

NORTHERN IRELAND



INFRASTRUCTURE 2014

While there has been improvement in some areas since the 2010 State of the Nation report, lack of delivery of key projects leaves parts of our infrastructure at risk.

UK OVERVIEW

Infrastructure is vital to society – our quality of life depends on it functioning effectively and our reliance becomes painfully evident when infrastructure systems fail.

The UK's ability to compete in the global race and to generate and sustain economic growth with appropriate quality of life depends on infrastructure networks that provide predictable energy generation and distribution, water supply, waste management and the transportation of people and essential goods into and around the UK by rail, road, sea and air.

State of the Nation is ICE's flagship report on the current state of the UK's infrastructure. The 2014 State of the Nation Infrastructure report assesses the performance, capacity and condition of the UK's economic infrastructure networks, and determines the actions required in order to improve and enhance performance, and importantly, to ensure that our infrastructure is resilient when faced with the many challenges ahead – from climate change to population growth.

Small amounts of investment have avoided major failures, however elements of our infrastructure are at capacity and decisions must be taken urgently to maintain public benefit.

ICE recognises the reduction in available capital spend since 2010 but key projects have been subjected to continued delay, namely the North-South interconnector, energy from waste plants and the A5 Western Transport Corridor.

We must ensure that commissioning, funding and planning processes are fit to support the delivery of infrastructure for the benefit of all in our society. Investment in infrastructure is a powerful economic tool; each £1 spent generates £2.84 for the economy¹.

This briefing sheet looks specifically at infrastructure in NI. ICE has worked with stakeholder groups to focus on the most pressing issues across five sectors; flood risk management, transport, waste management, water and energy.

FLOOD RISK MANAGEMENT CURRENT OVERVIEW

The three main sources of flooding in Northern Ireland are rivers, the sea and surface water. It is estimated that some 46,000 of the 830,000 properties across Northern Ireland are situated within river and coastal flood plains with approximately one third of these protected by flood defence and drainage infrastructure². 20,000 properties are also estimated to be at risk from surface water flooding³, which is the most frequent source of inundation. While the condition of publically-owned flood infrastructure is broadly considered to be satisfactory, it has insufficient capacity to cope with increasingly frequent heavy rainfall events. In addition, the condition and capacity of privately-owned infrastructure is giving cause for concern.

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FLOOD RISK MANAGEMENT

KEY DELIVERABLES

One government body should have overall authority for flooding

Education for the public and business owners, along with timely flood warnings to allow them to defend their properties

All development must be designed for extreme events when drainage infrastructure is overwhelmed

KEY BENEFITS

A more sustainable approach will reduce the economic, social and environmental impact of flooding

Those best placed to manage flood risk will be able to take appropriate informed action

Flood risk will be proactively managed through better design





WHAT CAN WE DO?

ICE recognised that with the implementation of the Floods Directive and lessons learned from recent flooding events, there has been a significant change in the approach to flood risk management. These advancements, including flood mapping and improved community engagement, have resulted in a more joined-up approach to the protection of people, property and vital infrastructure, as well as planning for, responding to, and recovering from flood events.

However, our changing climate is eroding the degree of protection afforded by flood defence and drainage infrastructure⁴. With over 4500 properties affected by flooding since 2007, it is essential that the Comprehensive Spending Review 2016-2020 reflects the required level of funding to provide adequate flood mitigation measures.

While considerable efforts have been made to promote a joined-up approach, gaps in responsibilities for flood risk management remain. Consequently, ICE supports the recommendation from the Performance and Efficiency Delivery Unit (PEDU) report to "consolidate all flood response organisations under one departmental ambit"⁵.

Statutory bodies can't eliminate all flood risk and communities must be prepared to play their part. ICE supports the promotion of self-help to enable communities, businesses and infrastructure owners to protect their properties. This was demonstrated

in Belfast in January 2014 when, during high tides and a storm surge, government departments made sand bags available at community centres. Vital information was distributed to residents to minimise damage to property in the event of flooding and ensure their safety.

In a changing climate, ICE considers that infrastructure should be designed and constructed taking account of the impact of more extreme rainfall events. ICE supports the introduction of Sustainable Drainage Systems (SuDS) for localised flooding problems but lack of clarity on the long-term maintenance of such assets remains a barrier to wide-spread implementation.

