The Challenges

Infrastructure Investment
• Publicly-funded infrastructure investment has helped connect Scotland’s cities, upgrade aging railway infrastructure, decarbonise energy generation and transmission, improve drinking water quality and driven consistent economic growth since mid-2012.

• There has been a 9% reduction in university students studying civil engineering in the five years to 2014, and a 32% reduction in the number of Further Education students on civil engineering courses over the same period.

Recruitment of an additional 180 civil engineers is required each year to meet industry needs.

Industry Transformation
• The UK total of female engineers working within the construction industry is the lowest in Europe. Attracting underrepresented groups into the profession and increasing the participation of women is vital if the industry is to remain vibrant, innovative and economically competitive. Increasing the participation of women in the UK labour market could be worth £15 billion - £23 billion (1.3-2% GDP), with Science Technology Engineering and Maths (STEM) accounting for at least £2 billion.

Climate change
• Since 1990 the UK has experienced 8 of the 10 warmest years on record, and 5 of the 10 wettest years. 2015 has been the second wettest year, and December 2015 the wettest calendar month, on record.1
• Scottish Environment Protection Agency recorded over 50 new record river levels across Scotland in December 2015/January 2016.
• Cost to the Scottish economy of winter 2015/16 storms estimated at £350m- £700m2

Population change and movement
• Scotland’s population is expected to grow by 7% by 20393, the number of people aged 65+ is expected to grow by 28% by 20394, and the working age population is expected to grow at a slower pace over the same period. This means more infrastructure network users, but a smaller working-age population and smaller funding base to meet our investment needs.

• 89% of the UK population is likely to live in urban areas by 2050 compared with 82% currently5

Skills shortages
• Knowing who will deliver the next generation of infrastructure and maintain our existing assets is as important as knowing where and when we are likely to need infrastructure in the future

Annual average infrastructure output growth in Scotland is expected to decline between 2015-2019 as several key infrastructure projects reach completion.6

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1 http://blog.metoffice.gov.uk/2015/12/31/whats-been-happening-to-our-weather/
4 from 1.06m in 2014 to 1.36m
9 http://www.engineeringuk.com/View/?con_id=145
Commit to Infrastructure

High quality infrastructure is the foundation of civilised living, and allows us to thrive in a competitive world. It drives change and regeneration, and supports our social infrastructure – schools, hospitals and housing. Fundamentally, it underpins sustainable economic growth, positive social outcomes, and our ability to compete internationally. Our members design, build and maintain Scotland’s infrastructure, and are dedicated to its high standard and success. ICE Scotland’s manifesto highlights the issues which will shape the future delivery of infrastructure in Scotland, and offers practical ways forward. All parties recognise the importance of good infrastructure to Scotland’s future, and as such we call on policy makers to commit to:

**Resilience**
Enhance the resilience of all networks to climate and demographic change, preparing systems to meet future needs and challenges

**Delivery**
Achieving a long-term, cross-party vision for infrastructure, underpinned by sustainable investment, and delivering maximum value for public money

**Skills**
Upskill Scotland’s workforce and grow a talent pool of engineers to meet our future infrastructure needs

The importance of designing in resilience to our networks was highlighted during this winter’s extreme weather events, where significant disruption and damage to transport and utilities infrastructure was experienced. Restoration of damaged assets – including sections of the West Coast Main Line – may take several months, in turn putting pressure on other networks.

In addition to considering the ‘what?’, ‘where?’, ‘how?’ and ‘why?’ of infrastructure planning and investment, the question of who will design and deliver Scotland’s future infrastructure is vital. Scotland will require a skilled and sufficiently plentiful workforce to continue to deliver high quality and reliable infrastructure into the future. Upskilling our existing workforce, attracting a new generation to the engineering profession and diversifying the workforce will all contribute to creating a dynamic, flexible workforce.

**Context**
Much of our key infrastructure is the result of historic investment decisions, the benefits of which we continue to enjoy today – rail transport across the Forth Bridge, aqueducts from Loch Katrine which supply Glasgow’s water and energy from the Cruachan pumped-storage hydro-electric power station among many others. Investment in infrastructure doesn’t just address the challenges we face today, but establishes the core and extends the life of our existing infrastructure assets upon which the future social and economic success of the country depends. This is why it is vital that infrastructure be considered over a long timeframe.

Increased pressure will be put on our transport, water, energy, waste and flooding networks, change how people use them and put strain upon resources available to fund them. They are factors which require consideration in all infrastructure design and investment to maximise public benefit and value for money.

#commit2infra

**Join the Debate**
Our Manifesto for Infrastructure builds upon the recommendations from our State of the Nation Scotland reports. It provides overarching and specific policy interventions required to support Scotland’s infrastructure ambitions.

