



Infrastructure Commission for Scotland

Consultation response

Initial Call for Evidence and Contributions

The Scottish Council for Development and Industry (SCDI) is Scotland's Economic and Social Forum. We are an independent and inclusive economic development network representing all sectors and all geographies of the Scottish economy. Our mission is to convene our members, partners and stakeholders across the private, public and third sectors to deliver inclusive and sustainable economic growth for Scotland.

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Infrastructure Commission for Scotland: Initial Call for Evidence and Contributions

SCDI supports an open, inclusive and globally-connected Scottish economy. Infrastructure is a key driver of high-growth, high-productivity economies. Our vision is of world-class transport, digital, telecommunications, housing, energy, public services and built infrastructure networks which meet the current and future needs of government, businesses, local authorities, communities and citizens in every sector and every geography of the Scottish economy.

1. The remit and in particular the Commission objectives provide an illustration of some key strategic drivers to an inclusive growth and low carbon economy:

a. What are your views on these drivers and are there any others that should be considered by the Commission?

The Scottish Council for Development and Industry (SCDI) agrees that the drivers identified in the remit of the Infrastructure Commission for Scotland (Section 2.1) are key strategic drivers of inclusive growth and towards a low carbon economy. Given the scope and scale of technological and environmental changes in our society and economy, additional drivers which should be considered are climate change mitigation and adaptation, and cyber-resilience.

It is important to note the new fiscal context in which decisions will be made. The new fiscal framework for the Scottish Government underpins the further powers over tax and welfare that has been devolved to the Scottish Parliament through the Scotland Act 2016. This delivers increased tax powers and therefore an increased reliance on tax generated in Scotland to fund the Scottish budget. Following the constraints on capital and revenue budgets which have been in place since 2010, these tax receipts will have an increasing influence over whether public finances continue to be sufficient to meet future demands.

This will require government to consider a more strategic approach to investment decision-making in Scotland to:

- Ensure best use of scarce resources, targeted at inclusive economic growth;
- Increase the potential to maximise the Scottish Government's tax-take;
- Offer external investors clarity and confidence in the Scottish Government's long-term investment priorities; and,
- Enable action to be taken at the appropriate spatial level – whether that is local, regional or national.

That strategic approach will need to be driven by a number of policy initiatives currently under consideration, or in action, that collectively will have a significant impact on the deliverability of these objectives.

As the Scottish Government makes the necessary transition to its own Treasury-led approach to financing and budgeting, there is strong evidence that supports the need to further develop decision-making processes. As current project commitments run their course, this enhanced decision-making framework will need to increasingly influence investment decisions, ensuring they:

- Are transparent, readily understood and, where possible, consistent with existing selection processes;
- Consider both new and existing assets, to ensure cost-effective asset-stewardship;
- Maximise delivery of essential infrastructure to ensure best returns for scarce resources;
- Are outcomes-focussed, for example on the delivery of the National Outcomes in the National Performance Framework;
- Are based on sound evidence, building on best-practice both within the Scottish Government and elsewhere; and,
- Are both deliverable and affordable.

There are several key strands in this evolution which manifest in terms of enabling programmes:

- cross boundary, cross sector or cross organisation collaboration and in many cases all three; and,
- strategic thinking, focused on inclusive growth focussing not only on infrastructure assets, but also encompassing many aspects of service delivery and skills and increasingly aimed at practical deliverable outcomes not simply the enabling assets being funded.

A review of the Scottish planning system has led to the introduction of a Planning Bill. Themes which have been the focus of the review are the need to develop a planning environment that is amongst other things:

- Strategic in design and intent, whilst being more delivery and outcome focused;
- Streamlined in process, to accelerate development particularly in relation to housing; and,
- Infrastructure-led, distinguishing between assets which enable development and those which are needed as a result of a development.

The Planning Bill which is ultimately passed into law by the Scottish Parliament should reflect this focus. There are concerns that as a result of many of the proposed amendments, the Bill in its current form will seriously impede rather than support economic development in Scotland and the delivery of the Scottish Government's Infrastructure Mission.

Lastly, the Commission will need to engage with and consider the views and priorities of all sectors and all geographies of the Scottish economy. It is important that in its consideration of inclusive growth and of Place-making that the Commission recognises and addresses the particular infrastructure challenges and needs of rural economies, businesses, communities and citizens.

b. What is the impact of these (and any additional) drivers on an inclusive growth and low carbon economy?

