

# DELIVERING VALUE

## INTRODUCTION

One hundred years ago the foundation stone of this magnificent building was laid by Sir James Charles Inglis, just before Sir Alexander Siemens took office as the 46th President of this Institution.

One of the big imperatives in 1910 was to build new transport infrastructure in this country. As a result, the government of the day established the Roads Board. It was funded by Lloyd George's excise duty on petrol, at thrupence a gallon, and it was tasked with awarding grants to local authorities for road improvements and the construction of new roads.

I now stand before you as the *one hundred and 46th* President. So tonight I'd like to look at how things have changed since this building was started.

The economic and environmental backdrop is very different to 100 years ago. In 2010 we still need more transport infrastructure. We also need more energy capacity, improved water and waste facilities, and all the other essential ingredients to support our economy. Across the world, communities desperately need new and improved infrastructure to support a growing global population, on course to rise to nine billion people by 2050.

But there are positive signs. There is a growing recognition of the value of infrastructure – and a growing recognition that our health and prosperity depend on it. Around the world, infrastructure and civil engineers are moving closer to the heart of society.

Here in the UK, only last week the new Government published its National Infrastructure Plan<sup>i</sup> - a long-term vision for investment in infrastructure in this country. This is a first.

A very welcome feature of the plan is that it covers all sectors of infrastructure. It takes a joined up, systems approach. This is another first.

And members of this Institution have been involved in developing the vision.

But it's not all good news. In the UK and indeed globally, we face unprecedented economic conditions. These have led to massive cuts in public sector spending and inevitable scrutiny of infrastructure investment plans; scrutiny to levels that our industry has never seen before.

So the imperative today is to deliver more for less. It is now crucial that civil engineers and our industry can show that we deliver 'value for money'.

At the same time, the world faces unprecedented environmental conditions, partly caused by an alarming growth in greenhouse gas emissions. Engineers are locked into a race to find ways to reduce emissions and to produce low carbon solutions for infrastructure.

Our imperative is to achieve the maximum benefit from the minimum carbon, in both emissions and embodied carbon in buildings and infrastructure. So we must also show how we deliver 'value for carbon'.

What **is** 'delivering value'? How do we recognise 'value' when we see it?

Delivering value is not to be mistaken for producing cheap or low quality work. It's not about reducing attention to safety. It's not about taking short cuts in protecting the environment. And it's not about making savings today, at the expense of higher costs tomorrow.

Delivering value is about achieving the maximum benefit – for society or for investors – from the resources they can afford. It's about making every pound, every euro, and every dollar count. It's about making every unit of carbon count. And it's about making every job count.

As infrastructure takes its rightful place centre stage, at the heart of society, civil engineers must show how they are delivering value. There is nowhere to hide - we are now firmly in the spotlight.

Society has the right to demand that civil engineers maximise the benefit from our scarce resources. Society needs us to deliver value.

## **VALUE OF INFRASTRUCTURE**

So why is infrastructure moving towards centre stage? What has prompted the change of attitude to infrastructure by governments and society around the world?

Sometimes it requires things to go wrong, or get close to going wrong, before the general public and the media sit up and take notice.

In recent years various parts of the world have seen large-scale flooding – in Cumbria, after Hurricane Katrina and most recently in Pakistan – drawing the public's attention to drainage, river management and flood defences.

In the UK, we've seen widespread damage to our roads after last year's heavy snowfall – highlighting the importance of highway maintenance.

Daily we see congestion on our transport systems. The commuter railways into London come to mind – drawing attention to our transport infrastructure.

That's when politicians show interest and that's when governments start to act.

And there's a growing urgency to provide more electricity generation as nuclear and coal-fired power stations approach the end of their operating lives.

All of these things prompt the public, politicians and governments to take a real interest. Infrastructure moves to centre stage.

What else has happened recently? We've experienced the global financial crisis followed by measures to reduce funding deficits. A new coalition government has been elected in the UK, with a mission to drastically cut

public sector expenditure. The level of capital spending on infrastructure has been thrust into the spotlight.

