Second National Infrastructure Assessment
Baseline Report – A call for evidence

ECITB Response
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Responses have been provided for Questions 1, 3, 5, 6, 7, 8, 11, 12.
All other questions have been removed from this submission.

1. Introduction

Question 1: Do the nine challenges identified by the Commission cover the most pressing issues that economic infrastructure will face over the next 30 years? If not, what other challenges should the Commission consider?

The nine challenges are well presented and provide a broad overview of the needs and challenges faced by economic infrastructure. Although the importance of ensuring there is a skilled workforce to address the outlined challenges is referenced in the assessment, there is a need for a much stronger emphasis on addressing skills gaps within the workforce.

The engineering construction sector particularly, which delivers skills across energy and critical industrial processing infrastructure, faces significant skills demands from private sector investment as well as from public sector procurement.

Workforce skills should be a theme that consistently runs throughout the assessment and as part of UK infrastructure planning, to mitigate against workforce shortages and skills mismatch.

Question 3: How can better design, in line with the design principles for national infrastructure, help solve any of the Commission's nine challenges for the next Assessment and what evidence is there to support this? Your response can cover any number of the Commission's challenges.

The below points consider the 'people' and 'place' design principles for national infrastructure.

People: Some services provided by the Engineering Construction Industry (ECI), such as Front End Engineering Design (FEED) and detailed engineering design, can be delivered remotely, meaning the labour force does not need to be based on-site. Consultations undertaken by the ECITB with industry suggest that whilst UK industry is confident that the initial projects needed to initiate the decarbonisation agenda throughout the 2020s could be conducted in time, these projects could be outsourced to the overseas offices of international engineering companies. This represents a risk mitigation measure to ensure timely deployment to meet early milestones.

There is a risk that such outsourcing could lead to a long-term skill dilution in the UK. It is in the UK's best interest to develop appropriate skills in feasibility study and design of decarbonisation technologies, particularly as a large number of projects will be commissioned over the next 30 years, to achieve Net Zero.

Place: Most of the UK's decarbonisation infrastructure will be deployed around industrial clusters. Research undertaken by the ECITB indicates that younger workers may be less willing to relocate for work in industrial areas. Therefore, a greater onus should be placed on recruiting local talent rather than relying on workforce mobility.

Government, at both national and regional levels, should ensure that the education provided locally by colleges and universities matches the regional needs of UK industry. This is particularly important in industrial cluster zones.

Question 5: What are the main opportunities in terms of governance, policy, regulation and market mechanisms that may help solve any of the Commission's nine challenges for the Next Assessment? What are the main barriers? Your response can cover any number of the Commission's challenges

Skills availability should be considered as part of the NIC remit and part of the evidence-gathering assessment process. This would provide a valuable perspective alongside any regional skills analysis and planning that is undertaken by skills bodies, LEPs, Skills Advisory Panels and the new Local Skills Improvement Plan bodies.

Challenge 1: The digital transformation of infrastructure – the Commission will consider how the digital transformation of infrastructure could deliver higher quality, lower cost, infrastructure services.

Question 6: In which of the Commission's sectors (outside of digital) can digital services and technologies enabled by fixed and wireless communications networks deliver the biggest benefits and what how much would this cost?

The anticipated digital transformation of the energy industry will bring new ways of working. Digital technologies will enable remote operations, data sharing, and automated maintenance, by using digital twins for failure and reliability forecasts.

Applied in industry, in the context of the decarbonisation agenda, these new technologies will help to maximise workforce productivity and enable better utilisation of resources, mitigating the impacts of shortages in the workforce and skills gaps.

In the Carbon Capture and Storage (CCS) value chain, digital technologies could be used for monitoring Carbon Dioxide capture and transport infrastructure and the associated pipelines by robots, replacing manual inspection of pipes (pigging), diver inspection offshore, and corrosion monitoring. Storage sites could become unmanned installations, monitored by various subsurface sensors tracking the integrity of the storage sites and detecting any Carbon Dioxide leakage.

Similarly, digital and analytic solutions can be employed to reduce workforce shortages within the hydrogen supply, ranging from managing electrolyser houses and aligning production and storage availability based on projected hydrogen demand (e.g. based on the wind forecast).

There should be strong investment in training on digital technologies and close collaboration with the developers of digital technologies, with a focus of their applicability in driving the decarbonisation agenda.

Digital can also be leveraged to provide training for the ECI (and other) workforce. Continuous training and assessment are critical in an industry where safety is paramount, but pressures of time, money, location and resource can impact the efficiency and effectiveness of training. Greater digital integration allows these concerns to be mitigated. For example, remote learning can reduce time off-the-job, offer a larger selection of training courses, and reduce travel to learner provider sites.

Remote learning is not always suitable but blended learning (whereby elements of a training course can be digitalised) can be used to meet emerging and future skills requirements. Blended learning can also increase the accessibility, quality and cost effectiveness of training.

Question 7: What barriers exist that are preventing the widescale adoption and application of these new digital services and technologies to deliver better infrastructure services? And how might they be addressed? Your response can cover any number of the Commission's sectors outside digital (energy, water, flood resilience, waste, transport).

On a technical level much of the existing ECI workforce do not have the digital skills to work with big data and other emerging technologies. In addition, often the management skills are also lacking, at a senior level, to project manage and implement such large-scale Digital Transformation programmes.

Alongside more technical and managerial training there also needs to be more awareness raised around the benefits of Digital Transformation, to encourage the integration of digital technology and data analytics into decision making by senior leadership.

2. Reaching net zero

Challenge 2: Decarbonising electricity generation – the Commission will consider how a decarbonised, secure and flexible electricity system can be achieved by 2035 at low cost.