The Institution of Civil Engineers' *National Needs Assessment – A Vision for UK Infrastructure* (2016) report for the UK – with which SCDI was closely involved as a member of the executive group for the report – highlights a number of key trends and interdependencies which impact on these drivers.¹

The Commission should also review the forthcoming Frost & Sullivan report for the Scottish Government on *Future Technology Trends in Scotland* upon publication this year. It will suggest that robotics & automation, quantum technologies and AI & machine learning are expected to have a high impact on our economy, but that this impact is also highly uncertain.

c. What are the key interactions and dependencies across these drivers?

Technological change and innovation will be a key strategic driver of inclusive growth and the transition to the low carbon economy, interacting with each of the other drivers identified by the Commission, as the Fourth Industrial Revolution in automation, robotics, Artificial Intelligence, Mobility as a Service, nanotechnology, Big Data and digitisation gathers pace. These technologies are already disrupting markets, workplaces, business models, labour markets and consumer expectations. New technologies and improved digital connectivity, for example, continue to drive the growth of online marketplaces, the sharing economy and demand for personalised mobility services.

Each driver has a critical dependency on technological innovation and change, which will open up new opportunities to increase the speed, efficiency, safety and quality of the movement and connectivity of data, information, raw materials, goods, services, capital and labour. For example, the ways in which our changing demographics will affect our economy and our society will be heavily shaped by the way in which we deploy and the extent to which we maximise the opportunities of the Fourth Industrial Revolution. Similarly, the nature of our communities and the ability of Place-making to reduce pollution, crime and congestion could be transformed and enhanced by innovations such as Electric Vehicles (EVs), Connected and Autonomous Vehicles (CAVs) and Mobility as a Service (MaaS). The report of SCDI's Connectivity Commission, *Scotland's Big Mo: Industrial Strategy, Inclusive Growth and the Future of Mobility* (2018), explores the opportunities and challenges for the Scottish economy in this area in some detail. It also makes key recommendations for government, industry and regulators, so that all parts of Scotland can accrue economic, social and environmental benefit from a world-class connectivity system.²

d. What is the impact of each of them and cumulatively on Infrastructure demand and need now and for the future?

See answers to Questions 3 c) and 3 d).

¹ <https://www.ice.org.uk/news-and-insight/policy/national-needs-assessment-a-vision-for-uk-infrastr>

² <https://www.scdi.org.uk/policy/scotlands-big-mo-industrial-strategy-inclusive-growth-and-the-future-of-mobility/>

2. Infrastructure has a key role in relation to an Inclusive Growth and Low Carbon Economy:

- a. What are your views on Scottish Government's definition of infrastructure as provided in the Commission remit, and are there any additional elements that should be considered, or areas that could be omitted?**

It is SCDI's view that industrial, commercial and natural infrastructure should be integrated into the definition of infrastructure provided in the Commission remit (Section 2.3). A number of private industrial and commercial infrastructure sites – such as the petrochemical and manufacturing site at Grangemouth or the Hillington and Eurocentral industrial estates – are of strategic national importance due to their large contribution to Scotland's economy. Natural infrastructure assets, such as the Central Scotland Green Network, can also support inclusive growth and a low carbon economy and warrant consideration.

In addition, however, it should also be stressed that there should not be a focus on traditional physical infrastructure assets such as roads, schools and ports, to the exclusion of, in particular, the digital, telecommunications and internet infrastructure which will be critical to the future success of the Scottish economy in the Fourth Industrial Revolution.

- b. What contribution does each of the infrastructure categories identified make to achieving an inclusive growth and low carbon economy?**

See answers to Questions 1 b) and 3 c).

- c. What role and impact does each of the infrastructure categories identified have on the drivers identified in the Commission remit and objectives?**

Across all categories of infrastructure there are different forms of ownership and operation across the public and private sectors, with different legislative responsibilities and different regulatory oversight and cycles. As the interdependencies between different classes of infrastructure increase, there will be challenges in integrating strategies, investment and ownership, which the Commission should look to address.

See also answer Question 3 c).

