in favour of the Emirates Air Line cable car crossing built for the London Olympics.

The latter has since been labelled a white elephant as usage has dropped, while Sustrans has produced new proposals for the Rotherhithe-Canary Wharf site, with an eye-catching twin-bascule design by architect ReForm and consulting engineer Elliott Wood.

The construction cost is estimated at £88m. Supporters include new mayor Sadiq Khan, which points to the scheme's political importance for Southwark at least. The bridge has received seed corn development funding from TfL and endorsement in the form of a mention in the 2014 *National Infrastructure Plan*.

Chances of success: ●●●○○

NINE ELMS-PIMLICO

This route is being promoted as London's first dedicated foot and cycleway crossing of the Thames. An Anglo-Danish architectural partnership of Bystrup and Robin Snell & Partners won Wandsworth council's design competition for this £40m bridge in November 2015.

Around £26m of the cost is being met by investors in the Nine Elms Vauxhall development, which is getting its own Northern Line Underground extension. Many residents of Pimlico and members of Westminster council are however opposed to the idea. Westminster is carrying out its own public inquiry.

Chances of success: ●●●○○

DIAMOND JUBILEE BRIDGE

Proposed for Battersea and designed by architect One-World Design and structural engineer Expedition Engineering, planning consent from Hammersmith & Fulham and Wandsworth councils has been in place since 2013, and from the London Mayor since January 2014.

However, full funding for the £24m bridge is still not yet committed. Part of the cost is being met by Barratt London as part of its Lombard Wharf development, but local councils and MPs are still seeking public and private-sector funds. While not as expensive as other proposals, the Diamond Jubilee Bridge lacks their heavyweight backing.

Chances of success: ●●●○○

Under and over options for drivers

SILVERTOWN TUNNELS

Three of the plans are for improving north-south road connectivity. The first, the Silvertown Tunnels project, is well progressed in planning terms. TfL is preparing to apply for a development consent order and has invited interest from design and construction consortia.

The twin-bore, dual carriageway tunnels from the North Greenwich Peninsula to Silvertown have been conceived as a means for relieving congestion through the nearby Blackwall Tunnels, with a route more appropriate for HGVs and abnormal loads. The cost is put at around £1bn. Both the Silvertown and Blackwall Tunnels will be tolled when the new route opens – possibly in 2022.

Chances of success: ●●●●○

EAST LONDON ROAD CROSSINGS

Initial consultation has now been completed for two more road crossings, at Gallions Reach (pictured) and Belvedere. Gallions Reach would connect Beckton with Thamesmead, while the second crossing would link Belvedere with Rainham.

Johnson asked TfL to investigate new road crossings in east London – there are currently no road bridges or tunnels between Greenwich and the M25 at Dartford. The resulting "East of Silvertown" project examined options for either or both crossings, as bridges or tunnels. The Gallions Reach location has the flightpath of City Airport to contend with, however, and both proposals are at points where the river widens, so large, long-span bridges would be needed.

These plans are reminiscent of the Thames Gateway bridge, in roughly the same place. This was scrapped by Johnson in 2008, owing to the £1bn costs as well as fierce local, political and environmental opposition to the expected increase in traffic, noise and air pollution. Opposition campaigns have also been launched to fight the new proposals.

TfL puts costs at between £1bn and £3bn, with benefit-cost ratios for

transport and economic regeneration from 1.9 to 7.1. The options include Docklands Light Railway lines using the crossings alongside road traffic.

The environmental aspects should not prevent either crossing being built, says Temple Group associate director Simon Perry. "TfL will clearly have to examine the usual possible impacts through an environmental impact assessment, plus changes to traffic, air quality and construction effects, but none are insurmountable," Perry says.

Chances of success: ●●○○○

Size matters

As more delays beset Hinckley C, *Paul Wilson*, head of innovation for power generation at WSP | Parsons Brinckerhoff, looks at small modular nuclear reactors

The UK is en route to becoming a global leader in small modular reactors, after chancellor George Osborne announced support for the technology through a £250m research and development programme. A competition has since been launched by the Department for Energy & Climate Change to identify the best-value small modular reactor design for the UK.

This scale of spending clearly demonstrates the government's commitment to the British nuclear industry and will help secure the UK's low-carbon energy supply.

Small modular reactors (SMRs) can be scaled-down versions of conventional nuclear plants or completely new designs, with a generation capacity of under 300MW. They are modular, since larger capacity can be delivered by deploying many identical units, and also as prefabrication of major components into modules minimises costly work on site.

The business case for SMRs is strong: they offer greater simplicity of design, economy through mass production and shorter construction programmes, leading to lower overall costs and risks. WSP | Parsons Brinckerhoff supported

DECC in preparing its evaluation of SMRs and has been involved in a number of related techno-economic and planning studies, which have contributed to this next exciting step.

Small enough for mass production

Large nuclear power plants have proven to be slow and costly to deliver, challenging the ability of even governments to finance. By contrast SMRs are estimated to have a unit capital cost below £1bn, well within reach of commercial funding.

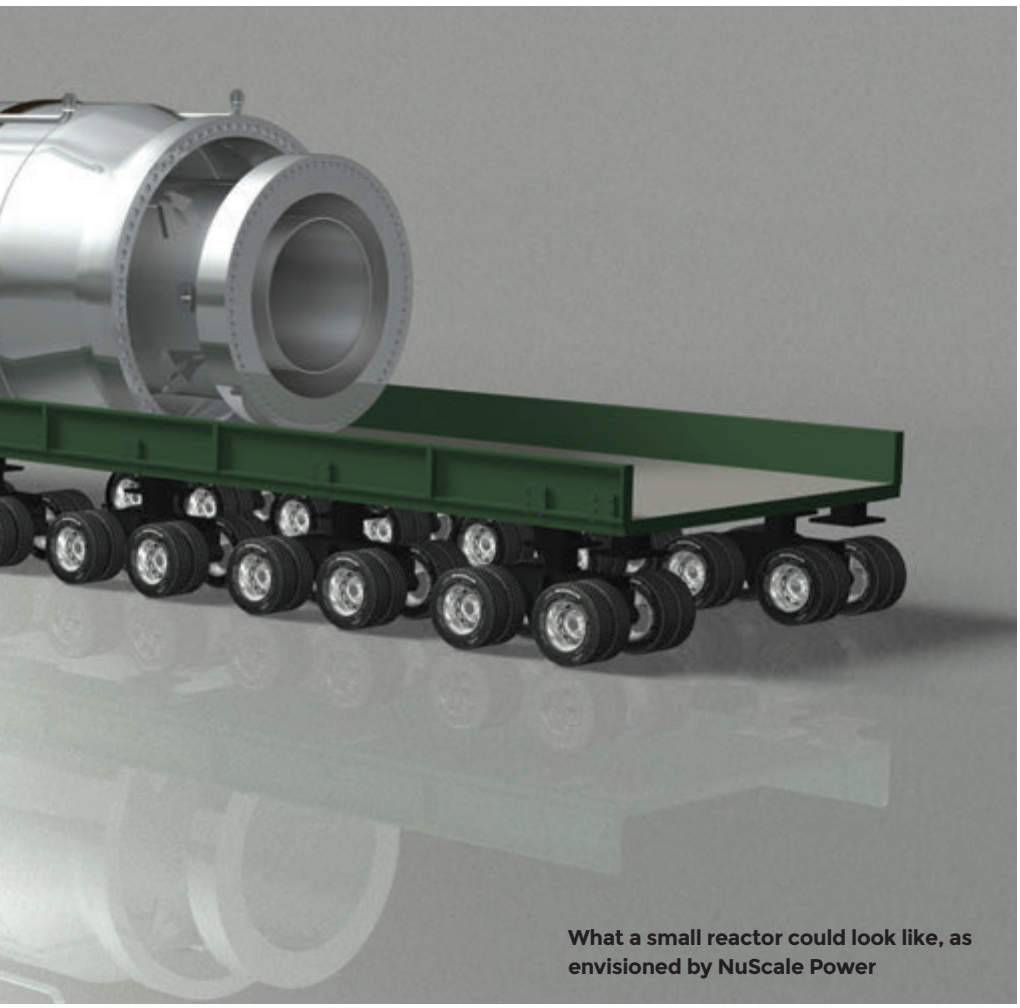
The vision is for small modular reactors to be produced in the UK in plants similar to aircraft or aero-engine factories, maintaining high quality standards and driving down production costs. We could even imagine an automated mass production line, with reactors being shipped out every week, to the UK and international customers. Series production offers major opportunities for design improvements and better methods of manufacture to be identified and incorporated, progressively reducing costs and risks.

Safety comes first

One of the key advantages of the smaller reactor is that the safety systems needed to cool it down after shutdown are much smaller and simpler than those needed for a large reactor. A key hazard for a nuclear reactor is loss of cooling, damaging core temperatures. SMRs are small enough to be cooled by natural air or water circulation, avoiding the need for power pumps or human intervention and minimising the risk of dangerous failures.

Anytime and anywhere

Their small capacity makes SMRs a good option for remote off-grid locations. At WSP | Parsons Brinckerhoff, we studied the potential of very small reactors, with capacities below 30MW. The great opportunities for cost reduction through mass production of such units could



What a small reactor could look like, as envisioned by NuScale Power

open up different applications and markets. At the smallest scale, different issues of siting and security become important as sites could become widely distributed and minimally manned.

Low-carbon energy

Large-scale production of SMRs offers the potential to undercut the cost of power from large reactors. Alternative low-carbon resources, such as solar PV or offshore wind, could deliver all the energy we need, but not necessarily when we need it. Storage capacity to bridge this gap is far beyond our current capability. SMRs offer more nimble power production, enabling them to complement intermittent power from renewables.

SMR technology also offers a potential source of heat for district heating networks or for industrial processes, although this is challenging, given current rules on siting nuclear power stations. The cost of heat would be likely to be competitive with current gas tariffs at the point of production, and siting potentially closer to consumers would minimise the additional heat network costs.

Large nuclear plants have proven to be slow and costly to deliver. SMRs are well within reach of commercial funding

Challenges and opportunities

The ambition is to re-establish the UK as an international centre of excellence for nuclear power. SMRs will be made in Britain, perhaps with a partner, but offering the prospect of UK design ownership and economic opportunities.