We have seen other changes in the government's approach:

- the appointment of a Chief Construction Adviser
- a new planning regime for major infrastructure projects
- the creation of Infrastructure UK within the Treasury
- and the announcement of a Green Investment Bank, to support the funding of low-carbon solutions.

And last week, the government unveiled its long-term vision for infrastructure.

With this new focus we have the framework and the will to address the UK's needs.

Maybe before long we'll have a Minister for Infrastructure in the UK.

The existing fabric of this country is in need of serious attention. The UK is ranked 33<sup>rd</sup> in the world<sup>ii</sup> for the quality of its infrastructure by the World Economic Forum. This is below all our major competitors in Europe and North America.

Does this matter? Well, yes it does.

Investment is needed to ensure the UK's economy remains competitive, to deliver energy security and to underpin the transition to a low carbon economy.

As Past President David Orr so wonderfully put it:

*"A nation that neglects its infrastructure neglects its future, whereas a nation that respects its infrastructure respects its people and provides for their sustainable future."<sup>iii</sup>*

How big is this challenge? Infrastructure UK has estimated that an investment spend of 40 to 50 billion pounds is needed each year until at least 2030<sup>iv</sup>.

Of course, this will not all come from the public purse. Private sector finance and expertise are essential. But government has the responsibility to create the vision and to ensure the necessary conditions to encourage investment.

In his address this time last year, Professor Paul Jowitt heralded an engineering renaissance – a time to build and rebuild our infrastructure.<sup>v</sup> And Paul made it very clear to us that the time for this great renaissance is now.

So Paul, are we closer? Has the renaissance arrived? I don't think so quite yet, but there are promising signs.

What is clear is that infrastructure is now much higher on the Government's agenda. Society is recognising the importance of its infrastructure – dare I say the value of infrastructure?

More than ever before, society has a right to expect civil engineers to deliver value.

## **VALUE FOR MONEY**

Everyone talks about value for money. But, what is that? Money is a precious commodity, in some ways a scarce resource.

Governments need to ensure the best use of limited public funds. Private investors need to ensure the best return on their capital employed. Both strive to achieve value for the money they invest.

All clients expect civil engineers to deliver value for money. All investment in infrastructure must be used to deliver maximum benefit. All of it must count.

I've spent the last 25 years working on large projects. I've built roads, railways and new town infrastructure. I carried out an audit of the

Scottish Parliament building, and I've reviewed projects in transport, energy and nuclear decommissioning.

I've learnt that there are two vital steps in delivering successful projects – getting the governance structure right and having an effective project client:

- a client who's accountable for the investment in the project and for the benefits that will result;
- a client who works closely with the other key players throughout the life of the project to achieve the right return on that investment;
- a client who ensures the project delivers value for money.

Mike Nichols, chairman of the Nichols Group wrote in a paper for the National Audit Office<sup>vi</sup>,

*"As a consequence of effective clienting, there is a substantially increased likelihood of intended outcomes being achieved".*

Or put another way it's more likely that value for money will be delivered.

There's been plenty of excellent guidance on being a good project manager, but very little on being a good client – despite the client's role being essential for the success of a project.

Recognising this gap, the Institution published its Client Best Practice Guide<sup>vii</sup> last autumn. This was compiled by a group of industry experts, led by Sue Kershaw and David Hutchison. The guidance is out there.

But good clienting alone will not drive the savings required. There is much more to be done.

We've seen the size of the infrastructure investment challenge – up to 50 billion pounds a year until at least 2030. To attract this much investment from domestic and international companies, and to get the maximum return on reduced public sector budgets, UK construction has to be competitive with the rest of the world. The UK must be seen as attractive to invest in.

There's evidence that the cost of infrastructure is much more expensive here than in other countries. And this seems especially true for civil engineering compared to other disciplines.

In 2007 the European Commission ranked the UK as the fifth highest of the 27 member states in terms of construction price levels<sup>viii</sup>.

Is this really true? Does infrastructure really cost more in the UK? If it does, why is it more expensive? And what can we do about it?