TRANSPORT CONCERNS FOR THE FUTURE

The 2013 State of the Nation report identified ICE's concern that our transport infrastructure is not being well maintained and that road networks in urban areas have insufficient capacity. While the maintenance budget has largely been secured in recent years, the amount is likely to be reduced in coming years, impacting on the capacity for repair work.

There is also concern over the lack of detail given in the Regional Transportation Strategy and it should be updated with definitive timescales and funding streams. The current Review of Public Administration leads to uncertainty surrounding

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TRANSPORT

KEY DELIVERABLES

- Update the Regional Transportation Strategy to include project specifics and timelines
- Identify secured funding streams for new infrastructure projects, and prioritise a maintenance budget for existing infrastructure
- Prioritise key projects across transport sector – road schemes and public transport, but particularly the York Street Interchange and Belfast Transport Hub
- Provide better sustainable infrastructure, particularly for walking and cycling

KEY BENEFITS

- NI's roads infrastructure is its most valuable asset; allowing it to deteriorate will have devastating consequences
- Better public transport services and better sustainable transport infrastructure will encourage a move away from private cars, encouraging better health, air quality, and fewer road deaths

the responsibility for local roads and development control issues. The York Street Interchange scheme is progressing, albeit slowly, and it is encouraging to see the A31 Magherafelt Bypass and A26 Frosses Road projects progressing and that the A5 and A6 schemes are still being developed.

WHAT SHOULD BE PRIORITISED?

ICE identified an urgent requirement for cycling infrastructure in the 2013 report and this is re-emphasised. Immediate improvements to the cycle network are required to reduce the risk to cyclists and other road users, while education around cycle safety is also essential. ICE welcomes the improvements to Victoria Park in East Belfast, particularly the Sam Thompson Bridge which helps open the cycle network. ICE is supportive of efforts to improve public transport journey times but is concerned that the application of rubber wheeled vehicles to the Belfast Rapid Transit scheme will not generate significant efficiency over existing Metro services.

ICE is also fully supportive of an integrated transport hub at Great Victoria Street and that the tender process has begun. This must be accompanied by protected rural transport services to allow a choice for those outside the urban setting.



4. UK Climate Change Risk Assessment: Climate Change Risk Assessment for Northern Ireland. DEFRA 2012. 5. PEDU Review of Response to Flooding on 27th and 28th June 2012 <http://www.northernireland.gov.uk/pedu-review-flood-response-june-2012.pdf>



ATTITUDINAL CHANGE TO TRANSPORT

Better services, improved park and ride connections, new trains, buses and stations have helped to increase passenger numbers across public transport demonstrating a changing attitude to transport. The number of rail journeys in 2013 reached a record high, close to 13 million⁶.

Belfast on the Move has been successful, resulting in a reduction in journey times, fewer passenger cars moving through Belfast and an increase in the use of public transport. The scheme encouraged car drivers to use alternative routes and as a result the Westlink now carries 6000 additional cars each day⁷. ICE re-iterates the importance of the York Street Interchange to improve traffic flow around Belfast.

PORTS

The island's ports are essential for vital imports and wealth-creating exports, as well as providing passenger connections to the British mainland. Northern Ireland's ports have adapted to meet the demands of modern industry; the facilities at Harland and Wolff and Dong Energy are now used to manufacture and export renewable energy equipment. ICE encourages the other ports to investigate the potential for developing their own assets in this way.

WASTE MANAGEMENT STRATEGIC LEADERSHIP

Initially, NI was slow to adapt to EU Directives and as a result the sector performed poorly in comparison with other regions.

Waste infrastructure is often overlooked by government and a more focused policy is required. Municipal waste is managed at the local government level and ICE believes that this 'step away' from the NI Executive may have negative implications on the long-term waste management strategies which are in place.

Greater prioritisation and investment is required to provide consistent and fit-for-purpose waste management services across the region. ICE believes new structures to establish a long term solution to waste management are vital, and the introduction of an overarching department is key to this.

RECOVERY OF VALUE

Energy from Waste (EfW) plants have been developed across most of Europe and the UK to convert non-recyclable materials into energy. Several sites have been progressed through planning in NI but none have yet been developed. Rather than paying to export such waste and then paying for energy imports, EfW has the potential to shortcut the current system, reducing costs to the public and potentially creating new jobs.