- d. What are your views on the relative importance and impact of optimising whole life asset capacity through investment in enhanced renewals and maintenance compared to investing in and developing new infrastructure?**

It is generally agreed that the emphasis in the existing model of public procurement is often on reducing the upfront cost of infrastructure, rather than on its overall lifetime cost. There is

a need to move away from this short-term approach to holistically evaluate long-term fiscal, strategic and environmental impacts to deliver optimum value for the public pound. Resilience and maintenance are critical for Place – for example, when a ferry service does not operate or a key road is closed, communities and businesses face significant and damaging disruption.

Infrastructure systems and networks will become increasingly integrated and interdependent. This will potentially increase their resilience, but it does mean that a failure in one system or network could affect a range of others. Resilience will become a characteristic which is vital across all infrastructure. It will be critical to recognise fully the value of reliability and resilience for the modern economy, and take action to improve maintenance and plan for challenges, such as climate change. Scotland should aim to become a world-leader in areas such as smart asset management for monitoring and maintenance. The review of the Cleaner Air for Scotland strategy provides one such opportunity.

The report of SCDI's Connectivity Commission (*Part 3: Where to Focus*) notes various issues around maintenance,³ which have been further highlighted by the engagements of our Rural Commission. For example, many locally- and regionally-significant roads across rural Scotland have deteriorated significantly over the past decade as a result of tight fiscal policy in the public sector. Audit Scotland's *Maintaining Scotland's Roads: Impact Report* (2018) raised concerns that although the headline data suggests a broadly consistent proportion of Scottish roads in an acceptable condition since 2016, the accuracy of the condition data is contested. Moreover, between 2011/12 and 2014/15, overall expenditure by local government on roads maintenance declined by 14% from £302 million to £259 million. Annual spend on planned and routine maintenance is 13% less than the Society of Chief Officers of Transportation in Scotland considers "necessary to maintain current road condition". Meanwhile, Transport Scotland spent 38% less on structural maintenance than it assessed as "necessary to maintain current trunk road condition".⁴ Addressing this budget gap would take a relatively small amount of public expenditure – somewhere in the region of just £60 million – for relatively significant socio-economic impact in terms of reduced journey times, reduced disruption and reduced risk of accidents.

e. To what extent and in what way can infrastructure act as a catalyst for change in a place; be that at a community, local, strategic or national level?

Infrastructure can act as a significant catalyst for social and economic change at all levels. It is the critical enabling framework – including essential public goods delivered by public investment – which facilitates almost all interactions, transactions and activities in the economy. The regeneration of Dundee as a catalyst for business investment and growth, and the work of Scottish Canals to support Place-making, are important examples of this principle in action in recent years.

³ <https://www.scdi.org.uk/policy/scotlands-big-mo-industrial-strategy-inclusive-growth-and-the-future-of-mobility/>

⁴ http://www.audit-scotland.gov.uk/uploads/docs/report/2018/ir_180626_maintaining_roads.pdf

- f. To what extent and in what way can infrastructure act as a catalyst for:**
- i. increased economic investment and growth?**
 - ii. improved service delivery?**
 - iii. improved community cohesion?**

Infrastructure is a key factor in attracting investors, entrepreneurs, workers, academics, students and visitors to any economy. EY's Attractiveness Survey for 2018 found that Scotland is the second most successful destination for foreign direct investment in the UK after London and the South East of England. The second most important factor cited by investors into Scotland is transport, telecommunications and technology infrastructure.⁵

Infrastructure can facilitate business growth by improving productivity through enhanced digital connectivity; connecting employers to new markets, suppliers and partners; or increasing their access to talent and labour. Infrastructure can incentivise or enable changes in citizen and consumer behaviour, including modal transport shift, to deliver Place-making or the shift to a low carbon economy. Infrastructure assets support the delivery of local services, business activity and growth, supply chains, consumer spending, skills development and employment.

The higher and further education sectors are essential partners in Place-making. The sectors' infrastructure and estate strongly shape the built environment; attract investment, innovation and employment; and support community activity in cities and towns across Scotland. For example, the Advanced Forming Research Centre at the University of Strathclyde, the National Manufacturing Institute Scotland in Renfrewshire and the ARCHER supercomputing service at the University of Edinburgh are world-leading, globally-significant facilities. Scotland's research excellence could be leveraged, with the backing of the Scottish Government and its agencies, to secure more investment of this importance and scale. SCDI supports the setting of a national ambitious target. However, capital funding from the Scottish Government has fallen significantly in recent years, which has resulted in higher levels of borrowing and a deterioration in the condition of some assets which were constructed in the 1960s and 1970s and are reaching the end of their operational lifespan.

