

Infrastructure Forum Lecture 2025

My thanks to the Infrastructure Forum for this opportunity to speak today. These are my own views and reflect a career spent as a contractor and client in both the private and public sectors in infrastructure, housing, transport and further education in the UK and overseas.

I was first attracted, as a 16 year old, to the idea of Civil Engineering by a pamphlet which showed an engineer looking through his theodolite, up to his knees in mud and which gave the definition of Civil Engineering, 'the art of directing the great sources of power in nature for the use and convenience of mankind'. I think the literary grandeur of those words together with the image was the attraction rather than having to flog through maths and physics. The promise of overseas travel also sounded good.

In 1828 when that description was coined by Thomas Tredgold those natural resources were earth and stone, water, timber, and through the 19th century coal, iron ore and more latterly oil and natural gas. Today that description is no longer acceptable and we now refer to the art of working with the great sources of power in nature for the use and benefit of mankind. So today our challenge is to reduce the emissions from burning oil and gas which damage our environment and create extremes of climate whilst at the same time we create a more connected, mobile and sustainable world which enables opportunity and growth with resilient, affordable infrastructure and homes for all citizens.

It is of course many of those citizens who enable and create our infrastructure. We enable by a willingness to finance in one form or other, by innovation, new materials and digital technologies, creativity, design and construction and by seeking to balance the impacts and the benefits. I will return to this challenge later.

When thinking about any piece of infrastructure I believe we have to start with three basic questions, Why, what and How. To often we

rush into the what and the how without really understanding the why. What problem are we seeking to solve , what outcomes do we require. Let me take a simple example.

We know that over the next thirty years our demand for water is going to increase by up to 30%. This is due to the need to cope with periods of severe drought whilst meeting additional demand from industry. We need to do this to have a resilient capacity of water to sustain our health and our economy. So there is a clear answer to why but when asking, so what do we need to do, the answer is reduce demand, increase capacity and reduce leakage. There will be options for reducing demand, more variable charging by use, smart meters, more efficient appliances, for capacity we can bring water in by pipeline from an area of surplus or build a new reservoir. Consideration will need to be given to their impact short and long term, the respective costs, life span and resilience. To reduce leakage we need better maintenance, more use of smart technology. Finally there is the how, how is it to be paid for, who is to take the responsibility and the risks of delivery and how is the investment to be repaid.

During the 18th and 19th centuries most of the infrastructure especially canals, water, railways and later gas and electricity were provided by private sector investors. As early as 1582 we find private investment together with city grants providing a water lift from the Thames to the properties on London Bridge. It stayed in the same family for 120 years before being sold to new private investors.

Fortunes especially on the railways were made and often lost. The First World War and the need for more government control, the inter wars recession and then the Second World War meant a deterioration in most of our infrastructure and in 1947 it seemed rational to the new Labour Government to nationalise not only rail but water, electricity, gas and telecoms as well as the coal and steel

industries, all together seen as the commanding heights of the economy.

The 1980s with a new Conservative Government led by Margaret Thatcher saw the re-privatisation of energy, water, telecoms and waste with enthusiastic public take up of shareholdings. Rail was the last sector in 1994, regarded as more difficult with the separation of rail from track and the break up of a largely vertically integrated industry into multiple sectors and companies.

Following a fall in public satisfaction and the commercial failure of some franchises rail is today essentially back in public hands with full nationalisation of passenger services planned by 2030. This carries risks, not least the relationship with the Trade Unions who could undermine productivity leading to cost increases. There will be a mixture of opportunity and risk, it will be 2035 before we know the outcome. Management and Unions will need to find an affordable way forward in the interest of employees and the customer.

At the same time public satisfaction with other sectors is mixed.

The UK is not alone, According to the Global Infrastructure Index survey by Ipsos Mori carried out across 28 countries in 2021; Public satisfaction with infrastructure sat at 39% on average, with 35% in the UK.

In 75% of the countries surveyed 75% of respondents believed investment will create jobs and provide an economic boost.

Interestingly 67% agreed they were relaxed about private sector ownership and investment.

On maintenance having the priority it is 55% preference to a 20% preference for money being spent on new build.

There is also a greater preference for considering the impact on the environment 51% whilst to the impact it has on the economy only a 26% preference. Three years on I see no reason to believe opinions would be any different.

I do wonder though what the response would be to the question, do you believe protecting the environment to be more important than the quality, reliability and resilience of your critical services such as water, electricity and transport.

These questions are central ones for policy makers in a democracy, which I will return to later.