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WASTE MANAGEMENT

KEY DELIVERABLES

More strategic direction and leadership is required from the NI Executive and consideration of a collective approach to delivering waste infrastructure

Delivery of energy from waste projects as part of a long-term waste management strategy

Targets for more waste streams (e.g. commercial and industrial) should be considered, along with mandatory reporting

KEY BENEFITS

Better central and local governance arrangements ensure that waste infrastructure is delivered more efficiently

Using our waste as an energy source helps NI economy and opens up potential for new jobs

More predictable funding streams ensure greater value for money to public purse

PERFORMANCE

It is extremely important that targets for a wider range of sectors are established, especially for agricultural waste which is yet to be regulated. Municipal sector performance against targets continues to improve, although it is starting to plateau. The DOE Waste Management Strategy identifies a recycling target of 50% of household waste by 2020, with the potential to increase this to 60% for all municipal waste⁸. This is a positive step to ensure sustainability but it reinforces the requirement for investment in the sector to ensure facilities are available to handle this level of recycling.

Consideration should be given to addressing performance and infrastructure in a more holistic way across all sectors e.g. agricultural, clinical, hazardous, construction and municipal waste. In particular, it is vital that construction and industrial waste should be monitored more comprehensively and a statutory recycling target introduced.

FUTURE PLANS

The NI Executive needs to refocus attention on moving waste up the hierarchy in terms of prevention and reuse. We can boost our economy by developing EfW facilities within the region, thereby avoiding waste export and energy import charges. However, we must uphold the proximity principle by having treatment facilities close to the point of waste generation.

6. <http://www.bbc.co.uk/news/uk-northern-ireland-25916120> 7. Belfast on The Move – Post Implementation Impact Study - April 2014 http://www.drndi.gov.uk/belfast_on_the_move_-_post_implementation_impact_study_-_report_-_updated_april_2014.pdf
8. Delivering Resource Efficiency Northern Ireland Waste Management Strategy, 2013



WATER

LONG TERM WATER STRATEGY

Although the Department for Regional Development is leading the development of a Long-Term Water Strategy (LTWS) ICE is disappointed to see that this has been subject to continued deferral. It is crucial that the NI Executive and Assembly fully support the development of this LTWS as it aims to take a holistic approach to all aspects of water management across the region.

CONDITION

ICE believes that the condition of clean water infrastructure has improved measurably since our last review in 2010. Despite this, the sewage network and waste water treatment infrastructure requires greater attention if customers are to receive the benefits of flood alleviation and environmental improvements. As NI's largest energy consumer, NI Water must seek to improve its energy efficiency, especially given the increasing effect of Carbon Reduction Commitments. The company should also develop opportunities for renewable energy at its sites including wind and pumped storage.

FUNDING

A secure funding stream is crucial for the delivery of more efficient and effective strategic planning for the provision of both water and sewerage services. The direct charging of domestic consumers, in addition to industrial and agricultural users, is vital to ensure that water is valued and used more efficiently. ICE is encouraged that capital investment in



maintenance has increased through the Price Control (PC) 10 period and PC13 periods and is projected to increase again in PC15.

Sydenham Pumping Station in east Belfast and Glenmachan Street pumping station in South Belfast are directly affected by the funding deficit.

CATCHMENT MANAGEMENT

A catchment is an area with several, often interconnected water bodies, such as rivers, lakes, and groundwater. ICE welcomes the work undertaken by NI Water and its stakeholders in realising the Sustainable Catchment Area Management Programmes (SCAMP). ICE would like to see the further development of an integrated catchment approach for managing water resources, linking with agricultural and industrial sectors. It is encouraging to see NI Water include additional monies for such plans in PC15.

CASE STUDIES

SCAMP



Inspecting a Drain in Dungonnell Plateau

A Sustainable Catchment Area Management Programme (SCAMP) has been adopted by NI Water to address water quality issues across its catchments. The approach has been piloted at the Dungonnell Reservoir catchment at Garron Plateau in the Antrim Hills. Garron Plateau holds the largest area of intact blanket bog in Northern Ireland and is designated as an ASSI, SPA, SAC and Ramsar site but overgrazing and drainage has damaged the peat, resulting in water discoloration at the reservoir. Treating peat-stained water is a costly process so NI Water, in partnership with the RSPB and NIEA, has worked with farmers to reduce grazing pressure and drains have been blocked across the site to restore the hydrological function of the bog.