Whatever the result in May 2016, it is vital that infrastructure continues to be at the heart of Scotland’s economic plans, and that all political parties in Scotland Commit to Infrastructure.
10 Point Plan for Infrastructure

The next Holyrood administration should:

1. Undertake an assessment of Scotland’s long-term infrastructure needs, taking account of their interdependencies. This assessment should inform the prioritisation of capital investment projects to deliver sustainable economic growth, international competitiveness, and positive social outcomes for people in Scotland.

2. Align strategic plans and delivery pipelines at national and local levels. A modernised planning system should engage with the interdependencies of energy, water, transport, flooding and waste infrastructure.

Government and private providers should:

3. Enhance the resilience of all networks to climate and demographic change, preparing systems to meet future needs and challenges.

4. Continue to provide foresight of national infrastructure projects for industry and investors, along with likely timescales for procurement.

5. Ensure public bodies have access to appropriate levels of infrastructure procurement expertise.

6. The construction and engineering industry should take a central role in addressing skills shortages, by developing strategies for upskilling the existing workforce and encouraging young people and underrepresented groups into the sector.

Sector specific:

7. Scottish Government energy policy should seek to meet future energy needs in a pragmatic, sustainable and resilient way, making full use of expert scientific and technical advice. Energy policy development should consider all viable energy modes and sources, their implications and interactions. The United Kingdom (UK) Government should focus on creating a stable environment for investment in energy infrastructure, particularly low carbon energy, to build system resilience and meet our energy needs.

8. The Scottish Government and local authorities should fully commit to addressing the road maintenance backlog, moving to a system of planned and preventative maintenance, underpinned by a multi-year investment programme.

9. Local transport planning should be more closely aligned with city region structures and issues of overlapping planning and governance should be addressed. Greater integration between different modes of transport should be prioritised to promote modal shift to public and active transport.

10. Increased energy efficiency, water conservation, and demand management in our water industry should be central features of future improvement and infrastructure investment, alongside enhanced resilience in treatment and supply.
The ‘domino effect’
The impacts of the 2015/16 winter storms on transport networks, utilities and communications, and the closure of the Forth Road Bridge in December, comprehensively demonstrate the risks of a ‘domino effect’ – where failure of one asset impacts upon the performance of other networks and systems. Resilience should be embedded into the decision-making process around priority infrastructure projects, so new infrastructure is ‘fit for the future’, while ensuring appropriate maintenance of existing infrastructure.

Decarbonisation
Scottish Government has committed to a low-carbon future, with ambitious targets for emission reduction and decarbonisation of energy and transport. It is vital energy policy decisions are made with resilience in mind as well as sustainability, for both generation and transmission, and an acknowledgement that changes to energy policy will impact upon other infrastructure networks’ operation.

HOW?
• Flood risk adaptation strategies should be integrated into all spatial and infrastructure planning, designed to include the adequate routing of exceptionally high flows.
• The resources, skills and capacity to deliver flood risk management need to be ensured for the future, including adequate long-term funding for defence infrastructure maintenance.
• The Scottish Government and local authorities should fully commit to addressing the road maintenance backlog, moving to a system of planned and preventative maintenance, underpinned by a multi-year investment programme.
• Energy policy should seek to meet future energy needs in a sustainable and resilient way, making full use of expert scientific and technical advice, and acknowledging the potential impacts of decisions on other infrastructure networks.

Goal: Enhance the resilience of all networks to climate and demographic change, preparing systems to meet future needs and challenges.

Climate Change
Storms across Scotland during winter 2015/16 saw extensive damage to homes and businesses, and disruption to utilities, communication and transport. Additional financial allocations from Government to local authorities for flood damage are welcome. However, during a period of continued budgetary pressure it is vital Government works with local authorities to ensure they are properly resourced in terms of skills, capacity and finance to deliver flood risk management (FRM) duties, infrastructure interventions and preventative maintenance long-term. Designing adaptation measures into new infrastructure and developments becomes increasingly important, particularly as new housing land requirement grows.
Goal: Achieving a long-term, cross-party vision for infrastructure, underpinned by sustainable investment and delivering maximum value for public money

Funding and finance
There are only two ways to pay for infrastructure - direct taxation or user charges. Continuing public budget pressures require best value for public money. Public funding for infrastructure is constrained, and private financing will increasingly be required to deliver future infrastructure investment. A long-term approach to infrastructure policy-making helps deliver sustainable investment, gives a clear long-term outlook to potential investors, encourages industry to plan resources to deliver work, and helps reduce construction industry cyclicality.

Local and national planning
Lack of alignment between local and national planning strategies, and disconnects between housing, infrastructure, transport, waste and flooding planning mechanisms need addressed. The Review of the Scottish Planning System provides a foundation for further work to consider such issues more strategically, and take greater account of their interdependencies in planning.

The Glasgow and Clyde Valley City Deal, other ongoing city deal discussions and the adoption of city-region structures offer opportunity to plan and deliver cross-boundary services and key infrastructure more effectively. Closer working and shared services deliver financial savings and support greater cross-boundary service alignment and best-practice sharing.