Priorities will of course change with time, climate change has increased the focus on water especially flooding and sewage overflows sewage overflows and at the other extreme drought.

Covid and subsequent increases in ill health has increased the focus on hospitals whilst rail demand has reduced or changed with the growth of online meetings.

The need to slow down global warming and climate change has increased the pressure to decarbonise transport, heating, energy and industry. But the investment to meet all these priorities means capital investment which must be recovered over time through either a regulated asset based model or taxation in order to keep down long term public debt. The operating and maintenance costs must be met by marginal pricing or again taxation with at the same time the need to take into account distributional impacts on different parts of society.

That normally the public see the source of the finance as a relatively low priority is most likely to be driven by the greater importance to them of the quality and reliability of service and the marginal cost. However at the moment we see a greater demand for nationalisation of water at 82%, and rail 75% but a lower demand for nationalisation of energy 60% and telecoms 40%. I do not believe this is an implicit view that public ownership is better but rather the suspicion that private owners and executives are taking too many rewards whilst delivering poor outcomes.

The importance of road maintenance is particularly important in the UK with insufficient funds increasing the severity and number of potholes. To be fair government has recently announced additional funding, whilst in Germany rail reliability and punctuality has dropped significantly also due to inadequate maintenance.

The public clearly understand this with their preference for maintenance over new build, today is more important than tomorrow, always a key political consideration.

My own fear, from personal observation, is that road maintenance finance is often spent inefficiently.

Let me return to the Why. There is not only in the UK but certainly in most developed countries acceptance of the broad arguments and agreements of the annual COP conferences. Yes we have to reduce the impacts of climate change, yes we want to protect our environment and its biodiversity. So yes to decarbonisation but plenty of questions around the what and the how.

The NIC has set out in two long term National Infrastructure Assessments and in many other particular subject reports what needs to be done and by when if we are to get at least close to net zero by 2050, the current global target, albeit China is working to 2060.

In brief, because I hope many of you will remember the many recommendations, we have to focus on replacement of fossil fuels by renewable electricity, mostly offshore wind, solar and onshore wind, Supported by limited hydro and tidal.

Our generated capacity from all sources will have to double by 2050.

Whilst we make that transition gas will still be needed, initially unabated and then with CCUS as the most likely solution to removing the CO₂ generated at scale. Hydrogen is a potential source of energy storage to back up the intermittency of renewals together with battery storage at more local levels.

Nuclear should continue to have a role both at large and small scale to provide base load and further support security but a lot needs to be done to reduce costs and minimise the volume of and long term cost of dealing with the waste. At present it seems unlikely that nuclear in the UK will provide more than 15-20% of capacity. In the short term, without agreed life extensions to old plants, more nuclear is going to come off the grid than new is added which will add to the challenge of intermittency and security against global uncertainties.

We have to increase our available water resource by 4bn litres a day, a 30% increase, by 2050. As I said earlier this can be achieved by reducing demand, reducing leakage and building new capacity, each delivering roughly 33% of the increase.

To support growth we need to build more transport infrastructure, improving connectivity both within and between our key cities. Within cities public transport will need to prevail whilst between cities we need an integrated approach to road and rail with rails prime focus being on intercity and commuting services together with an increase in local bus services between towns and villages which are cheaper and more flexible. Without these changes car use and the risk of congestion will increase which together with the electrification of road transport and associated loss of fuel tax makes many of us believe that smart road pricing is inevitable.

Our national coverage of gigabit broadband is progressing well, 85% coverage is expected in 2025 and 5G will become increasingly important in the support and managing of infrastructure systems and autonomous vehicles. The attendant DATA centres will create their own demands for energy and water and pressure will be needed to optimise their efficiency and potentially use the surplus heat in district heating systems.

For our infrastructure to be resilient to climate change and the increased frequency of flooding there need to be appropriate national resilience standards which are adopted following a prioritised analysis of risks and economic impacts over time. Today there is a patch work of standards across traditional services which need to be updated in light of changing circumstances, in addition they will be required on our broadband networks and data support systems which will be of increasing importance in the operation of all utility systems. Regulators must require operators to stress test their systems and demonstrate resilience. Hostile cyber attacks are likely to increase whilst broader conflicts and protectionist measure could lead to shortages of critical resources. The impact and costs of all these challenges must be considered in developing appropriate, affordable resilience standards and mitigation.

Reduction and recycling of waste is also important to reduce for example plastic pollution in our rivers and seas whilst reducing the use of fossil fuel based products and packaging.