WATER RESOURCE MANAGEMENT PLAN

ICE commends the work of NI Water in continuing to implement its Water Resources Management Plan 2012 (WRMP)⁹, consulting with a wide range of key stakeholders, to help establish robust measures to secure an adequate supply of water for the next 25 years. However, the plan suggests that supply will be affected unless there is further investment to reduce leakage and create new strategic trunk main (STM) schemes, such as Carmoney to Strabane and Killyhevlin to Lough Bradan.

FUTURE PLANS

ICE is concerned that a number of major capital schemes to alleviate flood risk in east and south Belfast are not included in the current PC15 capital works programme. The NI Executive must realise that funding for such schemes goes beyond investment in the construction industry, resulting in wider social, economic and environmental benefits. In particular the flood alleviation schemes for

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WATER

KEY DELIVERABLES

Construct strategic trunk mains schemes (Carmoney to Strabane and Killyhevlin to Lough Bradan)

Upgrade Sydenham Sewage Pumping Station and construct Glenmachan Tunnel

Greater adoption of catchment-based management plans

KEY BENEFITS

More reliable water supply

Reduced out-of-sewer flooding

Economic, social and environmental well-being from appropriate water and sewerage services

9. NI Water Resources Management Plan 2012 <http://www.niwater.com/sitefiles/resources/pdf/niw-fwrmp-main-report.pdf>



These projects will not be delivered until after 2021. This will continue to place a burden on sewer networks and leave customers vulnerable to out-of-sewer flooding and the social consequences.

ICE encourages the Government to adopt a more pragmatic approach to the implementation of EU Directives, for example, clear evidence of potential risk to habitats from existing water abstractions must be identified and mitigated before abstraction licenses are renewed. ICE considers that the energy intensive treatment technologies adopted to deliver EU quality standards constrains NI Water from achieving a reduction in carbon outputs. This paradox needs to be addressed in the Price Control mechanism.

ENERGY SINGLE ELECTRICITY MARKET

Northern Ireland is in a better position as a result of the Single Electricity Market. We have a transparent market where prices and quantities are available every 30 minutes, resulting in more efficient scheduling of generators.

Whilst this is a positive platform, ICE stresses that our energy network faces some challenges. Inter-connection issues, the penetration of renewable technology on to the grid and uncertainties around UK electricity market reform are all reducing the sector's ability to deliver in the medium to long-

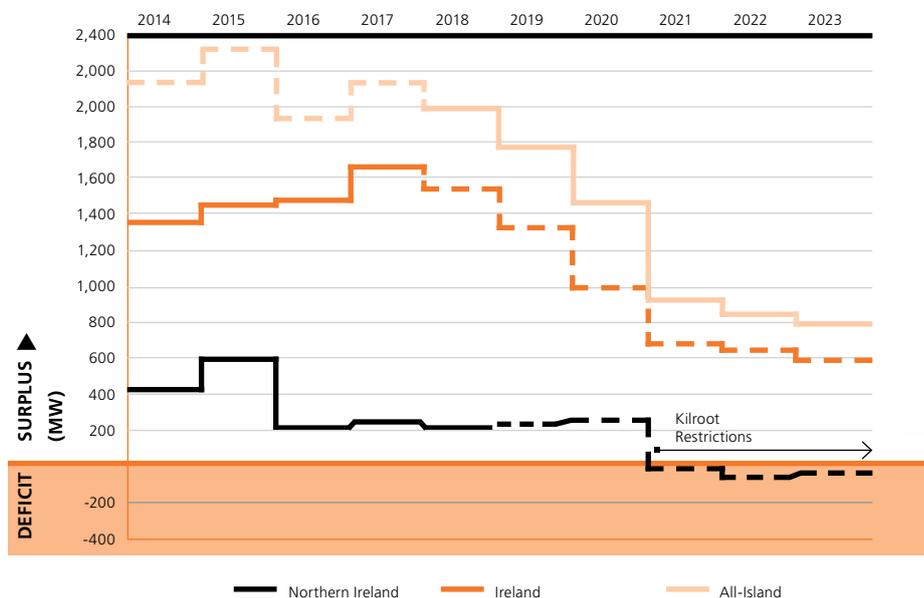


Fig. 1 Generation adequacy assessments¹⁰

term. Without action in these areas, consumers will have to pay more and rely on a system with increased risk of power outage.