The competition for the best-value SMR design is expected to attract companies from China, South Korea, the USA, the UK and beyond. While their designs generally use similar technology, they are at very different stages of readiness. They diverge in other ways too; capacities range from below 10MW to over 200MW, and while some use conventional above-ground arrangements, others locate the reactor in protective underground silos.

Making the winning design a reality will not be straightforward. A prototype design will need to be approved by the Office of Nuclear Regulation. Safety is a key condition. One of the significant benefits of SMRs is that a full-scale prototype reactor, with electrical heating elements instead of nuclear fuel, can be used to test behaviour directly under extreme conditions, rather than depending on computer tests.

Once the design has been accepted by the ONR, a suitable site for the prototype must be approved. The subsequent steps of contracting for construction, funding, manufacture, installation and commissioning will test all the preparatory work.

Vital business step

Turning a prototype reactor into a viable business has often eluded reactor vendors. Success hinges on developing the reactor factory to drive costs down.

Initially, this factory would resemble a final assembly shop. However, as production gears up it could be expected to become more like an aircraft production line, with areas of intensive automation and quality control. The facilities would also need to produce large prefabricated sections of civil works to reduce construction costs. The key challenge will be building the confidence that the scale of sales will justify the large upfront investment.

It is essential to get public support for SMRs if they are to be viable and widespread. SMRs offer greater safety and smaller construction footprints, opening the prospect of location on a much wider range of sites. Policy needs to be developed further on this point, as the previous strategic siting assessment only considered siting for reactors of 50MW or more, and one of the conditions was the ability of sites to support generation by 2025.

Alongside the challenges there is an undoubted reward: the opportunity for the UK to re-establish itself in the nuclear sector globally. Such a position at the forefront of innovation would offer considerable potential for the development of skills and employment.

There is a need for over 10GW of nuclear capacity in the UK. Even if half of this were supplied by large reactors, potential remains for a fleet of 25-200 SMR units. And with the right export partners a UK vendor could participate in producing hundreds more units.

Despite the very real challenges and difficulties, the economic justification for the SMR competition seems persuasive. The key is to ensure that all participants seize this opportunity.

John Hicks,
Director and head of government & public, AECOM

New mayor must show bold vision for homes and transport to keep London on top

After a hard-fought campaign, London has a new leader. The ink has barely dried on the ballot papers, but the new mayor must swiftly focus on delivery if London is to retain its position as a global leader. The city's long-term future depends on the mayor's ability to develop the right conditions for success.

Housing has been at the heart of the mayoral campaigns. London's housing crisis is rapidly becoming a very real threat to the capital's competitiveness. Indeed the business-led Fifty Thousand Homes campaign, of which AECOM is a supporter, is calling for the creation of at least 50,000 new homes a year in London by the end of this mayoral term. A focus on housebuilding to stimulate growth, increase capacity and offer a wider choice of dwelling types and tenures is key.

The housing shortage must be discussed as part of a joined-up conversation alongside infrastructure and employment, as house prices push people outside London's traditional boundaries. Much of London's growth will be determined by connectivity, ensuring it is affordable and accessible for people to commute in and out of the city. Making it easier for people to live close to employment opportunities is a clear advantage of improved connectivity across the South East and will enable London to draw on the strengths of a wider regional economy.

Improving the capital's transport was another focus of the election campaigns. While Crossrail 2 was supported by the main candidates, a range of other projects were mooted. From Bakerloo Line and London Overground extensions to new river crossings, Crossrail 3 and increasing capacity on the District, Circle, Metropolitan and Hammersmith & City Lines, ambitious promises have been made.

Covering the cost of such schemes will likely require different ways of funding. The public purse and conventional infrastructure levies cannot fund such transformational change. But investors don't back cities, they back their best bet of getting a return. The challenge is for the new mayor to create the right conditions to attract this investment. This is no mean feat, given that indecision over aviation capacity in the region is threatening the capital's attractiveness to investors.

The incoming mayor is facing a number of tough challenges around housing, employment opportunities and the delivery of transport. Bold, strong leadership is required. London needs an ambitious, long-term vision if it is to continue to rank among the world's most successful cities.

Professor Tom O'Rourke,
Cornell University

Protect our buried treasure with hazard-resilient pipelines

Pipelines are a ubiquitous and crucial part of our gas and liquid fuel, electric power, telecommunications, and water and wastewater infrastructure. This infrastructure is a national treasure and, like much treasure, we bury it. But that presents challenges – we don't see this complex mass of underground pipelines, often have incomplete maps and can't monitor their performance. Factor in uncertainty in the shape of extreme events – storms and floods, subsidence, earthquakes and terrorism – and the vulnerability becomes evident. There is a pressing need for government and industry to identify, monitor and future-proof these assets to enable more resilient communities.

Market competition can stimulate good practice. When the Los Angeles Department of Water & Power implemented a seismic resilience programme, they imported hazard-resistant pipes from Japanese firm Kubota. Soon other water agencies in San Francisco, Portland and Seattle registered interest, and demand stimulated innovation; US, Canadian, and other Japanese companies began to develop hazard-resilient pipelines.

The benefit of new-generation pipelines was evident in New Zealand after the 2010-2011 Christchurch earthquakes. Damage to he city's water pipelines, made mostly from cast iron, asbestos cement, and polyvinyl chloride, left most of the city without water. In contrast, the city's gas distribution pipes, made of thermally fused polyethylene, sustained virtually no damage.

At Cornell University, we work with industry to test pipelines under soil deformation that replicates earthquake-induced movements. We collaborate with researchers at the University of Cambridge's Centre for Smart Infrastructure & Construction to develop 2D and 3D modelling for a better understanding of how various materials and structures behave under extreme conditions.

Resilient underground infrastructure reduces the economic downturn after a major event, reduces disruption from repairs and provides communities with the resources they need to combat secondary effects of hazards, eg fighting fires after earthquakes. The beneficiaries, owners and managers of these assets must all plan for the future.

Professor O'Rourke is Chair of the CSIC's International Advisory Group and Thomas R Briggs Professor of Engineering in the School of Civil & Environmental Engineering at Cornell University. He is key speaker at the International Conference on Smart Infrastructure and Construction, from 27 to 29 June 2016, at the University of Cambridge. See ***www-icsic.eng.cam.ac.uk/***

Robbie Owen,
Head of UK Infrastructure planning & government affairs, Pinsent Masons

Genuine public engagement will drive success

Effective public engagement has long been a major sticking point for UK infrastructure projects. Promoting healthy, grassroots debate in which the voices of local communities are heard, while not stifling progress with lengthy delays to essential projects, is challenging to say the least.

Progress has been made. When it comes to the planning consent stage, project promoters now realise that effective engagement can really improve projects. But the focus is now on how to improve engagement at the earlier, long-term policy making stage. A delicate balance must be struck between genuine engagement and decisive planning which will truly transform the UK's ageing infrastructure.

As the National Infrastructure Commission looks towards its National Infrastructure Assessment, the question is: how do we achieve this equilibrium? The issue was hotly debated by infrastructure industry heavyweights, including the president of the Institution of Civil Engineers, Sir John Armitt, at Pinsent Masons' London office last month as part of the ongoing National Needs Assessment.

Gathering evidence from across the industry, the NNA seeks to inform the NIC's own needs assessment by providing an independent perspective on the UK's long-term priorities.

At the session, there was clear consensus that rather than shy away from the debate, those advocating projects before their inception should value alternative views and recognise the contribution they can make to shaping the future of infrastructure.

In France, transparent debate on infrastructure, driven by the Commission Nationale du Débat Public, has successfully promoted genuine discussion at the earliest possible stage on how the country's needs should be addressed by individual projects.

Taking engagement to its most extreme, the Swiss government gives the electorate the final decision on some infrastructure projects, with mini-referenda used to decide their fate. We may baulk at such a suggestion, but the Swiss experience is largely positive.

These models would not work in their exact form in a UK context. But we need to find a better way to involve the public on such projects. Promoting education and engagement can lead to widespread public support.

It will take some time to foster significant progress and for public opinion to genuinely influence infrastructure policy making. Only then will we see a shift in public attitudes towards the more controversial projects.

Robbie Owen is also a member of the National Needs Assessment Executive Group.

Chris Cheetham,
director of Cheetham Hall

Grey hairs can fill the skills gap

In the mid-1990s I frequently travelled to south-east Asia to meet customers. On one trip in Thailand, I clearly recall a conversation with our customer, who had just attended a 70th birthday party for one of the US nationals on the team. Apparently he was not the first to reach 70 whilst working on the project. At the time we found this very unusual, as the Brits and Australians were generally in their 30s, 40s and 50s.

Twenty years later, this situation is far more common in the UK. Whilst the reasons for working longer may vary, this trend is likely to continue.

Many excellent recent articles on the skills shortage in the consulting engineering sector have focused on the importance of attracting more apprentices and graduates. In addition, though, we should not lose sight of the huge contribution that the more mature sector of the workforce can provide. These employees form a long-term asset, helping in:

- transferring knowledge to the next generation;
- accelerating the learning process for younger engineers;
- providing confidence to clients;
- utilising the wide range of contacts developed throughout their careers; and
- providing stability in often fast-changing corporate environments.

My observations from interviewing many people at this stage of their career are that very few organisations consciously plan how to maximise the contribution of these individuals, for their benefit as well as the company's. Often factors such as constantly working away from home; difficult commutes or travel requirements that push individuals towards retirement. In many cases, with some thought, their services and knowledge could be retained. Part-time is better than no time when skills are in short supply, yet this is an option which is rarely offered.

Smart organisations will work hard to retain the knowledge and experience that the "grey hairs" possess. They will introduce flexible work programmes and use these staffers as key mentors for the new generation. With today's healthcare and IT literacy, 65 is no longer old. For the CEOs reading this, when did you last do a skills audit?

Power shifts

– the what, where and why of devolution

With its emphasis on driving economic growth, the trend to transfer powers to local government has great potential for infrastructure. But there is still a lot of confusion and uncertainty surrounding the process. *Jon Masters* explains

A change in regional and local governance is happening all over England. Ever since the September 2014 Scotland referendum went to the No camp, local authorities in England have been queuing up to take advantage of a newly emerging political landscape.