This summer, Infrastructure UK launched an investigation into ways of reducing the cost of our major infrastructure projects. This Institution is playing a key role in the study and I am delighted to be leading this work for ICE. We are the focal point for contributions and the whole industry is behind us. We've received enthusiastic support from clients, consultants, contractors and suppliers. It's an excellent example of the industry coming together to address a problem. We are all determined to find ways of delivering better value.

If we can reduce the overall cost of infrastructure by a number of percentage points over the next five years, government and investors will save billions of pounds. Or they could build more with the same level of funding.

When we achieve these savings, civil engineers will be seen to deliver value.

## **VALUE FOR CARBON**

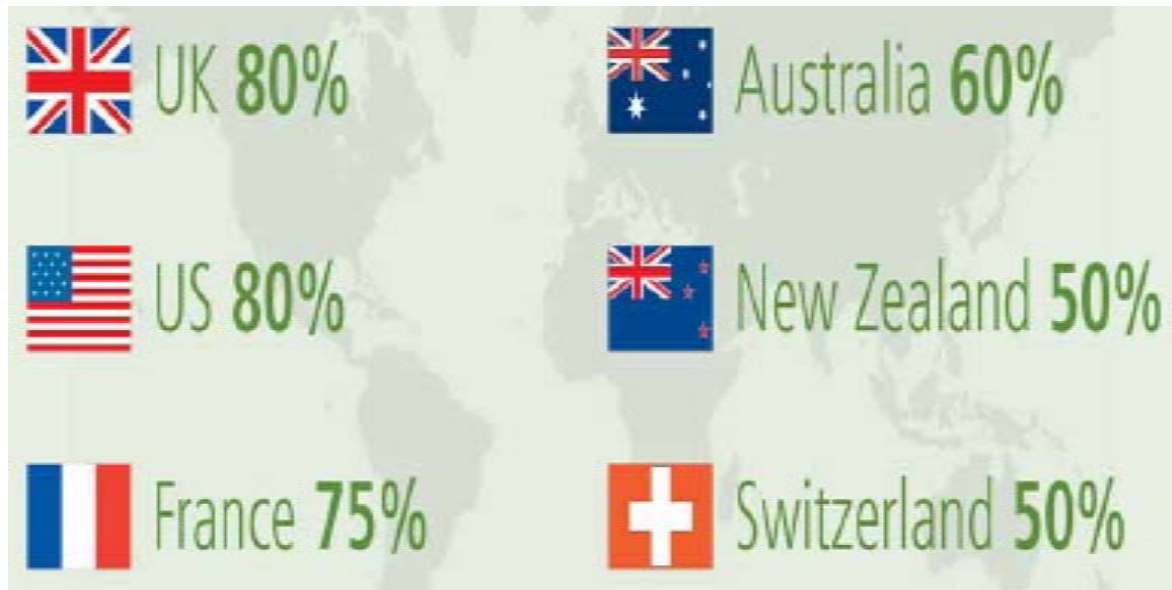
If only it were that simple.

As civil engineers, we now have conflicting pressures. As well as the urgent need to reduce costs, there is another imperative – to reduce the carbon that's embodied in or used on the infrastructure we create.

It's very clear to me that the future has to be low carbon. Here in the UK the Government is committed to reduce carbon and greenhouse gas

emissions. This is enshrined in the Climate Change Act, 2008<sup>ix</sup> and the Climate Change (Scotland) Act, 2009<sup>x</sup>. The Institution applauds this commitment.

But we have to act fast. The targets for the reduction in the UK's emissions are 26% from 1990 levels by 2020 and by no less than 80% by 2050. And as you can see, many governments around the world have made similar commitments. This is a truly global issue.