Figure 1 shows that supply-demand levels for Northern Ireland drop to low levels in 2016 due to three factors:

1. The withdrawal of three units at Ballylumford,
2. The Moyle interconnector assumed to be still operating at reduced capacity and,
3. The second North-South interconnector is not expected to be commissioned by then.

Even if all generation plants performed at optimal levels, Northern Ireland would fall into deficit in 2021 due to further restrictions at Kilroot. If the second North-South interconnector is not in place at this stage, then the risk to security of supply becomes very high indeed. Urgent action is required to ensure that the interconnector project is progressed to construction.

ELECTRICITY MARKET REFORM (EMR)

ICE notes the continuing delays in the UK electricity market reform. Investors need stability in order to invest and this is linked with the EMR, which introduces the Contract for Difference (CfD). ICE welcomes the CfD as a means of stimulating investment in low-carbon technologies and replacing the current Renewable Obligation Certificate scheme.

RENEWABLES

From a base of 10% in 2010, the DETI target of 40% of electricity demand being provided from renewable sources by 2020 will require significant infrastructure investment¹².

ICE welcomes the move towards a diverse mix of renewable energy technologies to meet NI's ambitious renewables target, including onshore wind, biomass, domestic solar panels, hydro, tidal, pumped storage and lower carbon alternatives, such as shale gas. With all renewable technology there is the potential to invest in associated research and development (skills, training, employment opportunities etc.) creating an exportable workforce.

The positive aspiration to develop renewables further should be tempered with the challenges associated with their deployment, such as variability, electricity storage and the costs of commercialisation. ICE notes the plans to build 100MW of battery storage in Northern Ireland – the largest of its kind in the world – yet there is a lack of understanding about the flexibility of electricity storage and the wider economic benefits it can deliver, beyond enabling enhanced returns on the deployment of renewable energy-based generation equipment¹³.

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ENERGY

KEY DELIVERABLES

- Second North-South Interconnector
- Replacement of the Moyle Interconnector cables
- Expanding gas network to the west
- Investment in the electricity network to facilitate renewable connections and develop smart grids
- Delivery of energy from waste projects¹¹

KEY BENEFITS

- Secure and reliable supply of energy
- Greater interconnection keeps cost competitive
- Improved competitiveness of local business, sustaining and creating jobs in short, medium and long term

¹⁰. All-Island Generation Capacity Statement 2014-2023, SONI <http://www.soni.ltd.uk/media/documents/News/Generation%20Capacity%20Statement%202014-2023.pdf> ¹¹. See p3, Waste Management section ¹². Sustainable Energy Action Plan 2012-15 and beyond, DETI, May 2012 ¹³. Electricity Storage Policy Statement, Institution of Mechanical Engineers, 2012



GAS

ICE commends the expansion of the gas network into the west as a means of reducing our reliance on high carbon fuels in the domestic and industrial environments; however, this development must be coupled with appropriate storage to improve security of supply. ICE supports the development of a 60-day storage facility at Islandmagee and the project should be developed through the appropriate gateways to construction. The discovery of potentially exploitable shale gas reserves is of growing interest, but its long-term role remains unclear¹⁴.

A FIT-FOR-PURPOSE DISTRIBUTION NETWORK

The majority of renewable energy is generated by onshore wind farms; however, offshore wind, tidal and biomass generation projects are currently in the early stages of project development. ICE welcomes NI Electricity's short, medium and long term plans to reinforce the electricity transmission network, but action is required to ensure that these deliver positive outcomes. In addition, the potential benefits of smart grids should be investigated to ensure that our existing infrastructure operates to maximum efficiency.

There has been considerable development within the renewable energy sector in recent years with onshore wind providing the majority of this growth. However, energy from wind is generated predominantly in the west and north-west of the region, with the majority of consumers mostly concentrated on the eastern sea-board. ICE encourages NIE to continue to develop the Network 25 plans to ensure that there is sufficient capacity within the distribution network.