3. The demand and need for the infrastructure assets included in the Commission remit is considerable and wide ranging. Across all the infrastructure assets identified:

- a. What is your assessment of the current infrastructure stock in terms of quality of provision?**

A number of major infrastructure projects of national and strategic importance – including the Aberdeen Western Peripheral Route, the Forth Replacement Crossing, Borders Railway, the Edinburgh Glasgow Improvement Programme, the Queen Elizabeth University Hospital Glasgow and V&A Dundee – have been delivered in recent months and years. There has

⁵ [https://www.ey.com/Publication/vwLUAssets/EY-scottish-attractiveness-survey-2018/\\$FILE/EY-Scottish-Attractiveness-Survey-2018.pdf](https://www.ey.com/Publication/vwLUAssets/EY-scottish-attractiveness-survey-2018/$FILE/EY-Scottish-Attractiveness-Survey-2018.pdf)

also been a transformation of the education estate across Scotland as a result of significant investment in modernising and improving primary, secondary, higher and further education assets over the past decade. The new and impressive campuses of City of Glasgow College, Forth Valley College and Inverness College UHI, for example, are testament to this transformation. SCDI also welcomes the other major infrastructure projects which are currently in progress – including City Region Deals, Schools for the Future, R100-Superfast Broadband for All, the Railway Electrification Programme, the Aberdeen to Inverness Rail Improvement Project, A9 Dualling and Glasgow Subway Modernisation – which will deliver substantial socio-economic impact.

Nevertheless, the quantity, quality and resilience of provision of infrastructure stock in Scotland requires further improvement. The significant expansion of free childcare provision announced by the Scottish Government will require significant investment in new and expanded facilities across the country. Digital and mobile connectivity is still relatively poor in some parts of Scotland, particularly in rural, remote, coastal and island communities. Fast, secure and reliable internet access is critical to improve productivity and remove barriers to business growth across rural Scotland. Although 95% of homes and businesses in Scotland are now able to access high speed broadband, the cost can make access prohibitive. The Institution of Civil Engineers Scotland's *State of the Nation* report (2018) also provides a useful assessment of current stock for the Commission to consider.⁶

As noted in answer to Question 2 d), Scotland's local and regional road network requires significant investment in maintenance and improvement. Beyond the Central Belt, East-West connectivity across Scotland is generally poorer than North-South connectivity. Lower than required levels of investment in recent years, an expanding road network and a low-cost, short-term approach to repairs has also resulted in the deterioration of some key routes. The condition of our roads, together with rising prices and increased congestion, has also contributed to the decline in use of Scotland's bus network. Official data shows that over the past five years passenger numbers have fallen by 8%, bus fleet sizes by 10% and staff numbers by 2%, while prices are 18% higher.⁷

b. What is your assessment of the current infrastructure stock in terms of its capacity and fitness for purpose to meet current demand and needs?

See answer to Question 3 a).

c. What is your assessment of forecast future needs and demand for infrastructure and the key areas of change and development over a five and 30-year horizon?

As articulated in SCDI's Blueprint for the Scottish Economy, *From Fragile to Agile* (2015), SCDI believes that achieving our vision of a network of world-class transport, digital, telecommunications, housing, energy, public services and built infrastructure which meets

⁶ <https://www.ice.org.uk/getattachment/about-ice/near-you/uk/scotland/publications/state-of-the-nation-scotland-2018-infrastructure/State-of-the-Nation-Scotland-2018.pdf.aspx>

⁷ <https://www.transport.gov.scot/media/44207/sct01193326941.pdf>

the future needs and demands of the Scottish economy, will require a long-term, strategic approach, building on transformational investment in the short-term, to respond to large-scale, long-term and global changes. The report of SCDI's Connectivity Commission (*Part 3: Where to Focus*) makes a series of recommendations over a number of different time horizons.