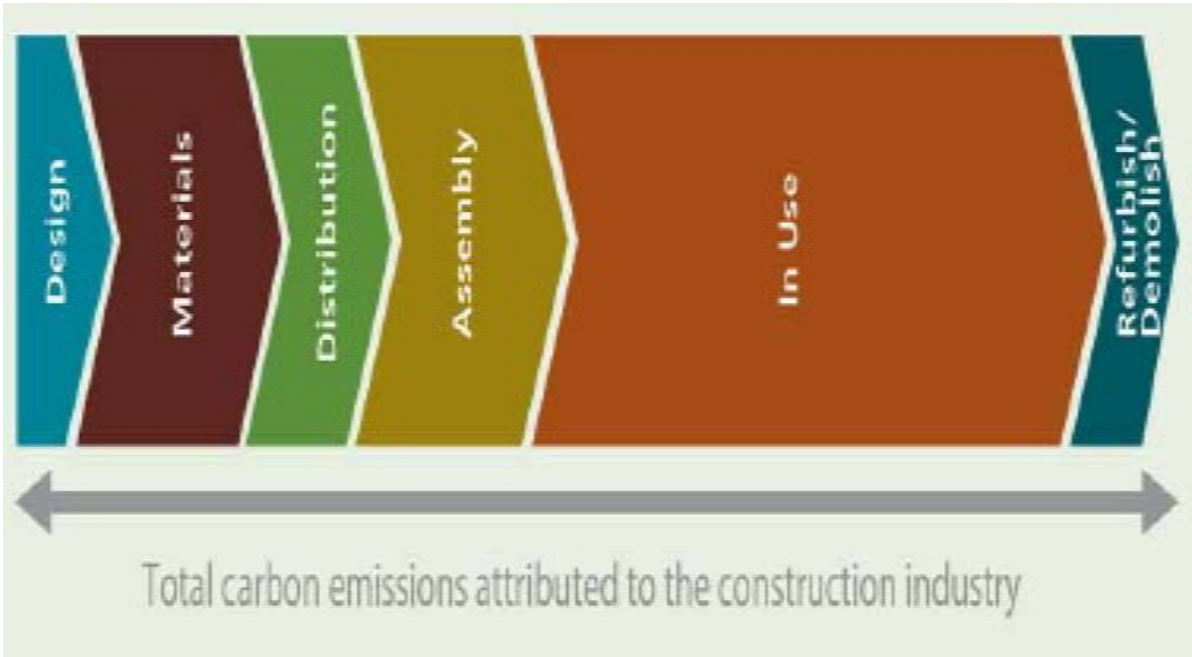


*Committed reductions by 2050 – UK and US 80%, France 75%, Australia 60%, New Zealand 50%, Switzerland 50%<sup>xi</sup>*