Scotland has been granted more powers of control over how it spends funds granted from Whitehall, and the English regions want the same. "We have heard the voice of Scotland. Now the voices of England must be heard," prime minister David Cameron said, announcing the referendum result.

Decentralisation policy has developed over the past two years, following on from Michael Heseltine's report *No Stone Unturned in Pursuit of Growth*. This called for funding streams to be simplified and amalgamated, and for more responsibility to be given over to local areas. Further reports followed, setting proposals for transferring powers in transport, health and welfare, plus allowance for local control over business rates and the setting up of combined authorities and elected city mayors.

Heseltine's report was predicated on the need for economic growth in cities outside London, particularly the North, and initially this is how devolution progressed – along city lines. Greater Manchester, already a combined authority, was ahead of the rest, signing the first deal in November 2014.

Where is it happening?

Next in line were Sheffield City Region and the West Yorkshire Combined Authority, based around Leeds. Both received devolution deals ahead of the May 2015 election, as did Cornwall – at that time the only rural region to push for greater autonomy.

Just about every area of England is now touched by the devolution process. After the 2015 election, chancellor George Osborne announced a Cities & Devolution Bill. Government invited proposals from local areas interested in taking advantage of what was on offer, with 38 different bodies responding.

So far 11 devolution deals have been announced. The latest three, announced in the March Budget, are with the West of England, Greater Lincolnshire and the East of England. These add to Greater Manchester, Sheffield, West Yorkshire, the North East, Cornwall, Tees Valley, the West Midlands and Liverpool. London too has secured further devolution of powers over health, skills and transport.

The Devolution Bill has since resulted in the Cities & Local Government Devolution Act (2016), which also allows for the setting up of statutory regional transport bodies. This legislates for the planning powers given to Transport for the North and the Midlands Connect partnership, and has also been pursued by the England's Economic Heartland Alliance, which was set up by Northamptonshire, Oxfordshire and Buckinghamshire and now includes Cambridgeshire as well as seven other bodies.

Cambridgeshire is also one of 22 councils involved in the East of England devolution deal, indicating that

statutory transport body status does not necessarily preclude getting devolved powers as part of a combined authority.

What are they getting?

While the new deals vary in detail, there are some common transfers of powers, such as responsibility for a consolidated transport budget and devolution of business support services. The new combined authorities will retain growth in revenue from business rates. The Greater Manchester Combined Authority calls this arrangement its "earn-back" deal, which it claims is worth up to £30m a year for 30 years and will be entirely reinvested in infrastructure. In return, the GMCA has agreed to hold a mayoral election in May 2017.

The actual transfer of powers is being done gradually through negotiations between local authorities, the Treasury, and government's Cities & Local Growth Unit (a joint group from the departments for Communities & Local Government and Business, Innovation & Skills).

The latest addition to Manchester's deal, announced in the March Budget, gives the city-region new powers over social support funding, criminal justice and building of social housing. Plus, it will be able to create a single economic investment fund by pooling transport and local growth funding with the £30m earn-back money.

Other combined authorities are further back in the process. Cornwall's deal is unusual, as the only devolution agreement signed by a single unitary authority. Cornwall has not been asked to introduce an elected mayor, and will not receive such a breadth of new powers as the combined authorities. It will get:

- devolution of local transport funding and power to franchise bus services;
- reshaping of further education;
- intermediate body status for EU structural funds, giving it the power to select projects for funding;
- a devolved approach to business support services;
- proposals for a low-carbon enterprise zone, plus joint work with government on energy efficiency;
- integration of health and social care;
- enhanced joint working regarding public-sector land and buildings; and
- establishment of a Cornish Heritage Environment Forum.

The three most recently announced deals – for West of England, Greater Lincolnshire and East of England – are

notable for their similarity. Government has issued virtually the same statement of agreed transfer of powers. Effectively, what these deals seem to say is: yes, you can have these powers, but first you have to form a combined authority, agree to an elected Mayor (which the East of England has not yet done) and join the queue.

Why do they want it?

Authorities' official motivation for seeking devolved powers is to drive economic growth, have certainty over spending and attract private investment. But, to some, it all boils down to the fact that local authorities are very hard-up – "anything that promises a bigger budget and pooling of resources is welcomed", says one commentator – and now that so many authorities have joined in, no one wants to get left behind.

Aecom director and head of government & public sector, John Hicks, says the reasoning is more subtle. "It all started with a drive to rebalance the economy between North and South. Yes, the squeeze on local authorities' resource spending is getting worse, and combining areas allows better use of existing funds, but there's also ideological thinking behind all this.

"For example, solving issues of health and social care nationally is proving politically unworkable. Discussions are changing mindsets from 'save our hospital' to 'better healthcare', from central diktat to local control. And it's the same with roads and transport."

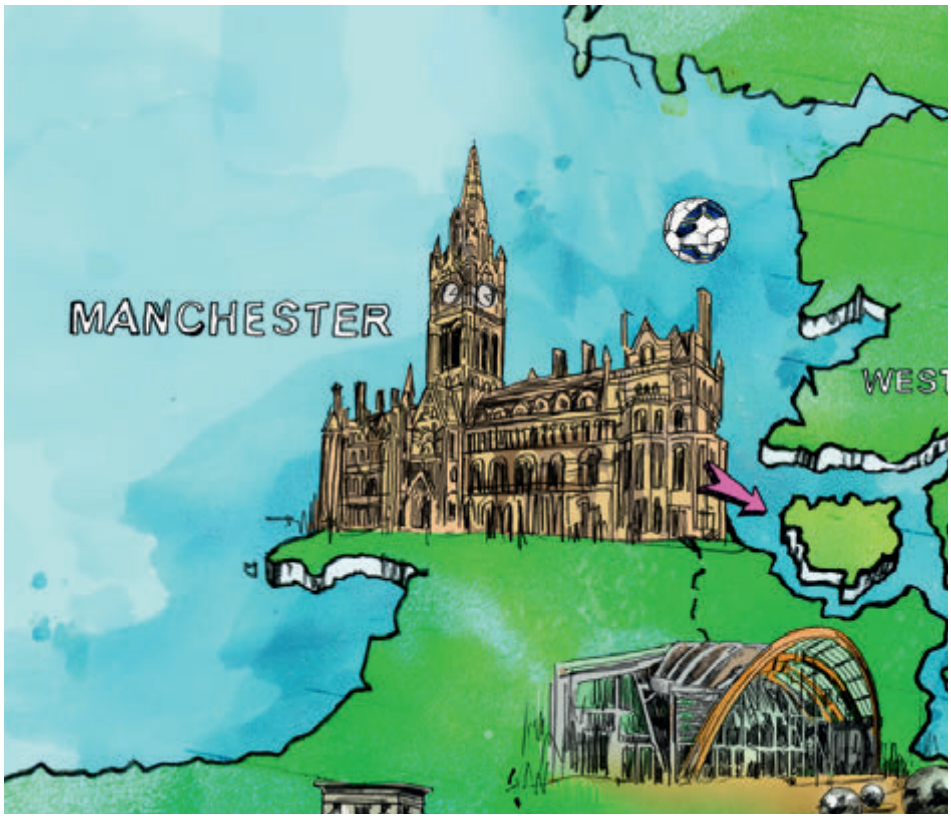
Further, he argues: "All big spending plans are predicated on private finance, and regions are competing with other parts of the world, so they have to make investment attractive. Authorities have to be financially freestanding and they have to think creatively to reduce their cost base. Those that don't get the timing right may be left behind."

What's in it for the supply chain?

With transport infrastructure highlighted as key to economic development, devolution deals would appear to promise a lot for industry. The question remains, however, of whether they will make a difference to local growth.

The local government services director for WSP Parsons Brinckerhoff is Mike Batheram. He says differences are already being seen across the company's regional client base. "Significant additional capital capital funding is coming through. We're supporting further extensions of Greater Manchester's Metrolink, and it's a similar story in other areas."

But there is no clear evidence that the recent increase in transport spending



has come as a direct result of devolution. "It's too early to notice more spades in the ground, but we're seeing an increase in strategic planning, such as the Birmingham Connected City transport strategy. Authorities and regions need strong plans in place. The scale and ambition of their plans has increased."

Aecom's Hicks says consultants may have to invest to help local government with change programmes as they reconfigure services. "Health stakeholders in Manchester are likely to change the way they provide care, but we may not see any bricks being laid for another five to six years. Meanwhile, some consultants may need to rethink their business model away from building assets and towards supporting organisational change," he says.

"As another example, HMRC is slimming down owing to the uptake of online tax returns, which demand computer servers and support centres and building refurbishment projects to reflect a different business model. Opportunity is coming even against the background of spending cuts."

What could go wrong?

The devolution agenda is already showing signs of unravelling in some areas. Once signed between government and local council leaders, agreements still have to be approved by each constituent council. And in March, Gateshead voted to reject the North East deal, because, said council leader Mick Henry: "We signed up to the proposed agreement with conditions, and we do not believe those conditions have been satisfied."

Likewise, both Cambridge City and Cambridgeshire County Council – key constituents of a proposed East of England authority – have rejected their proposed devolution deal. The sticking point is the elected mayor. This was initially the stumbling block for West Yorkshire, and it's proving a problem for others who do not welcome an extra layer of administration.

A National Audit Office report, published last month, warns of uncertainty over untested governance structures and a lack of clarity on boundaries. The first devolution deals were signed with cities and regions coterminous with local enterprise partnerships. More recently formed authority partnerships have overlapping LEPs.

Geoff French is chair of the Enterprise M3 LEP, which covers parts of Hampshire and Surrey. "It's proving a challenge to get a bid together that works," he says. "Surrey and Hampshire do not have one big city to centre a proposal on. And while there was hope for a combined Hampshire-Solent deal, Solent has backed off and put its own plan together.

"There is a lot of uncertainty in the process at present. Meanwhile, pursuit of devolution is threatening to sidetrack the more established LEP agenda, diverting attention and resources."