Most of these ideas and recommendations have been put forward by the NIC over the last ten years and largely accepted in principle by government. Policy development and delivery has however been slow in most sectors.

The reasons for this are well understood and not new. A limit on government funds available, inconsistency of policy with changing ministers and priorities, a regulatory regime largely devoted to keeping bills down. An increasingly sclerotic planning system with an imbalance between national need and local preference and a reluctance to invest by the private sector as all the previous factors create uncertainty, weigh against likely returns whilst those returns can be at risk from unexpected a windfall taxes.

These are all factors over which government has control and the current government is seeking to make a difference with the

production of a ten year national infrastructure plan, reviewing more use of private finance in a collaborative risk sharing regime and a focus on the importance of infrastructure on economic growth.

The Dartford crossing and the Second Severn Crossing were both examples of private finance and delivered significant successful infrastructure projects. I see no reason why this should not be possible for the Lower Thames Crossing and other schemes. The private sector has to be committed to keeping capital costs down and it is important that we do not ignore this source of investment in dealing with essential infrastructure whether economic or social. We cannot use the excuse of past failings in the operation of social infrastructure to stop a regeneration of public private partnerships. Unresolved commercial disputes either require a pragmatic resolution and a willingness to move on or if not the particular actors will have to be ignored and new realistic collaborations developed. If we don't we will be missing out on significant sources of development finance.

Government of course cannot control directly international conflicts, the use of energy as a bargaining tool, the rate of adoption of new technology in other countries or of course protectionist measures which could impact home grown industry, limit GDP and increase security risk.

The scale of investment required in the UK is huge. For economic infrastructure we are looking at £2trillion over the next 25 years with at least 50% coming from the private sector on top of at least another trillion for social infrastructure and housing. The NIC has not addressed housing but from my personal experience it also can only be addressed by the right combination of policies with both government and private financing.

As we heard in November the government cannot do every thing it wishes and requires another few months to assess the balance of

need and investment and determine priorities. As ever it is faced with an electorate who want higher quality of services but at lower costs.

It makes the promised ten year National Infrastructure Strategy very important. If it lasts for five years that will be a relative success, what is important is that it is not constantly reviewed every two to three years. Major infrastructure typically takes ten to fifteen years to develop and deliver, a rolling ten year strategy with only minor changes of tack is what is really required.

The strategy by itself is just the start. It is only meaningful if it is properly costed, that cost well managed and there is a strong focus on delivery at the most senior levels of government.

It will need to be accompanied by National Policy Statements for each sector and a much stronger planning regime which gives clear direction to the planning inspectorate which balances critical national need with local interest. That local interest will require sensible and acceptable compensation, physical and financial, to individuals and communities.

In respect of planning, this has to be much broader than simply individual schemes. We have to develop spatial plans which recognise the need to focus, supported by an industrial strategy, different industries and sectors in different regions, as has been recognised for CCUS and hydrogen production, to plan housing where it is needed, supported by infrastructure, not just arbitrarily spread across the country. Spatial plans are required at a regional and city level with greater devolution of powers to combined authorities who best understand their regional and local needs.

In taking schemes forward there needs to be a consistent application of environmental and biodiversity mitigation which learns from experience and develops standards which can be quickly understood and applied. The most recent Government proposals to consider

environmental protection on a much larger strategic and spatial approach funded by developer payments but with less project consideration of environmental impacts is welcome. It will of course be challenged but could result in less time consuming and costly project by project assessments.

There needs to be clear direction of the outcomes required to regulators who must then balance cost to the consumer with urgent delivery, reliability and resilience whilst enabling investors to make a market return. Of course that is not easy but it is essential. We cannot afford to renationalise. We have to have effective regulation which recognises demand, the impact of climate change and works for consumer and investor. It cannot be the investors and companies fault alone that parts of the water sector have gone from a triple A to single or worse rating.

Hard calls will have to be made, pace before perfection, consumers may not be prepared to pay for perfectly clean rivers or too rapid decarbonisation, industry will push back on penalties for not meeting government targets but meeting 80% of tough targets will be something to be proud of.

All of this will require more of a political consensus, country before party. That can be helped if there is more openness and honesty with the voter who is not left on the side lines but is engaged with an open and frank conversation about the risks, the choices, the costs and the benefits not just next year but five to ten years down the road.

I do not pretend that many of these issues are easy for politicians. They are assailed from all directions by different interests groups and are expected to make the 'right' decision quickly. In reality there is no right or perfect decision. It requires a capacity to make choices based on sometimes contradictory advice from experts, perceived common sense, affordability, public expectation of a service. More openness of the debate can only be a good start.