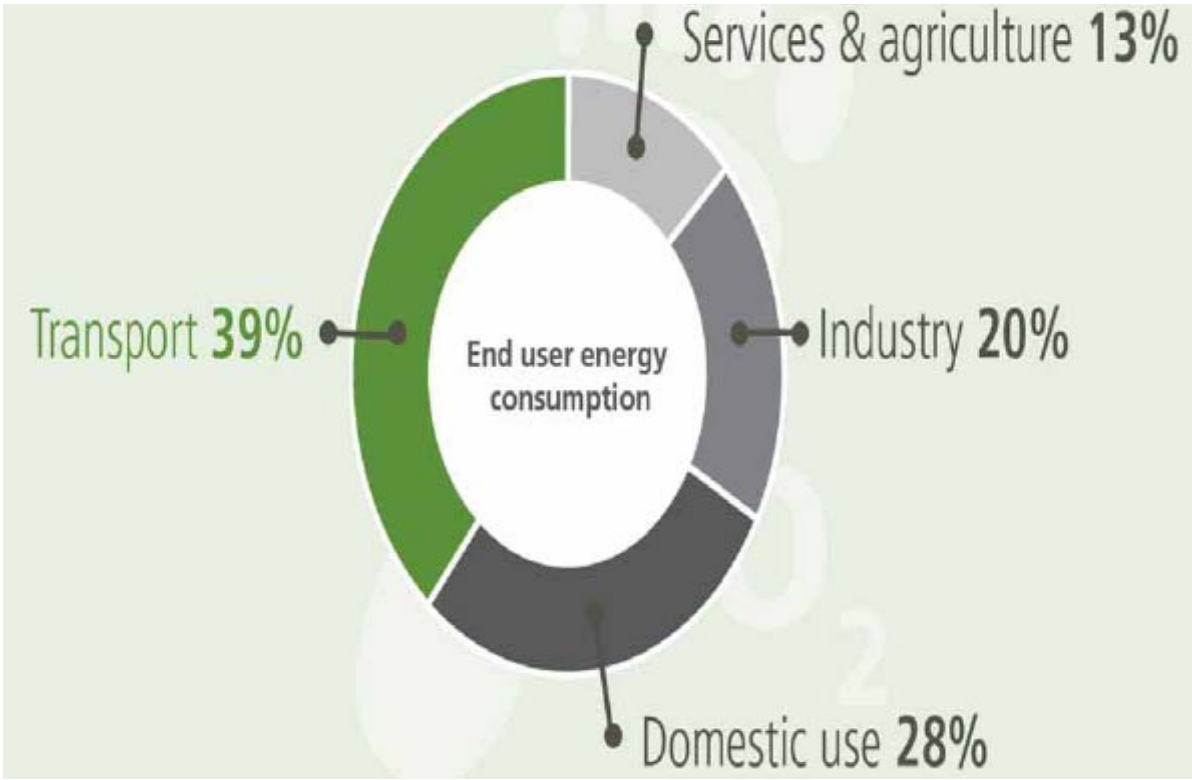
And it is particularly relevant to civil engineering. We know that the operation of infrastructure is one of the largest consumers of carbon – particularly in energy, transport, water and waste. And the very creation of new infrastructure uses carbon. So carbon will have a major impact on how we practise civil engineering.

In his recent report<sup>xii</sup>, Paul Morrell, the UK Government's Chief Construction Advisor, shows the carbon emissions resulting from the whole life-cycle of construction – from design, materials, distribution and assembly. And that is before any emissions generated through the use of the new infrastructure.





UK government data<sup>xiii</sup> sets out end-user energy consumption as shown on the chart below.



You can see that our transport networks use the most energy, so I'm going to focus on transport.

This next chart<sup>xiv</sup> shows greenhouse gas emissions by transport mode.



It's clear that reducing emissions from road transport will be a major step in achieving our carbon reduction commitments.

The good news is that there's already much progress in this area. Electrification of passenger cars is happening, both with new vehicle technology and the provision of battery charging facilities. But it's early days.

We know it's beneficial to move people from road to rail, but that needs much more rail capacity. All of that new capacity cannot be created overnight, and to be truly effective it requires the electrification of much more of the rail network. We'll start to see some of this happening over the next decade.

Some road freight can be transferred to rail, but not enough of it. So for the foreseeable future, we will continue to see many lorries on our roads. Bio fuels may have a role to play replacing diesel for long distance HGV trucks.

And civil engineers have a direct role in reducing emissions from roads. Highway design itself makes a huge contribution – removing pinch points on trunk road networks, creating more grade separation, introducing intelligent transport systems – all ways of reducing traffic congestion and improving carbon efficiency.

The industry is also developing lower carbon construction materials and using more low carbon construction methods. And UK academia is at the forefront of low carbon research.

But reducing carbon comes at a price. The cost of decarbonising the UK energy sector alone has been estimated at over 230 billion pounds<sup>xv</sup>.

Do we have a choice?

Well, we could continue to design and build infrastructure the way we did yesterday and the way we mostly do today – old ways of doing old things. But that will not make much difference to the levels of carbon – it might actually increase it. We cannot accept that.

We could make a small shift, continuing to develop and improve our existing methods and technologies – new ways of doing old things. That will help but it will not meet the targets.

No, if we are to reduce carbon to the extent required, we must do things **very** differently. We must innovate – we need to find new ways of doing new things. Only then can we radically change our industry. Only then can we achieve the carbon targets demanded.