What the North needs if it is to power ahead

The government's plans for the region are a good start, but there is much more to do, writes WYG director and chair of ACE's Northern Region, *Marc Davies*

The concept of the Northern Powerhouse was introduced by chancellor George Osborne in June 2014 as a vision to reduce economic disparities between the North and South, benefiting the country as a whole.

The significant economic performance gap was highlighted most recently in the *Transport for the North Spring 2016* report. This gap is estimated at a £4,800 per person difference in income between the North and the UK average, and a £22,500 per person difference between the North and London in 2014.

In *Rhetoric to Reality*, the IPPR North report produced in partnership with KPMG, a staggering statistic supports the Northern Powerhouse agenda: "If the North were able to halve the gap between its economic output per head and the national level then its economy would be £34bn (11.9%) bigger."

In *State of the North*, an October 2015 IPPR North report, some key differentials are observed. In education, for instance, the North has a lower attainment level for the 4-9 age group.

The report highlights other priorities: boosting economic growth, involving people in the way the North is run, and investing in the necessary future-proof infrastructure. The need for better transport connections is also clear. It takes longer to get from Liverpool to Hull by train than it takes to travel twice the distance from London to Paris.

In an effort to put the Northern Powerhouse on a level playing field with Greater London, it is sometimes pictured as an area confined to the M62 corridor linking Liverpool to Hull. But superimposing the Greater London urban model fails to account for the lower density of the Northern population and its geographical diversity. The Pennines and the Peak District certainly give the North a quality of life advantage, but also present challenges when it comes to transport infrastructure.

The Rhine-Ruhr region in western Germany offers a much better comparison. This polycentric region, capable of attracting international investors and accounting for 15% of the national economy, has been cited as a credible model for the Northern Powerhouse. The Randstad in the Netherlands serves as another example

of an economically powerful region revolving around multiple cities. These European power hubs demonstrate how the North of England could become stronger if its cities were better integrated, operating in synergy rather than independently and competitively.

A powerful, unified vision of the North needs to extend further than this east-west axis, to include Sheffield in the south, Newcastle in the north-east, and Cumbria. With £25bn of private investment being pumped into Cumbria over the next 10-15 years and a national lead in the energy sector established over several decades, Cumbria has the potential to become an engine room of the Northern Powerhouse.

Solid plans for transport investment

The Budget, announced on 16 March, backed up the recommendations made by the National Infrastructure Commission's *High-Speed North* report, which called for immediate and sustained investment in transport links in the North. Since then, Transport for the North has published its *Northern Transport Strategy Spring 2016* update.

Among £300m of further investment for transport: £60m for HS3, between Leeds and Manchester, and other major city rail links; £161m to accelerate the M62 upgrade; and £75m to fast-track the development of major new road schemes, including on the M60, A66, and A69, and the feasibility study for a trans-Pennine road tunnel.

The NIC has quite rightly identified that the answer is not a single rail line but a high-capacity regional network, and that proposal should align with currently planned investments.

The transport commitments are a step in the right direction, but much greater commitment is required if we are to move from modest incremental improvement to transformational impact, and redress the current heavy bias of infrastructure investment toward the South East.

The £150m investment in flood defence schemes in Leeds, Cumbria, Calder Valley and York – as well as the additional £130m to repair roads and bridges in Cumbria, West Yorkshire, Northumberland, Greater Manchester, Durham and North Yorkshire – are a much-needed addition to the road upgrades and will go some way to alleviate the criticism of the government for neglecting the North's flood defences.

Measures to streamline the planning process are more immediately capable of bringing tangible results, and they will contribute to bringing forward significant regeneration sooner.

Regional rail networks including Merseyrail must be upgraded, and integrated with the planned high-speed rail links, if the region is to achieve its economic potential

> The Budget's transport commitments are a step in the right direction, but much more is required if we are to move from modest improvement to transformational impact, and to redress the bias toward the South East
>
> **ACE Northern chairman Marc Davies**

The challenge will be for government and local authorities to engage with developers and landowners to ensure that planning applications are approved in good time to be delivered alongside the Northern Powerhouse infrastructure schemes. These can include housing, commercial development around stations, freight development and improved transportation links. Without this significant peripheral growth, in 20 years, the Powerhouse could be just better infrastructure.

A great example of transport investment acting as a catalyst for development is the South Bank in Leeds city centre, one of the biggest development areas in Europe. A key element of the masterplan is the planned HS2 station, and the already opened southern entrance to Leeds station. Once completed, over 1,700 new homes and 13,000-20,000 jobs will be created, according to HS2's February report *Changing Britain*. Investment is already taking place, with Burberry investing £50m in a manufacturing facility.

Engage with business for success

As those who will actually generate the economic outputs, businesses need to be part of the conversation. Business North was launched in February to create a unified voice for the region's business community to ensure that business plays a new civic leadership role.

As a founding member, WYG supports the aim of significantly growing the region's economy and ensuring it is an internationally competitive place to do business. Integrated thinking needs to go far beyond transport. We need to develop a plan that aligns skills, transport, energy, and other economic drivers. Future government decisions would do well to adopt a holistic approach to the Northern Powerhouse.

Midlands must learn from the North's teamwork if it too is to become a Powerhouse

The proposed devolution of political power to the regions undoubtedly offers great potential; for more effective decision making, for better targeted investment, and for much-needed improvements in efficiency of municipal administration and provision of services. Unfortunately, the political obstacles are proving great.

As chairman of ACE's Midlands region, I am increasingly frustrated that little of substance is happening in this strategically important region; a region that also forms the central piece of the political jigsaw. The sound ideals that underpin the case for major overhaul of local government are in real danger of becoming discredited and seen as just yet more empty political rhetoric.

There's no doubt that the region first out of the blocks and gaining most media attention is the Northern Powerhouse. In contrast, the so-called Midlands Engine has yet to fire up, let alone start running smoothly!

ACE Midlands chairman Steve Wooler and managing director of BWB calls for more unity in the region

There is growing support for the devolution agenda, feeding the momentum of the Northern Powerhouse. Its profile is growing and the concept appears to be catching the imagination of both business and political leaders. I recently attended a major Northern Powerhouse conference in Manchester and the quality of the debate and presentations was good, building on a lot of groundwork put in over the past year or so. Even more impressive was the apparent political consensus that has been achieved based on recognition that "together we are stronger".

The impetus is clearly coming from Manchester, which has capitalised on its strategic location at the heart of the North West, but even the cities east of the Pennines seem to see the benefit.

I only wish the same could be said of the Midlands, which remains totally divided along its east-west historic legacy. The West Midlands engine is somewhat belatedly beginning to turn, but it does have significant political, economic and geographical agglomeration advantages that simply don't exist in the East Midlands.

The eastern half of the Midlands has historically lacked regional identity and critical urban mass. Consequently it suffers from lack of cohesion, and remains plagued by parochialism. Whilst Nottingham and Derby show a willingness to work together, Leicester is refusing to join the party. If the political prize of greater regional self-governance is to be claimed, all stakeholders – businesses and politicians – must show long-term vision.

Slater's message is clear; engagement with the political process, and a clear appreciation of infrastructure's value, is critical to success

If you're not at the table, then sometimes you're on the menu

As a former US secretary of state for transport, Rodney Slater – now at the transportation division of law firm Squire Patton Boggs – knows a thing or two about infrastructure's place in the political process. By *Andy Walker*

The first thing you notice about Rodney Slater is his presence. Whether that's because this is a man who has worked closely with former US president Bill Clinton, or because he possesses an air of calm assurance, is hard to determine. The bottom line is that he knows his stuff, and his views on how the infrastructure sector should be looking to influence the political process are worth listening to.

Given its place near the top of the political agenda, with government and opposition now seeing UK infrastructure as critical to the nation's economic prospects, lobbying has clearly improved. More infrastructure spending is planned or happening than has been seen in our lifetimes, so the industry is doing something right.

But spending on local infrastructure is being cut, a great deal of projects rely on private funding which is not forthcoming, and the jury is still out on whether there is substance behind grand ideas such as the Northern Powerhouse (*pp17-19*). So no one can afford to take their foot off the pedal.

Construction professionals have long lamented that national decision makers are not listening to them on key issues. Slater believes they simply need to get more active in the political arena.

"I listen to Transport for the North chair John Cridland talking about transport," said Slater. "He takes transportation out of the context of being just asphalt and steel and connects it to the economy and to one's quality of life.

"What I find interesting is that he's a historian, not an engineer. I think it takes that kind of broader understanding of the implications of infrastructure investment – what happens when it's not supported over time and we get a degradation of quality of life. It's important also to highlight the need to make decisions that are based on the needs of people, more than the interests of the policy makers."

Need to engage

Slater is big on engagement. As US secretary of state for transport, his bipartisan approach to issues earned him wide respect on both sides of the political divide, enabling him to have one of the best relationships with the White House, Congress, and business, labour and political leaders worldwide in the history of the department. Under his leadership, the federal transportation budget doubled, and he is widely credited with altering the appreciation of transportation.

In the UK, historically, engineers and construction professionals have played the hand that politicians have dealt them. It's not necessarily the approach across the pond. "Not at all, and it shouldn't be," Slater says. "We have people in the transportation arena who have an idea about what is needed, and they need to proactively engage the political process and make their case."

But how do you do that when you are not used to it and you've spent a career doing what the politicians want?

"The best way is to find individuals who are seeking to become political office holders," says Slater. "Clearly, you have to talk to the politicians in place if you can, but a lot of times they come with their own agendas. If you identify someone early on – it could be a backbencher, or just someone making himself or herself known at a local level – you can start to educate them about the importance of transportation and infrastructure.

"You need to get in early with politicians. They are then likely to go to parliament with a much better idea of how to make the case for their local area. They need the support of experts. Engagement with politicians is much more important than simply telling them what to do."

Slater says that, as a global law firm that has an appreciation for local contacts but international influence, there is much that his organisation can bring to the table. "We have a unique perspective of serving at the intersection of business, government, law and policy, so we can help those who play the various individual roles understand what the collective role is all about. We've got lawyers who have been in government, lawyers who have served in the private sector, lawyers who have seen that interconnection between law and policy, and so by bringing those collective strengths to bear we can help navigate often uncertain terrain," said Slater.