Infrastructure for the future
An independent Scottish Infrastructure Commission, underpinned by a holistic assessment of Scotland’s longer-term national infrastructure needs would build on the existing Infrastructure Investment Plan (IIP).

ICE is currently leading a coalition of business, academic, environment and industry experts to produce an independent ‘National Needs Assessment’ (NNA) to support and inform the work of the UK National Infrastructure Commission.

An NNA and Infrastructure Commission would help build a long term vision and set of joined-up priorities to prepare Scotland’s infrastructure for future challenges and drive our international competitiveness.

HOW?
• Undertake a National Needs Assessment (NNA) to support the work of an independent Scottish Infrastructure Commission.
• Align strategic plans and delivery pipelines at national and local levels. A modernised planning system should engage with the interdependencies of energy, water, transport, flooding and waste infrastructure.
• Provide foresight of national infrastructure projects for industry and investors, along with likely timescales for procurement.
• Align local transport planning with city region structures and address issues of overlapping planning and governance.
Goal: Upskill Scotland’s workforce and grow a talent pool of engineers to meet our future infrastructure needs

Skills

UK STEM industries face a skills challenge at all levels. Priorities include attracting the next generation of employees, recruiting to replace those who left the industry during the economic crisis and upskilling the existing workforce to succeed the 30% aged 50+ who will soon leave the industry. A greater understanding of local skills requirements would aid the smoothing of cycles of demand and inform local skills developments. Industry must play its part, but improved long-term national infrastructure planning by the next administration will aid this process.

Attraction and retention

Improving uptake of Science Technology Engineering and Maths (STEM) subjects in schools, the creation of clear pathways between school and further/higher education and work, and improving awareness of Modern Apprenticeships as an entry route to civil engineering will help attract more people into the industry. Support must be given to industry efforts to improve pathways, such as Foundation Apprenticeships in Civil Engineering and the Highland Shared Apprentices Scheme.

The multiplicity and fragmented nature of small-scale STEM education initiatives should be addressed to deliver greater coordination and impact, highlighting engineering as a career for all.

Numeracy, project management and problem solving skills make civil engineers attractive across sectors beyond engineering, eroding numbers of graduates moving into industry. Interventions are required at all levels – from primary school to employment – to ensure there are sufficient civil engineers and civil engineering technicians to deliver Scotland’s vital social and economic infrastructure into the future.

Improving diversity

Fewer young women choose STEM subjects at school. If they progress to study science or engineering few end up in the industry. Once in the industry, few return if and when they have children. Although the number of women in the profession is slowly rising, with graduate numbers at 18%, women represent only 10% of ICE’s Membership – a number mirrored across all engineering disciplines in the UK. It is clear women, and other underrepresented groups, remain an untapped resource in addressing the UK’s skills crisis. The construction and engineering industries should take a more active role in increasing diversity in their own ranks – a key aspect of the Scottish Business Pledge.

Enhancing capability

A flexible and adaptable civil engineering industry is required to address future challenges. Civil engineers will require a broader range of skills including leadership and communication as well as new technical skills – low carbon infrastructure, whole life design, Building Information Modelling (BIM). ICE, as a public benefit organisation, will lead by encouraging our members to take control of their careers and raising awareness of skills for the future.

HOW?

• Scottish Government should use its Infrastructure Investment Plan Project Pipeline to plan for future capability and capacity needs to ensure the Scottish workforce fully benefits from infrastructure projects. Industry should be encouraged to participate in work to identify local skills needs and engage with local skills development schemes to drive a demand-led skills supply.

• The construction and engineering industries should take a more active role in increasing diversity in their own ranks. Greater business involvement in gender and BME-focused fora, and a more joined-up approach between the public, private and third sector will be key to embedding lasting change, and political support should be given to this approach.

• Efforts should be made to address the fragmented nature of small-scale STEM education initiatives to improve coordination and impact, supporting their efforts to highlight engineering and other STEM pathways as a career for all.
Join the Debate

Ahead of the 2016 Holyrood Elections, ICE Scotland calls on all policy makers to sign up to our Manifesto for Infrastructure commitments:

1. Enhance the resilience of all networks to climate and demographic change, preparing systems to meet future needs and challenges.

2. Achieving a long-term, cross-party vision for infrastructure, underpinned by sustainable investment, and delivering maximum value for public money.

3. Upskill Scotland’s workforce and grow a talent pool of engineers to meet our future infrastructure needs.

You can also support our campaign by:

- Retweeting our Holyrood 2016 campaign hashtag - #commit2infra – to be part of the debate, and encourage your followers to do the same.
- Adding a link to our Manifesto for Infrastructure animated video on your website.

Follow us @ICEScotland
#commit2infra

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About ICE
Established in 1818 and with over 86,000 members worldwide, 8000 of whom work in Scotland, ICE is a leading source of expertise in infrastructure and engineering policy and is widely seen as the independent voice of infrastructure. ICE provides advice to all political parties in Scotland and the wider UK and works with industry to ensure that civil engineering and construction remain major contributors to the economy.