So far I have given an overview of the why, the what and the how. I hope I have made it clear that the why derives from a clear understanding of the outcomes required across a timeframe. There is a need to cost those outcomes against different iterations, technologies and methodologies. That may require adjustment of the outcomes and timeframes. At a government level it could lead to how much relative support to give for example between renewables, nuclear, ccs and hydrogen. It requires government to have access to the right skills and having to choose between consultants or increasing in house capability attracted by commercial rates of pay. Some will argue let the market decide, but we are talking about the fundamental services of survival for people and the environment that cannot be left just to the self interest of corporations however well meaning their CSR statements but requires realism and collaboration in which the government is the principal sponsor.

When it comes to ownership and delivery by the private sector they like government have to adopt the role of sponsor and go through the same process of identifying a programme of projects outcomes and the technical specifications and costs and iterating these several times before reaching a conclusion. Yes, it takes time, costs money but it reduces the likelihood of having to stop, re scope and incur delay and more cost later on. The recent NIC cost report makes all these points and others such as the the need for the inclusion of client, designer, contractors and suppliers in a collaborative environment. Infrastructure is not the supply of 10000 coffee tables for a fixed price with penalties for late delivery. It is the complex delivery, of often one off schemes, in varying geophysical conditions delivered in uncertain weather conditions with multiple national and international contractors and suppliers.

Given the complexities and different interests it must be right to work in the most collaborative way. A problem shared is a problem halved.

Talking of collaboration I do believe the client is critical. The client will set the tone from the outset. The client has to believe in a constructive, collaborative approach from all parties, in this sense I also believe that a weakness of the UK sector is that unlike Europe we do not have large scale companies who are vertically integrated especially with in house design. We are the only major manufacturing industry which separates the two. Until the 1980s the largest UK contractors had in-house design, in-house research and largely in-house plant holdings together with significant direct labour. Some also had house building divisions and property assets, so they were truly conglomerates with significant balance sheets. Today even our largest contractors are a fraction of the size of their European competitors or the large American consultants. Most of our large consultants are now in the hands of overseas companies, whilst this gives them the muscle to operate internationally, it is I believe to the disadvantage of the UK market which is then taking its place alongside others in the owners strategic thinking.

In the meantime as I just said it is the clients who hold the key to successful delivery.

They set the criteria, the culture and the delivery structure. I believe the enterprise approach or Project 13 is excellent. A client who is part of the team, willing to listen to advice from the designers who in turn must listen, be innovative and keep the clients requirements as their first priority. It requires give and take. Not just at the beginning but throughout the project from early design to handover. In terms of public reaction to infrastructure the quality of design cannot be underestimated. It does not have to mean more expensive but it must be given full consideration.

In contract terms there need to be incentives not penalties, imagination and challenge applied to keeping costs down and delivery on time.

The NEC 3 design and construct target form of contract is a good basis, we used it on the Olympics , it can work.

But delivery of our infrastructure requires people, significantly more than we have today, from highly experienced project managers at sponsor, client and contractors, experienced designers and on tens of thousands additional skilled site employees.

What is certain is that over the coming decade, with the scale of investment required across all sectors there will be acute shortages, sectors will be competing with one another, costs will go up.

This is not a new problem. As a contractor I can recall having to recruit engineers from around the world in the late 80s whilst through the 90s and 2000s we were happy to accept an influx of skilled operatives from Eastern Europe reducing the need to create home grown talent.

A combination of Brexit and growth in their own economies has resulted in many returning home.

At the same time our continued focus on a university degree and insufficient value placed on the importance to our economy of the skills of the 50% of young people who do not go to university has led to a shortage of new blood as older skilled people retire.

Constant government tinkering, short term initiatives such as the apprenticeship levy have led to to reductions rather than increases in apprentices, levy funds returned to treasury or the levy used for increases in degree apprentices and management training which do at least have the benefit of earning whilst studying and training but do not solve the main problem. It is unacceptable to have 13% of our 16-24 year olds, almost a million young people, in neither education employment or training.

I realise there are many organisations at a national and local level trying to address and meet the challenge but clearly it is not working at the scale required and requires stronger consistent political leadership.