Rodney Slater's rise to the top

Born on 23 February 1955, Rodney Earl Slater rose from poverty to become an Arkansas assistant attorney general, serving in several positions under Arkansas governor (and later US president) Bill Clinton.

In 1993 he became the first African-American Director of the Federal Highway Administration and from 1997-2001, he was secretary of transportation under president Bill Clinton.

He is a partner in the law firm Patton Boggs LLP, where he heads the transportation and infrastructure practice group. He is also a partner in James Lee Witt Associates, a risk management firm, and serves on the board of directors of Africare, a non-profit providing development aid to countries in Africa. In 2011, he was appointed to join the board of WS Atkins as a non-executive director.

> "Being isolated, even when you have real power, limits your power. You want to use it"

Many professionals, especially engineers, are still hesitant about getting involved politically. What advice does Slater have for them? "The reality is that if you are not at the table, you're sometimes on the menu," says Slater. "People are discussing your interests anyway, so it is appropriate for you to be there and discuss them as well. It's also very important that the industry is respected as a part of the process. Being isolated, even when you have real power, limits your power. You want to have the ability to take that power to the table of power and use it for collective benefit."

He cites the Northern Powerhouse (see p17) as an example. "Investment in the North strengthens the North to play a larger, more significant role in what makes the UK important. If the North does not fulfil its potential, it leaves London and the UK weakened. There was a time when the North was the motor force for the entire UK. In this age of globalisation, the UK needs all its regions at the table and offering their best, so that the collective can be as strong as it can be," Slater says.

Slater with former president Bill Clinton

Confidence is key to success

Of course, the US experience isn't about hiding your light under a bushel. Don't US professionals have a different experience to that of those in the UK? Slater says it's about confidence, giving the example of Bill Clinton.

"In certain parts of the US, there were those who didn't believe that if you were from a small state like Arkansas, you could compete with, say, people from New York state," Slater says. "But he became president. Early on, he had his detractors. 'Where is Arkansas exactly? Is it some place near Oklahoma?' And then there were questions over whether you could apply the policies and the energy that Clinton had shown to move forward a state of 2.5m people to running a country of more than 250m.

"There was also this belief that coming from the South you couldn't shoulder the responsibility of a great nation. Every day, Clinton had to demonstrate that he could. In the case of the North there will be those who claim that it can't be done, but we are here to not wither in the face of the challenge, but to stand firm."

The UK industry can draw inspiration from this, says Slater, to punch well above its weight on the political stage. "Infrastructure professionals have vast knowledge and experience. They need to use their power to speak to power. That's how you get things done."

Stations can provide a platform for growth – if plans are realistic

Are station development zones the answer to regeneration? *Keith Mitchell* examines the promise and challenges of the rail-led approach

Leeds station is one of many sites pinpointed for intensive housing development.

We have read much about rail-led development recently. First came the Outer London Commission report, *Accommodating London's Growth*, which identified development around public transport corridors and hubs as a major opportunity to intensify land use.

Next came the Starter Homes Land Fund prospectus, launched by government at the time of the Budget, which identified stations as a key opportunity for regeneration – and last week saw the announcement of a deal between the Housing & Communities Agency and Network Rail, designed to encourage development around stations.

While public transport-oriented development is hardly a new concept, it does seem that more policy and funding support is being targeted in this direction. As someone who has been working in support of this agenda since before the publication of PPG13 in 1994, I welcome this. But why now?

Much is to do with the pressure on government to deliver against its own, very challenging, housing targets. It may also have to do with the need to provide better justification of its commitment to transport by taking account of wider regeneration benefits. However, not all the reasons are political. There are good societal and demographic reasons too.

> Sites often require remediation, are physically constrained, and highway access issues must be dealt with. These are not trivial issues

For example, research by the Independent Transport Commission shows decreasing dependence on cars by young men, and decreasing use of cars for business travel, probably driven by cost and changes in tax regimes. The National Travel Survey confirms that rail travel has doubled over the past 20 years, and as the highway network reaches saturation during peak hours.

Car use beats car ownership

Looking forward, with major population increases forecast, it would seem logical to assume these trends will continue. The ITC's 2015 research into attitudes to travel reinforces this point, suggesting that the use of urban transit systems is seen by the younger generation as an important part of a more mobile and connected lifestyle, in which access to a car is perceived as being more important than ownership.

Perhaps these trends are creating more optimism about the attractiveness of development around rail hubs. We are moving in the right direction towards a more sustainable pattern of development. However, a rail-based growth strategy is not without its challenges. Development around rail hubs can present exceptional cost, viability and deliverability issues.

For example, rail-led development will lead (we hope!) to increasing use of the already creaking rail network. Sites often require remediation, are physically constrained with railway interfaces that need careful management; and highway access issues still need to be dealt with.

These are not trivial issues. We need complete realism about the costs and risks of development around stations. This needs to be considered early, so that the impact on achievable land value is understood at the outset.

Successes are needed

There are enough examples of rail investment or proximity failing to result in viable outcomes to make developers and investors nervous of the rail-led approach – particularly outside London.

Despite this, there are welcome moves towards the use of wider regeneration benefits in appraising the business case of rail investment. But without a strong track record, there will be limits to how this is taken into account, creating a vicious circle of declining confidence – rather than the virtuous circle we are after, in which investment and development are symbiotic partners in delivering growth.

Future plans must encompass both the railway infrastructure, and the development it is supposed to stimulate. Leadership and collaboration between local authorities, developers and infrastructure providers will be critical – from beginning to end of the process.

Perhaps we need to introduce the concept of a station development zone through which the leadership and partnership arrangements can be determined, and the necessary planning, land and funding arrangements can be established. I'm not one for creating governance structures for the sake of it, but it just might help to provide the necessary certainty of vision and flexibility of framework for development to be brought forward with greater confidence.

Keith Mitchell is chairman of Peter Brett Associates, a member of the Outer London Commission and a board member of the National Infrastructure Planning Association.

The digital path to productivity

When "delivered on time and on budget" is a proud – and rare – boast, there must be a fundamental problem. Warning that our sector has failed to take advantage of digital innovations, McKinsey's *Tim McManus* and *Mukund Sridhar* suggest four ways to improve productivity and performance through tech

Infrastructure has a problem. Delays and cost overruns are common. Poor planning and execution, unbalanced contracts, inadequate controls and ineffective risk management are rife. Productivity has been subpar, innovation slow, and margins thin. Simply put, the current approach is not working.

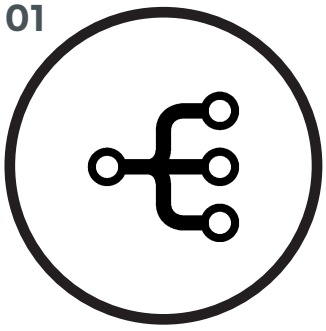
The industry needs to accelerate innovation, including the use of digital solutions. That may sound obvious, but research has found the construction sector to be a technological laggard, with low levels of digitization and R&D spending. Our research has shown that emerging technologies could boost productivity by 25-30%.

We have identified four ways project owners can improve the odds of success, embedding in each digital tools. Other ideas are quickly emerging, such as advanced analytics for predictive maintenance and geo-location solutions to manage workforce and materials. Non-digital methods, such as modular design and pre-fabricated and pre-assembled volumetric construction, and even 3D printing are also promising.

In 2013, McKinsey calculated that $57 trillion of global infrastructure spend would be needed by 2030 just to keep up with economic growth. Learning from successful – and unsuccessful – projects can help companies to improve their outcomes, and the communities they serve.

Tim McManus (Tim_McManus@McKinsey.com), in Boston, is a vice-president in capital projects & infrastructure. Mukund Sridhar (Mukund.Sridhar@McKinsey.com), a partner in the Singapore office, leads digital & technology research globally for capital projects & infrastructure.

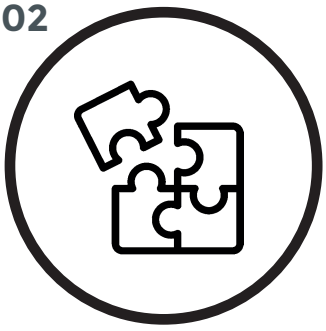
01



Manage the project as part of the overall business case

Finishing on time and budget is important, but a project can meet those criteria and still not work well. Think of an airport that is obsolete the day it opens. The owner should appoint someone to monitor the business case (not the designer, construction manager, or contractor, who are too close to the project to provide a dispassionate view). The monitor should have the authority to prevent changes during design and construction that could hurt performance. By using advanced analytics on project performance, commodity price trends and contractor performance, owners can do a better job of spotting how projects could fail in time to mitigate problems.

02



Match the delivery method to the project

Particularly in the public sector, there is a tendency to opt for the same delivery method, such as design-bid-build or design-build, for all capital projects. The better practice is to decide which method is most appropriate.

This means evaluating a variety of factors, such as permitting, land-site control, owner priorities, geotechnical analysis, and organisational and supply-chain capacity and degree of risk. Digital tools can improve the efficiency and accuracy of this process, cutting the time needed from months to weeks. For example, advanced surveying and geo-location technologies such as drones improve site assessments and project planning.

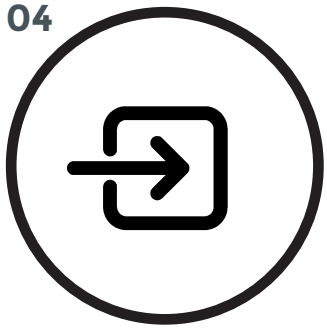
03

Balance risks

It is common for owners to try to transfer risks and liabilities. Contractors then seek to cover themselves through higher bids, additional contingencies, costly insurance policies, or adversarial contract management. This can lead to disputes, delays, and failure. Counter-intuitively, when owners, designers, and contractors share the risks, they may actually lower them – and also make the project run more smoothly.

Technology can play a vital role: next-generation building information modelling, boosted by augmented-reality solutions, can help provide a common platform for owners, designers, engineers and contractors to identify risks and work together to address them.