Large-scale electrification of heat and transport services, which is critical to meet climate change targets, is anticipated. Digitalisation will take place in both the energy and transport sectors to develop smart infrastructure, monitor and maintain it operationally, personalise services for customers, and manage demand and dynamically price – all utilising data. The Infrastructure industry will have to be supported and challenged to embrace the use of data, including to balance supply and demand in a much more flexible and efficient way. In response, government in Scotland needs to develop, at the time of their next reviews, an integrated strategy across energy, digital and transport infrastructure and policies i.e. a single, cohesive 'Connectivity' strategy.”

Increasing numbers of journeys will be completed by EVs as the Scottish Government phases out new non-hybrid petrol and diesel cars by 2032 and introduces Low Emission Zones in Scotland's four biggest cities. Facilitating this paradigm shift will require a strategic, accelerated and large-scale expansion of charging infrastructure. It should be a priority of the Scottish Government, the UK Government and the National Grid to ensure that Scotland is producing and supplying enough electricity through a dense network of accessible charging points to meet future demand and facilitate the shift to a low carbon transport system. These efforts should consider and build on existing private sector activities and networks to create charging points at retail sites.

The capacity of Scotland's railway network will have to expand in order to meet growing demand for mobility. The number of journeys has increased by a third since 2006 and is forecast to continue to grow. Between 2012 and 2043, Network Rail estimates that the Edinburgh morning commuter market will expand by 115%, the Glasgow morning commuter market by 128%, the Aberdeen morning commuter market by 226%, the interurban market by 197% and the rural market by 158%.⁸ Ongoing and future plans to increase capacity at Edinburgh Waverley and Glasgow Queen Street are, therefore, very welcome. Maximising connectivity between Edinburgh and Glasgow is an important part of maximising the competitiveness of the concentrated urban region in the Central Belt between Scotland's two largest city economies. Similarly, improved rail connectivity between Aberdeen, Dundee and Inverness and the Central Belt should also be a priority for investment. Future proofing Scotland's network should involve planning for possible HS2 expansion. A journey time of less than three hours between both Glasgow and Edinburgh and London is key to delivering the full economic and environmental benefits of high-speed rail. Faster connections between central Scotland, the Northern Powerhouse, the Midlands and London, integrated into an improved conventional rail network, can promote knowledge exchange, investment and growth. Options for routes and the mix of new and upgraded track need to be considered, but it should be possible to start work on improvements by 2020. Scotland can maximise the economic benefits with the opportunity to develop skills and the supply chain, stimulate investment in advance, and develop a world-class innovation centre in rail. Moreover, the

⁸ <https://cdn.networkrail.co.uk/wp-content/uploads/2016/11/Scotland-Route-Study.pdf>

resilience of Scotland's rail network infrastructure appears to have deteriorated in recent years with a significant knock-on effect on the network's performance, including journey times and reliability. This will need to be a priority for strategic investment and planning, because extreme weather events, from heatwaves to storms to floods, are expected to become more frequent due to climate change.

It is likely that demand on Scotland's major road networks and at our ports and airports will increase substantially in response to the increasing personalisation of services, growing tourism numbers and the increasing internationalisation of the Scottish economy. The Scottish Government's Export Growth Plan, *Scotland: A Trading Nation* (2019), sets a target of increasing exports to 25% of Scottish GDP by 2029, which would mean a further £25 billion of exports by 2029.⁹ Long-term trends suggest that the volume and value of exports from and imports to Scotland will continue to increase.¹⁰ Transport Scotland's *Transporting Scotland's Trade* (2018) report illustrates the importance of road, rail, air and sea transport networks to support the movement of goods, services, capital and labour to deliver export growth, supply chains, employment and inclusive growth.¹¹ Infrastructure – including improved air connectivity between Scotland, London and internationally – should be maintained and improved to support the expansion of trade with key markets. Scotland is especially reliant on a small number of key transport hubs which need to be future-proof and resilient. For example, Cairnryan/Loch Ryan is one of Scotland's most important economic arteries. It is the biggest Scottish port for transporting goods and people to and from Northern Ireland and the Republic of Ireland. The A77 and A75 trunk road links to the port, which transport an estimated £67 million worth of goods every day,¹² are in need of capacity and safety improvements to handle this level, and increasing quantities, of freight all year round. Other projects to support increased passenger and freight capacity at Aberdeen, Edinburgh and Glasgow Airports, dual the A96 Aberdeen-Inverness and upgrade the A90 Aberdeen-Dundee should be prioritised. More broadly, climate change is likely to alter global trade routes and intensify the need for sustainable connectivity. If our cities continue to grow and densify, and technologies and social changes alter supply and demand for travel, how do we keep people moving and ensure that people can access socio-economic opportunities wherever they live?