CAPABILITY AND CAPACITY GOVERNANCE

ICE recommends that a Regional Infrastructure Plan should be published to secure the infrastructure investment that NI needs and to hold delivery bodies publically accountable. Also, the ISNI Delivery Tracking System is not being used to its full potential and should become mandatory for government departments.

ICE welcomes the Finance Minister's recent announcement on proposed changes to the commissioning and delivery of infrastructure, and calls on the NI Executive to agree a portfolio of strategically significant schemes. The upcoming Planning Reform Bill and devolution of planning powers to local councils has the potential to negatively impact on what is an already unwieldy

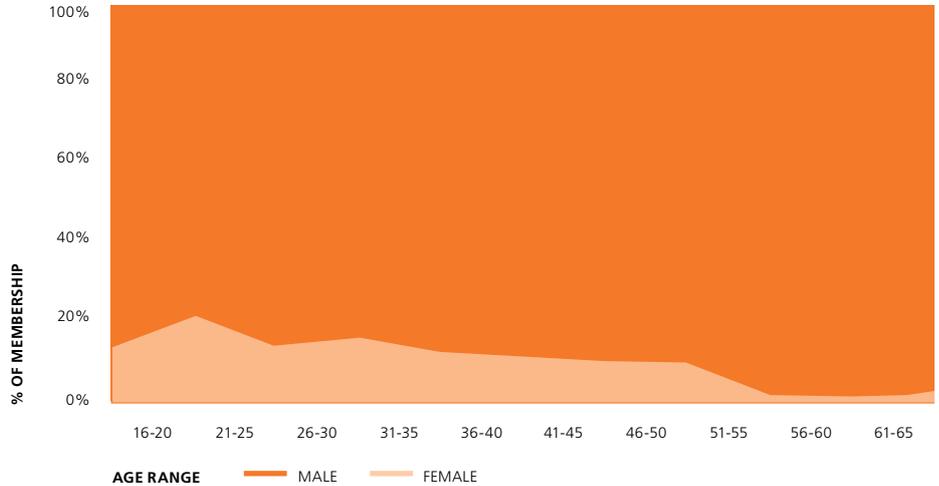


Fig. 2 Percentage of ICE NI membership by gender and age group

planning process. Care must be taken to ensure that the reformation delivers a process which is appropriate for developers and consultees alike and results in quicker decisions bearing in mind that the current PPS1 has a presumption in favour of approval.

The approach to the appraisal of projects should also be reviewed to ensure a more complete and consistent system of assessment is adopted across infrastructure sectors. The 'Green Book Plus'¹⁵

approach could help identify and articulate the benefits, outcomes and outputs expected of any given scheme.

The articulation of clear strategic need, together with pipelining and clear sponsorship would enable increased confidence to grow amongst infrastructure owners (in both the public and private sectors), investors and infrastructure finance providers and the wider supply chain.



14. Institution of Civil Engineers (2013) Shale Gas Policy Position Paper 15. What is the true value of Major Projects, Major Projects Association, April 2014



SKILLS

Failure to attract and retain engineers in all infrastructure sectors is a major threat, not only to the delivery of much needed infrastructure, but to the economic growth and social inclusion such activity can bring to our communities.

Despite the difficult conditions of recent years local firms have innovated by diversifying their skills and expanding their reach beyond NI. However, even as we see tentative signs of growth in NI, employers are finding a skills gap as they attempt to meet their business needs. It is imperative that the profession is promoted as a viable career to our young people. In a global context engineering is second on the list of jobs global employers find difficult to fill¹⁶.

The impending retirement of the 'baby-boom' generation will not leave civil engineering untouched, as 41% of ICE members are over 50 years old. At the other end of the age scale, recruitment of graduate engineers has declined during the current recession. In order to develop and maintain our infrastructure, a step change is needed.

ENHANCING CAPABILITY

The engineers of today and tomorrow need to be much more than technically proficient or even expert to remain part of a globally competitive skills pipeline. Civil engineers' transferable skills are not only vitally important to economic infrastructure sectors, but their range of competencies, including numerical modelling, project management and risk analysis are utilised in other sectors, such as manufacturing and financial services. As multiple sectors return to growth, the demand on engineering skills will continue to increase.