As Keith Clarke challenged us in his Brunel Lecture<sup>xvi</sup> earlier this year, civil engineers urgently need to move outside their comfort zones; we need to go beyond rhetoric. Civil engineers must lead the way in creating the society we aspire to live in.

In the Institution's *State of the Nation, Low Carbon Infrastructure*<sup>xvii</sup>, published last November, we said

*“the challenge for the engineer in the low carbon age is to understand and minimise the carbon emissions associated with*

*designing, constructing, operating and maintaining the infrastructure network, while still meeting society's needs".*

This is still true.

Earlier this year I led an expert panel, of ICE members and other specialists, that reported to government on how the UK construction industry can become 'fit for purpose' to deliver a low carbon future<sup>xviii</sup>.

We concluded that our profession has a pivotal role to play in delivering the infrastructure solutions that reduce carbon emissions and support the growth of our economy.

Less carbon usage does not mean less construction. It means constructing different forms of infrastructure, by different methods, using different materials. And to do that we need to develop new skills and new tools.

We need new tools for project appraisal. Today this is about whole-life costs and net present value in monetary terms. We refer to 'Capex' and 'Opex'. We now need to add the carbon factor. We need to know how much carbon will be embodied in the proposed infrastructure, and how much will be used during its construction and operation.

We need to know the 'CapCarb' and the 'OpCarb' – new terms for most of us. And importantly we need to understand the relationship and trade-off between these two measures. For example, a relatively flat road alignment is likely to pay for itself in reduced carbon emissions, even though it requires extra earthworks.<sup>xix</sup>

We also need new tools for risk management. Today we quantify risks in money and time. We now need to add carbon risk to the mix. What are the carbon threats and opportunities from delivering a project? What are the carbon threats and opportunities from making a particular change?

And we need new approaches to how we contract. Today we have target cost contracts. Should we now have target carbon contracts? Should all clients set incentives for contractors to reduce carbon used during construction?

The goal is minimum carbon and maximum benefit to the environment. This is similar to minimum cost and maximum benefit to the economy.

We are all familiar with '*Value for Money*'. Now we must think about '*Value for Carbon*'.

The Institution is continuing to drive this agenda. I've asked Tim Chapman of Arup to lead a new panel to set in train the Institution's *Low Carbon Routemap to 2050*. His work will offer a greater understanding of what types of infrastructure are needed for a low carbon world. It will examine construction processes and regulation, advising on which are carbon-efficient and which are not. And it will propose means to evaluate projects, based on whole-life carbon and other factors. Tim will bring this to Council next autumn.

Reducing carbon, on the scale demanded, is a huge challenge for all of us. In an interview with NCE, Paul Morrell described it as "*the biggest change management programme that the industry has faced since Victorian times*"<sup>xx</sup>. It is our challenge for the decades ahead.

The Victorian engineers, our eminent predecessors, are remembered for their legacy in creating the infrastructure of this country, and indeed the infrastructure of many parts of the world. Let our generation's legacy be the low carbon infrastructure we create in the first half of the 21<sup>st</sup> century.

***INTERLUDE - Infrastructure makes a difference to the world we live in.***

## **VALUE OF ENGINEERS**

Imagine a world without professional qualifications, a world where we have no way of knowing who is competent and who is not. Who we can trust and who we can't. It's actually quite scary.

It might mean going for a major operation and hoping that the surgeon is qualified. How do we know? It might mean getting on a plane and

hoping that the pilot had passed his last proficiency check. How do we know? And it might mean crossing a bridge and hoping that it's not going to collapse. How do we feel about these scenarios? Our lives could be at risk.

But there's much more to this than just getting a professional qualification. Imagine a world where these professionals don't bother to keep up to date with advances in their field.

We expect the medical profession – doctors and nurses – to have regular training to maintain their knowledge of the latest advances in what they do. We expect airline pilots to undergo regular training and assessment. All these professions owe a duty of care to the people who place trust in them. Why should civil engineers be any different? They should not.

As civil engineers, we must show the value of our professional qualification. We must show we're competent to practice. And we must inspire trust in what we do and how we maintain and develop our competence. Society deserves no less.