04



Involve operations and maintenance right from the start

The costs associated with operating and maintaining (O&M) infrastructure assets over 20-30 years are many times higher than those for design and construction. To ensure running costs are considered in design, O&M experts need to be involved early. Many oil and gas companies use this approach for big capital projects, finding that such projects are ready to go upon completion.

New technologies can enable a smoother transition from construction to operations. The use of 5D building information modelling provides O&M staff with a more accurate representation of what has been built, meaning less confusion and fewer changes.

Eleven dramatic years in the driver's seat

David Waboso reflects on a decade spent handling challenges from the 2005 bombings to the Olympics and systemic transformation

After 11 great years with London Underground, I will be taking up the role of managing director, digital railway, at Network Rail. It's a great opportunity for me to build on the experience of transforming the Tube's capacity through digital technology, but it will be difficult to say goodbye to fantastic colleagues – not to mention the huge number of projects which have become so near and dear to my heart!

I started with LU as director of engineering in April 2005. Working late one summer evening not long after I started, I heard a loud cheer from the pub below my office. This, of course, marked the announcement that London had won the 2012 Olympics.

An incredible amount of work was done to improve infrastructure in preparation for the Games, much of it on the Tube. The Victoria line was upgraded, and fantastic new trains equipped with wheelchair access.

Overcoming significant engineering and logistical challenges, the Jubilee line upgrade was also completed in time, with digital in-cab signalling dramatically increasing capacity.

We also got the Met line's new air-conditioned trains ready, completed Green Park station – a key interchange, particularly during the Paralympic Games – and replaced a large part of our track and power, the bedrock of a high-capacity railway. We exceeded even our own best expectations in delivering Olympic transport.

> I don't think anyone who worked with LU at the time will ever forget the thrill of working on stations during the Games

It was an incredible experience – like most of our senior team, I volunteered to work on stations (in my case Stratford) during the opening and closing ceremonies and the Games, and I don't think anyone who worked with LU at the time will ever forget the thrill.

Across the portfolio, we are carrying out such complicated projects that they take years and years to complete. The Victoria station upgrade was first contracted out in 2010. Despite very complex, intrusive engineering in one of the busiest stations in London, we are now just a year and a half away from opening a completely transformed station. Victoria and our other major station upgrades, at Tottenham Court Road and Bond Street, remain on time and on budget despite the massive complexity of building and tunnelling underneath central London, in stations used by thousands each day.

We've upgraded some of our old operational depots to be handle the newer, larger train fleets – particularly challenging as we are working in a busy operational facility in constant use.

In the years I've been at LU, I have witnessed remarkable improvements in how we deliver projects. The Track Partnership, formed in 2010, has transformed the way we renew our ballasted track. At the time the partnership was formed, we would never have dreamed of replacing ballasted track overnight – now it's business as usual.

Enormous complexity

And I've seen fantastic innovation. One of the first and biggest challenges thrown at me was to lower tunnel temperatures. We've made great progress, using everything from groundwater-cooled chillers to massive turbines in ventilation shafts. Our engineers have created some really cutting-edge stuff, including wayfinding for the visually impaired and track circuit monitoring.

There have certainly been some hard times. The July 2005 bombings were dreadful, yet the way the organisation rallied round was remarkable.

Getting the Jubilee line upgrade completed was at times a rather painful experience, with a huge number of closures and initially poor reliability – both of which we solved, and we were able to apply what we learned to the Northern line upgrade, which was delivered with half the original planned closures.

The doors on the Victoria line trains needed recalibrating and the automatic train operation software needed an upgraded version – all in service. I often rode with the drivers and reassured them how seriously we took this responsibility, and that personal interaction helped enormously. I've found the dedication and professionalism of the trains, signalling and station staff second to none.

No doubt the most difficult time when we made the tough decision to terminate the failing contract for the resignalling of the Circle, District, Hammersmith & City and Metropolitan lines. So it was very exciting to see a test train running with new signalling system late last year – a major step forward.

My last day at LU will be a sad one, but I hope to oversee the same transformation on Network Rail. Infrastructure is the hardware of society – I firmly believe the work we are doing to transform railways is critical to the ongoing success of our country. I am just so grateful to have played a part.

BIM, procurement and contracts – is it time for a rethink?

As information modelling takes hold, is it time to link BIM protocols more closely with contract forms? Professor *David Mosey* reflects on the CIC protocols

Is building information modelling a parallel digital universe, or are there links to the selection of procurement models and the impact of contract terms? Recent research led by the King's College London Centre of Construction Law has examined how clients such as Crossrail, UCLH and UBS structure their procurement and contracting processes so as to get the best out of BIM.

For example, the UK government's Cookham Wood trial project showed the benefits generated when BIM was combined with the recommended "two-stage open-book" procurement model, and with early teamwork under a collaborative contract. These included 20% capital cost savings agreed by all team members ahead of start on site, namely a cost of £2,332 per square metre against a baseline benchmark of £2,910.

Using BIM at the procurement stage, the main contractor and its specialist subcontractor submitted a precast volumetric cell proposal in response to the Ministry of Justice brief, which was then developed by the wider design team. This led directly to a time saving of six weeks and a cost saving in overheads of £85,000.

Other Cookham Wood innovations driven by the combination of BIM with two-stage open-book included:

- the use of solid precast floor slabs in place of pre-stressed floor slabs, resulting in a time saving of 12 days;
- the creation of more robust lighting in the education block through a bespoke solution proposed by the mechanical and electrical subcontractor, creating a significant cost saving;
- joint development by the mechanical and electrical consultant and the services subcontractor of service ducts and cell risers that can be serviced by repair and maintenance engineers more quickly and reliably from outside the cells.

The King's BIM research team has interviewed 40 specialists engaged in leading BIM-enabled projects and have analysed evidence of links between BIM and the use of particular procurement models and contract terms. This work was against a backdrop of mixed messages, such as the UK government Construction Clients Group guidance in March 2011 that "little change is required in the fundamental building blocks of copyright law, contracts or insurance to facilitate working at Level 2 of BIM maturity". While contract drafting bodies at first accepted this guidance, in 2013 the Construction Industry Council published its BIM protocol containing a number of far-reaching contract amendments.

The CIC protocol provided a valuable bridge between anxious designers and the contractual challenges created by BIM. But among the 40 King's interviewees, only 12% mentioned using it, even though all recognised the importance of creating procurement and contractual links to BIM.

The Cookham Wood team did not use any BIM protocol at all, instead adopting the multi-party PPC2000 contract form. Similarly, the Australian Department of Defence is adopting guidance provided by the Strategic Forum for the Australasian Building & Construction Industry, suggesting that BIM should be combined with a new procurement model known as project team integration. Rather than a separate protocol, this uses a multi-party contract designed to enable early collaborative working with the whole supply chain, including facilities management.

Not all BIM legal issues are resolved through the choice of procurement model. On intellectual property rights, the CIC BIM protocol has created a consistent and balanced approach among a set of two-party contracts; but the protocol has various limitations on liability, which were intended to give designers the confidence to work through BIM but which may now be less attractive to clients.

Cookham Wood Prison served as a case study in the use of BIM in procurement.

Time for an update

As we assess the impact of the April 2016 public sector BIM mandate, is it time to consider how the CIC BIM protocol can be updated? For example, can we remove the disclaimer of liability for electronic data exchange, and the diluted duty to exercise only "reasonable endeavours" in delivering BIM models? And, in maximising the benefits of BIM, could a revised protocol provide guidance on links to recommended procurement models, including the importance of engaging with those who will manage and repair the completed project?

All these issues deserve serious consideration and are addressed in the King's research report *BIM, Procurement and Contracts*, released in draft at a conference on Friday 6 May.

Professor David Mosey PhD is in the Centre of Construction Law, King's College London.

For more on the Cookham Wood trial see https://www.gov.uk/government/publications/procurement-trial-case-study-cookham-wood-prison

Is our industry fit for the future?

In times of great change it is vital to stay nimble – yet construction seems stuck in the past. Chief executive *Dr Nelson Ogunshakin* makes the case for bold thinking

When looking back on 2016, I predict that it will be seen as a pivotal year for our industry. Starting with the EU referendum this June, the country's business leaders must contemplate the future of how the UK continues to interact with the rest of the world. It is inconceivable that we will suddenly cease interacting globally. No matter the result of the referendum, now is the time for industry leaders to examine their business models and adapt them in order to succeed in the global marketplace.

Over the last three decades we have witnessed digital transformation of other industries – automobile, industrial manufacturing, music and media, computing technology etc – with improved production efficiency, cost reductions and innovative solutions.

However, our industry has yet to effect any major and significant changes in traditional procurement of major capital projects across the infrastructure, built and natural environments.

While client leadership is a critical success factor for progressive change, the industry supply chain equally has the responsibility to drive appropriate change through innovative and cost-effective services offerings, providing value-added solutions for investors and assets owners. This challenge calls for a radical change in our traditional business model, and one must ask whether our industry is fit for the future.

Frontier markets leap ahead

Across the world, infrastructure activity remains at different stages of maturity, with developed countries having long-standing assets that are now coming the end of their life cycle. Meanwhile, other countries are considered to be frontier markets, implementing forms of infrastructure that reach beyond what is common, and also those that embrace the most up-to-date and innovative practices possible.

Frontier markets, without ageing infrastructure in place to hinder their progress, are able to seemingly leapfrog the standards that developed markets have used in infrastructure for years – skipping ahead by using the latest technology, such as those utilised within smart cities, to maximise efficiency while positioning infrastructure as a perceived utility, instead of just a designed solution or product.

> Actions must match words, building R&D into the corporate plan and the cost base of one's business, helping businesses to stay relevant

Businesses involved with continually evolving technologies have ensured that while frontier markets are still volatile there is still great potential for them within of the asset's life cycle.

However, to participate competitively in frontier markets, existing industry players must reassess their business models, as the different regulatory environment, entry barriers, new procurement processes, integrated design and construction, off-site manufacturing, institutional capacity and other supply chain factors may render the traditional industry business model obsolete. Factors that engender success in fast-moving markets may indicate the need for businesses to specialise within the relevant supply chain.