From a technological perspective the shifting climatic baseline, the use of Building Information Modelling (BIM), the low carbon agenda, the use of off-site construction, globalisation and innovative approaches to improve resilience are all changing the skill sets that engineers require.¹⁷ Compliance with environmental regulations and the use of environmentally sensitive materials and practices has also altered the skills required.

Innovation, research and development are central to global competitiveness and demand for service-based products to both the domestic and export markets are likely to increase.¹⁸ ICE will take a lead by encouraging civil engineers to take control of their career using a competency framework as a strong base for reflection and personal development.

However, much like the National Infrastructure Plan, NI needs a visible pipeline of work to enhance the capability and capacity of our engineering workforce. Historically, infrastructure projects have been initiated and delivered as one-off activities; this leads to a disaggregated supply chain, where lessons from one project are not passed on to another, and the opportunity to identify transferrable skills and capture value from a pipeline of a project is missed.

ATTRACTING PEOPLE INTO CIVIL ENGINEERING

To counteract the predicted deficit of civil engineers, the profession as a whole requires change. In particular, civil engineering must attract entrants from diverse backgrounds to ensure maximum benefit to society. ICE has an important role to play in promoting the industry, the different routes into civil engineering and the importance of STEM subjects in schools. Figure 2 shows that whilst civil engineering is a male dominated industry, there is an increasing trend of young females choosing the profession; ICE is working with other organisations to ensure that this continues.

APPRENTICESHIPS AND VOCATIONS

The Department for Employment and Learning's skills strategy Success through Skills – Transforming Futures, demonstrates clearly that our economy will require a significant increase in higher skills, mostly through apprenticeships. For example, by 2020, around half of our workforce will need to be trained to level 4 or above. Technicians are in increasing demand within the UK workforce. It is estimated that by 2020 the UK will require 450,000 more science, engineering and technology (SET) technicians¹⁹. There has been a history of a lack of attractiveness towards technician occupations. Combined with a desire for increasing the numbers of students progressing to further education this has led to declining numbers of technicians.

ICE, the Institution of Mechanical Engineers (IMechE) and the Institution of Engineering and Technology (IET) aim to register 100,000 Engineering Technicians by 2018 and establish a valued membership product so that technician registration and membership becomes the norm for those entering the profession.

CONTRIBUTORS

ICE NI WOULD LIKE TO THANK THE FOLLOWING ORGANISATIONS FOR THEIR ASSISTANCE IN COMPILING THIS REPORT:

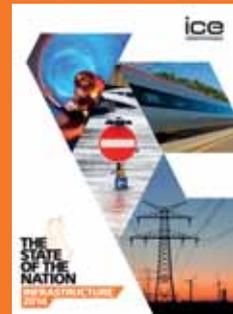
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¹⁶. 2012 Talent Shortage Survey Research Results http://www.manpowergroup.us/campaigns/talent-shortage-2012/pdf/2012_Talent_Shortage_Survey_Results_US_FINALFINAL.pdf ¹⁷. Sector Skills Insights: Construction Evidence Report 50, July 2012 <http://www.ukces.org.uk/assets/ukces/docs/publications/evidence-report-50-construction.pdf> p.31 ¹⁸. Sector Skills Insights: Construction Evidence Report 50, July 2012 <http://www.ukces.org.uk/assets/ukces/docs/publications/evidence-report-50-construction.pdf> p.33 ¹⁹. Jobs and Growth, The importance of engineering skills to the UK economy, Royal Academy of Engineering, September 2012, www.raeng.org.uk

**KEY TO NORTHERN
IRELAND GRADES**

- A** **FIT FOR THE FUTURE**
- B** **ADEQUATE FOR NOW**
- C** **REQUIRES ATTENTION**
- D** **AT RISK**
- E** **UNFIT FOR PURPOSE**

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CONTACT

ICE Northern Ireland
143 Malone Road
Belfast
BT9 6SX

t +44 (0)28 9087 7157
e iceni@ice.org.uk
ice.org.uk/northernireland

For more information on State of the Nation reports, please contact ICE Public Affairs:

t +44 (0)20 7665 2152
e stateofthenation@ice.org.uk
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