The Institution has taken steps to inspire that trust. As vice president membership I brought proposals to Council for members to declare their Continuing Professional Development, their CPD, each year. Tangible evidence to support the trust that society has placed in us.

We know that CPD monitoring drives the recording and maintenance of competence. So we've set up a panel to oversee the auditing of CPD records. We've moved CPD centre stage.

This has not been universally popular. For our younger members, CPD is already a way of life. For some of our older members, it is not. I make no apologies. I am proud to have raised the importance of CPD. We all need to stay competent – and be able to demonstrate how – so we can justify society's trust in us. And we all need to learn new skills for the future – our low carbon future.

Today's civil engineering is not the same as yesterday's. Tomorrow's will be very different again.

The knowledge that we have worked so hard to get is precious. What if we kept that knowledge to ourselves and didn't share any of our experience and wisdom with others? What if every young engineer was left to learn the hard way, by trial and error? How sensible would that be?

We've all gained considerable knowledge during our careers as civil engineers. And we can all share it with others. It's of limited value if we don't. Experienced engineers can make a huge contribution to the profession by mentoring less experienced engineers – passing on their wisdom and knowledge.

For the last six years, the Graduates and Students National Committee (GSNet) has been operating its Mentor of the Year competition and I'm proud to have been a judge for three years. This year's competition was sponsored by Mott Macdonald. Through this scheme we have seen the dedication and care that mentors provide.

I've acted as a mentor and coach myself to a few young engineers and other professionals. At least one of whom is here this evening. I have found it one of the most rewarding things I've ever done – seeing them grow and achieving their goals.

So, this is my challenge to every one of our members – at every stage of your career. Pass on some of your wisdom. Offer yourself as a mentor. Let that be your legacy to the profession.

In recent years the profession has done well in improving both the quantity and quality of civil engineering undergraduates. But that good progress will count for nothing if we can't provide jobs when these students graduate. And we are already seeing worrying signs of that coming true. Over 13 percent of last year's graduates are still without a job.

I know the current economic climate makes recruitment decisions much more difficult. But we must look further ahead. It's vital for our industry.

Despite the economic circumstances, we must continue to build the skills needed for the future. We must develop and encourage the engineers of tomorrow. This means resisting the temptation to make the easy cuts in training and graduate employment. We all know these are often the

areas that get squeezed when companies are under financial pressure. But these are false economies.

Delivering value means cutting out things that are unnecessary, eliminating unnecessary cost. But do we always think through the consequences? We've seen it before. In previous recessions, a hiatus in recruitment has caused a shortage of trained engineers in later years.

We must learn from the past. As Paul Jowitt reminded us, we must not lose a generation of young engineers. We must act.

ICE is working closely with industry to find ways to secure the supply of the engineers that we need for the future. And the industry, in turn, must continue to recruit and develop these engineers. We must rise to the infrastructure challenge. We must rise to the low carbon future. We owe that to society.

Now I want to look at an even younger age group. How do we enthuse young girls and boys to become our engineers of the future?

ICE is very active in this area: providing input into 14-19 engineering and construction diplomas; launching an advanced technical apprenticeship; delivering positive messages in schools about civil engineering careers; and providing resources and materials to show young people what civil engineers and technicians do.

This works best when we collaborate with other professional bodies, particularly the Royal Academy of Engineering, STEMNET, and other institutions. ICE is an enthusiastic supporter of the Engineering UK's *Big Bang* national schools fair which is growing every year.

As I've visited some of our regions, I've seen the excellent work being done by our schools ambassadors. During this coming year I'm taking this to another level – I'm launching a national schools initiative. This will involve every region of the UK. My objective is to create awareness of engineering as a career, at an age before curriculum choices have to be made.



With the growing public interest in the London 2012 Olympics, ICE has worked with partners to design a project centred on sports venues, the *Create Sport Challenge*. We're aiming at boys and girls around 12 or 13 years old.