Government should focus on an education system to the age of 18 which gives equal opportunity to all abilities so that on leaving school they are ready to move into university , college and training. Delivery by universities, colleges, local government and especially employers working together, or to use that word again, collaboratively. Employers in particular, large and small must be prepared to do more and not rely on government subsidy. In the short term it may well increase costs but that has to be an incentive for more innovation in construction processes. The pace of technological change, especially the opportunities created by AI, means this is not a one stop shop but a continuous process of adaption and development of new skills, more innovation and higher productivity, all especially needed when we have a falling birth rate.

In the medium term the suggestions I have made will not suffice and controlled permission for foreign labour will be needed to meet demand.

I would like to conclude with some reflexions on our political process and the national challenges which we face over the next 25 years.

There is today very little debate around the need to slow down the rate of climate change and that to do so we need to decarbonise our lives from limiting basic conveniences such as plastic bags to delivering large scale renewable energy. In a sense it is taken as a given and we have made good progress in the UK particularly by reducing our use of coal and success with offshore wind and solar. But it will get tougher. It will require continuous adaption of life styles, investment in everything from education and training to new and smarter technologies. It requires belief and understanding not just by industry, technologists, civil servants and politicians but by the general public. The public must be involved in the Why question. That requires open communication, listening as well as telling, honest

and open debate on the choices, the costs and the respective outcomes.

The public are both stakeholders and shareholders. Whether it is a private sector or public sector scheme they pay. The cost will be driven in part by the degree to which different stakeholder groups can hold the scheme to ransom with particular demands.

The planning inspector has to rule on the reasonableness of these demands. Not easy and again the need for clear policy direction. I have said many times we are doing this for one another, for the citizen who in one form or another pays the bill and enjoys the benefits. The bill cannot be ignored but if we are to avoid reversal of policies it must be understood and accepted at the outset whilst the distributional impacts must be fair.

The infrastructure and growth we require will not be achieved at the pace and scale required with 1-5 year cycles of short term decisions geared to short term popularity.

A vision and ambition is not enough. As any leader knows managing change is one of the most difficult tasks. It requires a clear focus on the end goal, the sails may need to be trimmed to adapt to changing circumstances but a laser focus retained on the end goal.

My question is, can this be achieved in a largely tribal political democracy which sees consensus as a weakness and prioritises the short term over the long term.

We know significant infrastructure takes fifteen years on average to deliver. We have to have an open debate and reach a national consensus which can then be taken on by different governments and show by our actions that the public can have confidence in our ability to deliver. We cannot afford another HS2.

A political system which cannot put national priorities first and keep the goal posts in the same place is not fit for purpose.

Today as I said earlier the government is preparing a ten year infrastructure strategy which will to be based on 25 year goals. They will need to be bold and ambitious but not unrealistic. Once established to have any chance of success they will need consensus, strong leadership, regular monitoring of progress, regular and clear communication with the public and resistance to resetting the dial every five years.

In this context the Government has announced its intention to create NISTA, The National Infrastructure Service Transformation Authority. This will bring together, within Treasury, the NIC which has to date focussed on assessments of our long term economic infrastructure needs and making recommendations to government and the IPA which advises and monitors Government departments investing in economic and social infrastructure including defence projects. Housing is also to be added.

This idea of combining the two activities of strategy and delivery is not new and was considered as one of the options in my original review which recommended the establishment of the NIC.

Given the NIC has produced two long term assessments in 2018 and 2023 and now off the back of the latter the government will publish a strategy for the next ten years so a focus on delivery is clearly sensible. The nuts and bolts are being sorted out but in principle the intention is for the NIC part of NISTA to focus on the priorities, costs and benefits of the programmes and projects which make up the NIS and assist Government in determining their relative merit, affordability, investment requirements and supporting policies.

The IPA part will, much as now, support the choice of the right contractual and financing mechanisms, support Project Management training and monitor progress.

With strong political leadership this can be a recipe enabling the successful delivery of the NIS.

What we must avoid during delivery are knee jerk reactions, digging up in response to a sharp frost, constant pruning and replanting because then, to continue the analogy, we will not deliver the full

and healthy blooms which can deliver growth and sustainable infrastructure for the future.

It will require respect and understanding of our respective roles, private and public sectors and collaboration to meet our goals.

All of us in this room have a part to play, we have done it before both in the distant and more recent past, I have not said anything tonight which I and others have not been saying for very many years. We cannot keep fudging the issues, industry, government, educators, financiers have to come together and deliver for the benefit of our society. We are now six months into a new government the next 18 months will be critical in making key policy decisions for the action required over the following ten years.

We know what to do, we have done it in the past, with consistency of vision, strong political leadership at the highest levels, collaboration and determination we can do it again.

Thank you