Changing global market

These considerations should also be applied when evaluating the business model being utilised in developed markets. For despite this model having worked in the past, the global market is changing, and every country is becoming more globalised in its aspirations. It is estimated that by 2050, roughly 70% of the world's population will be urban. This shift will be accompanied by an unprecedented high level of demand for efficient daily amenities such as utilities, water, transport and housing.

As such, the business model required to affect competitive success will likely change, with today's businesses forced to adapt or surrender potential profits.

It is ultimately the responsibility of all business leaders to stress test their businesses, ensuring that the key drivers within the current and future global marketplace are both understood and anticipated within the business strategies they adopt.

Business leaders must fine-tune their ability to forecast market drivers and adapt to the changing circumstances at hand. Without this ability, leaders, businesses and the workforce will suffer during the changing times ahead.

R&D must be a priority

Essential to the adopting of the appropriate business model is fostering innovation through research and development. Actions must match words, building R&D into the corporate plan and the cost base of one's business, helping businesses to stay relevant through achieving increased efficiencies and higher value. The increasing costs of business now seen across the industry indicate that not enough effort or resources are being put towards R&D.

Not taking the need for business model adaptability seriously, through the development of a clear corporate strategic plan to achieve innovative solutions, will I believe be to the detriment of a company's success. It will inhibit ability to respond to key market drivers and restrict its abilities in both frontier and developed markets.

As the world changes we must change with it. We need to be bold, embrace the digital world and seek new, creative and innovative procurement solutions for our industry offerings. Only through such a move can we be ready for the future challenges ahead. As the late Steve Jobs from Apple said, "The ones who are crazy enough to think that they can change the world are the ones who usually do."

Business benefits from apprenticeships

With a compulsory levy coming into force in the next tax year, it is more urgent than ever that employers recognise what they have to gain

Apprentices are vital for the industry's future as companies face a looming skills gap. With an ageing workforce, more engineers will retire, but a 9% fall in the numbers of 18-year-olds entering the profession between 2012 and 2022 means they won't be replaced.

Meanwhile, it is estimated that by 2020 the UK will require 450,000 more science and engineering professionals.

For several years, consultancy firms have been employing apprentice engineering technicians through the Technician Apprenticeship Consortium – for which ACE is the administrator. But from April 2017 all large firms, whether they employ apprentices or not, will have to pay the apprenticeship levy being introduced by the government.

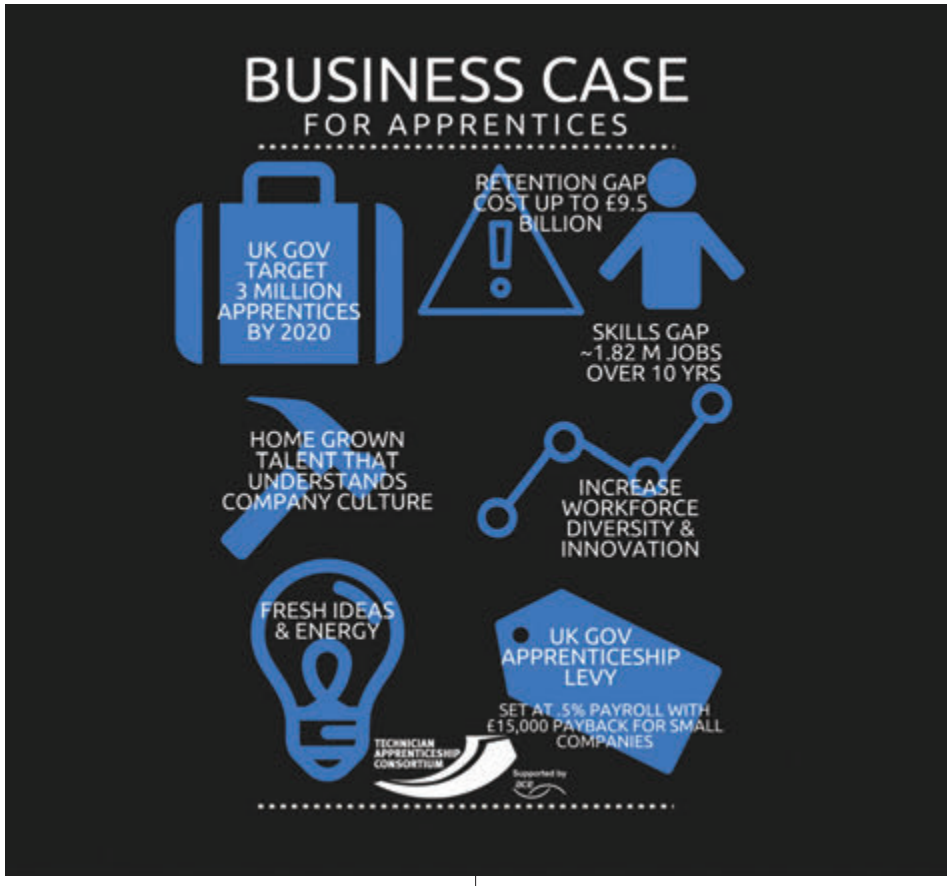
New guidance states that:

- You will need to pay the apprenticeship levy if you are an employer, in any sector, with a pay bill of more than £3m each year. For the purposes of the levy, an employer is someone who is a secondary contributor, with liability to pay Class 1 secondary national insurance contributions for their employees.
- The levy will be charged at 0.5% of your annual pay bill. However, you will have a levy allowance of £15,000 to offset against the levy you must pay. This means you will only pay the levy if your pay bill for a given tax year exceeds £3m.
- You will pay the levy to HM Revenue and Customs through the Pay As You Earn process.

There are numerous advantages to employing apprentices. For one thing, apprenticeships enable companies to begin the employment process three to five years earlier than with graduates, since apprentices learn on the job, while getting day release for study.

Apprentices have higher levels of loyalty and satisfaction, allowing for a better understanding of company ethos, with 92% of those companies hosting an apprentice and taking part in the National Apprenticeship Service survey seeing higher levels of workplace motivation and satisfaction.

Former apprentices are also likely to remain in the company longer, with low likelihood of leaving the industry, as seen by 80% of National Apprenticeship Service survey respondents, reducing the retention gap forecast to cost up to £9.5bn in the next decade.



Examples of what you will pay

The £15,000 levy allowance will reduce and in some cases eliminate the final bill.

Example 1:
An employer who would pay the levy

An employer with an annual pay bill of £5,000,000:
levy sum: 0.5% x £5,000,000 = £25,000
subtracting levy allowance: £25,000 - £15,000 = £10,000 annual levy payment

Example 2:
An employer who would not have to pay the levy

An employer with an annual pay bill of £2,000,000:
levy sum: 0.5% x £2,000,000 = £10,000
subtracting levy allowance: £10,000 - £15,000 = £0 annual levy payment

Diversity and innovation benefits

Offering apprenticeships is linked to increases in diversity through opening prospective talent pools. Diversity in turn is linked to higher levels of innovation, which for an industry predicated on new ideas means a competitive benefit for the company.

Similarly, those companies investing in skills development for apprentices see higher long-term profits through consumer preference, as well as freeing time of existing staff to get on with higher-value work.

For more information on the Technician Apprentices Consortium, contact project manager Sheila Hoile, shoile@acenet.co.uk (020 7222 6557), or Wendy Lasebikan, head of HR/corporate office, wlasebikan@acenet.co.uk (020 7202 0254).

Industry leaders come together again to cast light on the cloudy future

European CEO Conference presents unique opportunity to share knowledge and insights in facing EU referendum and ever-changing business conditions

Given the turbulence in Europe and continued questions around the UK's global standing, whether in the EU or outside of it, businesses based in both the UK and the EU must be attentive to the state of the market. No matter the decision of voters this summer, there will be future repercussions upon business processes, already evident in the drop in the value of the pound as the looming referendum fosters uncertainty.

This year the industry faces a spectrum of business possibilities, with many commentators believing that the lack of knowledge as to what the future holds puts business potential at risk.

It is at times such as this that participation in thought leadership events such as the European CEO Conference is essential. This event – held this year on 9-10 November – provides a unique opportunity for senior executives from across the industry to meet to contemplate the business challenges of today and of the future. This year will hold particular importance for understanding the implications of the EU referendum aftermath, as well as examining future industry best practices.

> These confidential, frank and high-level discussions allow business leaders to move the industry to the next level with confidence, using the annual ACE benchmarking survey

Conducted under Chatham House rules, these confidential, frank and high-level discussions allow business leaders to move the industry to the next level with confidence, using the annual ACE benchmarking survey and report – an in-depth, peer-to-peer comparative barometer for business practices that examines operations, growth, productivity, costs, staff turnover, marketing and general competitiveness.

With hundreds of business metrics analysed, this unique data gives insight into the most effective business strategy. Such measures, particularly in these turbulent times, will allow business leaders to demonstrate additional value for money, aiding in the retention and acquisition of clients.

Have your say

We urge you to take part in ACE benchmarking, regardless of your firm's size. It is your participation that enables the report to be a relevant barometer, serving as a platform to develop business strategy. To find out more or to participate in ACE benchmarking, please visit http://www.acenet.co.uk/ACEbenchmarking/611.

As conference places are limited, we recommend you register early. Please note that the entire European CEO package also includes registration for the prestigious Parliamentary reception, held on the House of Commons Terrace, as well as the gala dinner celebrating the European CEO Award winners.

To find out more information or to register to attend the European CEO Conference, please visit http://www.acenet.co.uk/EuropeanCEOConference/619.

SMEs need to take action to improve climate change resilience

Undeniably, with extreme weather events becoming more frequent, climate change has become a key business risk. Therefore, business models, particularly in the field of construction, must adapt for long-term profitability amidst this changing environment.

The majority of businesses engaged in the UK construction sector qualify as small or medium-sized enterprises (SMEs), and are therefore more likely to suffer a significant impact from climate change. For SMEs, the largest business area exposed to risk is within the supply chain, and this is also the case when considering the effects of climate change. For instance, studies on the 2007 floods revealed that the key impact of flooding on business involved disruptions in the supply chain.

Serious supply chain disruptions are typically caused by natural disasters, industrial disputes, terrorism, supplier bankruptcy, single-supplier dependency, war or political instability. And yet these are hard to separate from each other, as natural disasters will spur on other forms of disruptions.