Question 8: What are the greatest risks to security of supply in a decarbonised power system that meets government ambition for 2035 and what solutions exist to mitigate these risks?

Potential workforce shortages within the ECI pose a threat to the decarbonisation agenda.
As outlined in the assessment, nuclear power generation is critical to the UK decarbonisation agenda. This is also reflected in the Nuclear Sector Deal (NSD). To retain talent the nuclear sector needs to be framed/branded as part of the UKs Net Zero ambitions.

Likewise, oil and gas continue to play vital role in the UK energy market as we transition to lower carbon energy sources, and as such there is continued demand for workers in the oil and gas sector, to deliver the energy transition. However, as with the wider engineering construction industry, the oil and gas workforce is ageing while seemingly recruiting too few young people. On current trends it is unlikely that the number of younger people joining the sector will grow sufficiently to compensate for those retiring in the next few years.

It is vital that this workforce is developed, not only for oil and gas, but also so the engineers and technicians working on the UK's energy assets (such as oil refineries) have the skills to design, operate, maintain, and decommission new carbon capture and hydrogen facilities, as well as support the offshore wind industry. The retention and reskilling of these workers will be vital for the UK's net zero ambitions.

The 80,000 workers projected to leave conventional oil and gas roles by 2035 will have many opportunities in the low-carbon economy, with an estimated 90% of employees in possession of transferable skills. For example, in new hydrogen and CCUS, where pipe fitters and designers, leak test technicians, and offshore barge operators already possess transferable skills.

To ensure there is a pipeline of talent and prevent further shrinkage of the skills pool there should be a coordinated approach across the various skills organisations working in the infrastructure sector. Employers, industry bodies, government and unions should work together to ensure the adult skills system is ready for the transition to net zero and to tackle barriers to retraining and upskilling so that no worker is left behind by the transition to net zero.

Finally, as more younger people look for careers with a positive impact on society and the environment, the ECI should reposition itself as a sector that is critical to tackling climate change, by emphasising its role as a key driver in decarbonising the UK.

Challenge 4: Networks for hydrogen and carbon capture and storage – the Commission will assess the hydrogen and carbon capture and storage required across the economy, and the policy and funding frameworks needed to deliver it over the next 10-30 years.

Question 11: What barriers exist to the long term growth of the hydrogen sector beyond 2030 and how can they be overcome? Are any parts of the value chain (production, storage, transportation) more challenging than others and if so why?

Hydrogen production technologies (natural gas reformation and electrolysis) are both mature and are currently in use, with minor skills impacts expected. However, these technologies have not yet been deployed at the scale that will be required which is likely to present some future technical challenges. A small level of disruption is expected in the case of water electrolysis, given the modular design of electrolyser stacks and their integration with the electricity grid and renewable sources of energy. This would require workforce specialised in the connection of large electric equipment to the grid, as well as technical assistance for the connection to water utilities (used as a feedstock for hydrogen production) and to hydrogen transport infrastructure. Once production reaches scale, hydrogen will be used widely in industry. However, industrial applications are unlikely to cause disruption to the engineering construction industry given that hydrogen industrial appliances (e.g. kilns, furnaces, burners, ovens) are expected to be similar to today's natural gas technologies.

In the medium and long term, more disruptive technologies are expected to be deployed. Those would include the development of technologically uncertain concepts, such as hydrogen storage in salt caverns, synthesis of fuels from captured carbon dioxide, or direct air carbon capture and storage, which have not been deployed at scale before and thus the full extent of the skills required is currently unknown.

Technologies such as hydrogen storage may also require skills that are currently not widely available within the engineering construction industry and would require similar skills to those employed by the exploration and mining industries. However, most of the technologies expected to be rolled-out in the medium and long term will be similar to today's assets and are likely to pose a low to medium disruption level in terms of workforce reskilling requirements.

It is worth noting that the UK fabrication skills base, and domestic infrastructure to fabricate the scale and specification of storage that will be required as hydrogen production and storage scales up, has been severely eroded. The UK is currently reliant on fabrication yards in Asia and the Far East, and an enormous investment would be required to re-establish the capability on home soil.

Question 12: What are the main barriers to delivering the carbon capture and storage networks required to support the transition to a net zero economy? What are the solutions to overcoming these barriers?

CCS technologies are used to capture and inject carbon dioxide in depleted hydrocarbon fields, under the seabed, and require similar skills to the chemicals and oil and gas industry. The capture technologies, either deployed in industry or for power generation, consist of a series of industrial installations and extraction columns similar to those in the chemical industry. In addition, the transport and storage infrastructure resemble typical oil and gas installations. Consequently, current ECI occupations could be converted to meet the future needs of the CCS network.

However, assets repurposing for various uses is not as straightforward as decommissioning and will require detailed studies and planning to ensure feasibility. A more integrated approach will be needed, to create close links between oil and gas sector and renewables. Some potential projects include: repurposing oil and gas rigs as low-carbon platforms or renewable energy platforms utilising electricity from windfarms to power oil and gas installation, gas-to-wire projects to convert natural gas to electricity offshore and utilise the existing windfarm cables to transport electricity onshore for further distribution. The oil and gas sector could drive decarbonisation further by integrating hydrogen production installations (e.g. ATRs) powered by renewables from wind farms and using existing depleted reservoirs for CO_2 storage to promote the concept of offshore energy hubs.

Decarbonisation of industrial clusters will require multisector involvement, with a wide range of technologies deployed within a small geographic area and a tight timeframe. Cross-industry collaboration will help improve efficiency and share skills. Analysis should be undertaken to determine the types of skills potential partners could bring in each cluster.