School teams will be encouraged to create a design for a community sports venue and to build a model of it. They will need to consider engineering issues, such as planning, the environment, transport and materials. Participating schools will receive visits from civil engineers – our members – who will provide advice on the technical aspects of the project.

As well as inspiring the pupils, my aim is to create awareness with parents and with teachers. As we know from our own school days – and it's backed by research<sup>xxi</sup> – parents and teachers are influential in shaping and encouraging future careers.

The initiative is being funded by external sponsors, and I am very grateful to the Kirby Laing Foundation, the Ove Arup Foundation, the BRE Trust and others who are supporting the competition.

As President, I hope to visit some of the schools who are taking part during my UK regional visits. And I am looking forward to seeing the finalists here at One Great George Street at a celebration day in June next year. This is very exciting. And who knows, if it's successful, we might see a similar competition become an annual event.

As the engineers of today, we must deliver value to society by encouraging and inspiring the engineers of tomorrow.

## **VALUE OF THE INSTITUTION**

My last topic tonight is this Institution. How does it deliver value across the world – value for its members and value for society?

Nearly 200 years ago the Institution's first members met in London coffee shops to discuss engineering. The Starbucks of the 1820s!

Not surprisingly, ICE's strategy has evolved over the last 190 years. We now serve over 80,000 members in more than 150 countries and we work closely with many other national engineering bodies. We are a UK based organisation with global engagement.

Our modern day strategy was formed in 2003, under Adrian Long and Doug Oakervee. I'm proud to have been part of that team. I led a review of our strategy<sup>xxii</sup> earlier this year and we agreed that it remains relevant today.

It sets out how the Institution delivers value:

- professional civil engineering qualifications, for all grades of the engineering team, to ensure that society's trust is justified;
- a high quality knowledge network and latest engineering thinking to keep that trust;
- and an independent voice for infrastructure to influence governments to do the right things for our future prosperity.

All of this is underpinned by our values:

- trust and honesty
- ethical behaviour and integrity
- high standards, and
- quality and professionalism.

These values shape and guide everything we do. These are values I'm proud to uphold.

I've had the privilege of serving this Institution for several years – as chairman of finance committee, as vice president membership, and as chairman of Thomas Telford Limited.

I now serve you as President. My role is to lead this great Institution and promote its policies and the interests of the profession. Crucially, this

includes listening to members and telling them what we're doing and why we're doing it.

I am very clear that this Institution must deliver value to our members as well as to society.

Hidden away in the Lake District preparing for this address, I received an email from a young member called Matthew. Matthew had written an essay<sup>xxiii</sup> on how engineering should respond to the needs of society and why it is failing to do so.

Matthew argued:

- not only that engineers could take the lead, but that they should;
- that engineers should not just watch change happening, but they should lead it;
- that the role of the Institution is not to be the star of the industry but to be the guardian of civil engineering knowledge;
- and that relating with the public is not the role of the Institution, but the role of the engineer – the role of every engineer.

And Matthew said something else. Commenting on the debate earlier this year regarding the charges we apply for hiring rooms in this building, he writes: "this example describes an organisation that has lost its way. It is an organisation whose purpose is to promote acquiring engineering knowledge but then chooses to make it harder to do just that."

Matthew, we've not lost our way, but in a way you are right. We must never forget our purpose. We must never forget our role. And we must never forget that we are here to serve our members, and to deliver value.

## **CONCLUSION**

Ladies and gentlemen,

I've covered much this evening:

- the value of infrastructure – essential for economic growth
- value for money – our professional obligation

- value for carbon – our legacy for the future
- the value of civil engineers – always professional and inspiring the next generation
- and the value of this Institution – for our members and for society.

As infrastructure, the economy, carbon and our industry move centre stage, so do we. Civil engineers at the very heart of society.

There will be no great change of direction during my year as President. I see my role as taking the baton in the relay, but not changing the direction of the race. A race to deliver value.

I will promote our strategy, uphold our values, listen to members and work hard to serve the Institution.

We are right in the spotlight. Our future is centre stage. The future depends on us.

### **Acknowledgements**

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