> Supply chain disruptions can lead to declines in sales growth and customer goodwill, easily putting companies out of business

This creates risks for SMEs by increasing the basic costs of technology, networks, facilities or inventory, as well as any degree of business downtime. Ultimately supply chain disruptions can lead to declines in sales growth, stock returns, shareholder wealth and customer goodwill – which, considering the limited funds of SMEs, can very easily put one out of business.

Modern supply chains run across various sectors and global markets, making the task of building resilience for such disruptions into SME business strategy difficult. Best-practice exploration and collaboration among business leaders is therefore vital.

Such collaborative discussions on how to ensure business strategy is climate-change resistant will be covered by experts at ACE's International Conference on 15 June, while considerations for SME business strategy will be covered in an extensive series of SME events UK-wide.

For more information, please see: acenet.co.uk/Events.

Is the green economy now facing red lights?

Austerity and Brexit have contributed to an environment in which recycling looks like yesterday's news. By Matthew Farrow

The 1990s and 2000s were years of unprecedented change in the waste and resources industry. Back in the 1980s, the industry was still primarily a logistics industry. UK geology and policy meant that landfills were cheap and plentiful, and money was made through efficient operation of truck fleets collecting, transporting and disposing of waste material. Recycling rates were perhaps 10% until around 2000, and the industry was a patchwork quilt of family-owned medium-sized forms who dominated local or regional markets.

A more national approach to regulation and enforcement, along with looming EU environmental regulation, the landfill tax and the impact of globalisation transformed all this. Money could be made out of diverting waste away from landfill, and the ind ustry became more capital-intensive, and technology-orientated.

Clever technology such as optical sorters and plasma arc gasification held out the prospect of more value being extracted from what had previously been landfilled. Consolidation and internationalisation followed, with a handful of growing UK firms such as Biffa and Cory as well as continental giants such as Veolia, Sita and FCC absorbing most of the smaller companies.

These changes went along with an industry whose fortunes and outlook were buoyant. Recycling became a civic duty, recycling rates rose rapidly towards 40%, and a combination of PFI deals, legally binding EU targets and the landfill tax escalator provided a robust framework for investing in large-scale waste infrastructure projects.

Changing economics hit sector

In the last five years, though, this outlook has become more challenging. This is due to four factors in particular.

First, Defra and the promotion of recycling have been an easy target for the public spending restraint of recent years. Defra's own budget has been cut, as has that of WRAP, the agency set up to facilitate the move to a recycling society. Local authorities have been unwilling to keep funding schemes to promote reuse and recycling when they are having to axe frontline services. These cutbacks have happened just as this sort of facilitation and support was most needed – as we move from the most easily collectable and recyclable materials, such as paper and glass, to the more difficult ones, such as plastic tubs and film.

Second, while "waste is a resource" has become something of a mantra, a resource is only worth collecting if someone is willing to pay for it. The fall in the oil price, and in commodities more generally, has badly hit the value of material such as plastics recyclate. Waste management companies almost always have to bear the risk of commodity price fluctuations, as their customers (whether businesses or local authorities) usually refuse to do so.

Political will has been lost

Third, there is less UK government leadership. A decade ago all political parties vied to outdo each other as champions of the circular economy. But although the coalition government began with ambitious rhetoric on the green agenda, ministers were soon bogged down in the bin wars, a judicial review over the implementation of waste collection regulations and controversy over some large energy-from-waste proposals. These days, I suspect No 10 sees waste policy as something that causes more political trouble than it is worth.

Lastly, and inevitably, the prospect of Brexit has alarmed an industry whose modern market was created by the Landfill & Waste Framework Directives. Those directives could be repealed in the UK after an exit, and the Commission's "circular economy package", which is laden with proposals for EU incentives for 70% recycling and more progress on reuse and remanufacturing, would become irrelevant.

Uncertainty adds to high risks

All of the above lends an air of anxiety to an industry which is a core part of the green economy. Investment in waste management projects always carries multiple risks – on planning, construction, technology (especially for new methods of sorting and treating waste that was not previously recycled), feedstock (the risk that people or companies start to throw away different things – even a small change in the proportion of, say, paper or certain types of plastic in a waste stream can completely undermine a project's technical and financial assumptions) and commodity prices.

Some of these risks are not present in other infrastructure sectors and so the sector needs a clear long-term policy framework to give investors confidence. Whether it will get this anytime soon is anyone's guess.

Matthew Farrow is director-general of the Environmental Industries Commission, the leading trade body for environmental firms.

Farington and Thornton plants will no longer process waste

The extreme risks facing recycling operations have been brought into stark view by the closure of two massive waste treatment plants in Lancashire. The MBT – mechanical biological treatment – centres in Farington and Thornton were built through a 25-year PFI deal between Lancashire County Council and Global Renewables. But after taking back control of the loss-making plants, the council says they will no longer process waste for recycling. Instead they will be used for transferring waste to other sites by road for recycling or landfill.

The MBT centre in Thornton will in future only transfer waste to other sites

Going underground

Jim Woodhams, senior business development manager at Topcon GB & Ireland, takes a look at the latest innovations in tunnelling, a core option for delivering key infrastructure in crowded cities

Space is at a premium in the UK, especially in the major cities. With the vast majority of space above ground developed, one solution to deliver critical infrastructure projects is to go underground. This has the benefit of enabling delivery right to the heart of a congested cityscape without requiring significant space on the surface. The completion of Crossrail has shown that the UK has the skills to overcome the technical challenges of delivering subterranean infrastructure, and with projects such as Crossrail 2, Thames Tideway and sections of HS2 running underground, there is certainly more enthusiasm for tunnelling.

The city taking the lead on underground networks is London. Early stations on the London Underground system were constructed using a "cut and cover" method, where a trench is dug, infrastructure placed, and the trench covered up again. This method was quickly abandoned by the late 19th century, owing to the considerable disruption, with the boring method taking preference to allow construction without needing to clear the surface.

While technology has moved forward considerably since the London Underground first began operating in 1863, the challenges faced are similar. When a new tunnel is bored, it needs to avoid pipework, sewage lines and electricity points, while ensuring it does not affect existing infrastructure, both underground and on the surface. This process is complicated further with the lack of visibility and dependence on a range of asset records – some decades or even centuries old – to show what needs to be avoided in the subterranean realm.

Academy formed to retain skills

To help deliver a project with pinpoint accuracy, developers need confidence in both their information, and the skills available to them. The development of Crossrail brought with it the establishment of the UK Tunnelling & Underground Construction Academy (TUCA), enabling a legacy to be built and skills to be retained for future projects. Through Crossrail 2, an extension to the Northern Line to Battersea Power Station, and the discussion of a road link beneath the Pennines to connect Manchester and Sheffield, there is plenty of scope to ensure these skills are developed further.

> Delivering a tunnel project requires a mass of accurate information and precision equipment

Delivering a tunnel project requires a mass of accurate information. Below ground, the guidance of the tunnel boring machine or roadheader is critical. Typically this will require precision surveying equipment. The constraints of limited sight lines and restricted space call for specialist techniques. Survey data will be collected and transmitted to the tunnelling control systems for real-time guidance and decision making.

On the surface, control surveys are carried out and the ground or structures monitored to ensure that any movements due to the tunnelling beneath are within acceptable design limits. Maintaining the safety of the workers and the public is paramount, and the use of precision surveying equipment, skilled operatives and robust procedures are vital to ensure the maintenance of data quality to support this vital requirement. Emerging technologies such as laser scanning, fibre optics, computer vision and big data can improve data quality as well as increasing efficiency.

BIM will provide valuable insights

The information taken on board will likely be integrated into a building information modelling system. The inclusion of monitoring data within BIM systems could give important and valuable insights into geotechnical and structural behaviours in the built environment, especially once the original designers and engineers have moved on. This will be of significant interest in the future, not just for infrastructure replacement, but also in terms of assessing the viability of extending the life of assets.

There is no doubt that going underground presents a distinct challenge. But the skills the UK has in delivering underground infrastructure, combined with the number of subterranean projects in the pipeline, show that these programmes will continue to take a lead going forward. Through compilation of existing data and greater collaborative handling of new data from ongoing projects, future projects will be delivered with greater efficiency and long-term effectiveness. This will help to establish tunnelling as a core option for delivering the key infrastructure projects needed in future.

Crossrail has shown that the UK has the skills to pull off major underground projects

Career path: James Stewart

James Stewart, the chairman of global infrastructure at KPMG and the former CEO of Partnerships UK as well as Infrastructure UK, talks us through his rise to the top

How did you develop your career?
At the time that I started there was not a set market for infrastructure, so I have been involved from the very beginning in the development of this market.

In 1992 I had held a job related to infrastructure finance for seven years when the government announced the launch of the private finance initiative. When my company decided to engage, I was chosen to lead.

Projects were funded through PFI until public-private partnership appeared. Since then the market has grown to incorporate all sectors.

After leaving SG Hambros, I became chief executive of Partnerships UK, which was the PFI/ PPP agency for the UK government. Partnerships UK was succeeded by Infrastructure UK, of which I was also chief executive.

Right now I don't think there is a

more exciting market to work in. I travel to major projects worldwide, and am pushed to learn new skills every day.

What advice do you have for the leaders of tomorrow?
Breadth of knowledge and experience is vital. Infrastructure encompasses a variety of topics and the market is now developing at the fastest rate I've seen during my career.

For PFI in particular two skills are needed: an in-depth knowledge of the sector, and capability. Many companies are now involved in infrastructure, so it is vital to ensure career flexibility by understanding geographic features, spot trends, the asset life cycle, and asset activities. It is crucial to be able to adapt and learn within new work situations.

What challenges do you foresee in infrastructure, and what is the UK's likely role going forward?
Whether the government or consumer pays for the project, cashflow generation is the key challenge.

The significance of infrastructure to development and growth is now recognised across the world. Identified as a way to achieve the sustainable development goals of the UN, this shifts the focus from the establishment of economic infrastructure to achieving the sustainable development goals, increasing access to daily needs such as water, energy and more.

The UK, with its substantial experience, is a global market leader and will continue to be seen as a centre for learning and professional services.

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