It is certain that health and social care facilities demand and need will increase significantly to respond to demographic change and support an ageing population. Scotland's population is ageing faster than the rest of the UK.¹³ According to official statistics from the National Records of Scotland, in 2017 19% of the total population of Scotland was aged 65 and over. The number of Scots aged 65 to 74 and aged 75 and over has increased by 27% and 31% respectively since 1997, the highest rates of growth of any age group.¹⁴

⁹ <https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2019/05/scotland-a-trading-nation/documents/scotland-a-trading-nation/scotland-a-trading-nation/govscot%3Adocument>

¹⁰ <https://www2.gov.scot/Resource/0054/00545619.pdf>

¹¹ <https://www.transport.gov.scot/media/43701/transporting-scotlands-trade.pdf>

¹² <https://www.transport.gov.scot/media/43701/transporting-scotlands-trade.pdf>

¹³ <http://www.scottishscience.org.uk/sites/default/files/article-attachments/SSAC-%20Reacting%20to%20Report%20Future%20of%20An%20Ageing%20Population.pdf>

¹⁴ <https://www.nrscotland.gov.uk/files/statistics/population-estimates/mid-17/mid-year-pop-est-17-publication-revised.pdf>

Housing demand and need will continue to increase in response to a growing Scottish population and a trend towards smaller households. Scotland now has a record 5.42 million people. The number of households in Scotland is projected to increase to 2.76 million by 2041, according to the National Records of Scotland. The number of households is expected to increase faster (13%) than the population (5%), with part of this projected increase due to more people living alone.¹⁵

It is certain that demand for digital and telecommunications capacity will increase significantly as a result of technological change and innovation. Infrastructure will require to be enhanced to securely manage the increasingly large and complex collation, analysis and flow of data and information by government, businesses, organisations, institutions, researchers, regulators and consumers. Research by McKinsey & Company suggests that the global free flow of data is increasing exponentially and can be leveraged to deliver higher levels of economic growth and business productivity.¹⁶ It is essential that Scotland's infrastructure enables our businesses and organisations to be truly plugged into the global digital economy to reap the tangible socio-economic rewards of an open, globally-connected economy. Scotland should ramp up efforts to deliver fibre connectivity across all of Scotland to future proof our digital network. It is critical that Scotland's cyber-security infrastructure ensures that other physical and digital infrastructure networks are secure from threats.

It is highly likely that demand for energy from both business and consumers, partly as a result of this expansion of technological possibilities, will increase greatly over the next several decades. Society is facing what has been described as a 'dual challenge': to increase the supply of energy while transitioning towards a low carbon future. Scotland's energy sector has made significant commitments to reduce emissions in their operations, improve their products and invest in low carbon infrastructure and businesses. Nonetheless, it is expected that oil will have to continue to play a substantial role in the global energy system over the coming decades in order to meet currently projected levels of demand.¹⁷ As result, investment in the development of Carbon Capture and Storage (CCS) infrastructure will be required.

d. What do you see as the priority areas for investment in order to enable these future needs and demands to be met?

As noted throughout this submission and specifically in answer to Question 3 c), it is clear that business needs and consumer demands in relation to infrastructure are evolving. These needs and demands will continue to evolve over the next 30 years in response to social, technological and environmental changes on a local, national and global level – in particular, the inevitable advance of the Fourth Industrial Revolution; the opportunities created by EVs, CAVs and MaaS; and the full-spectrum threat posed by climate change.

¹⁵ <https://www.nrscotland.gov.uk/files/statistics/household-projections/16/household-proj-16-pub.pdf>

¹⁶

<https://www.mckinsey.com/~media/McKinsey/Featured%20Insights/Globalization/Global%20flows%20in%20a%20digital%20age/MGI%20Global%20flows%20in%20a%20digital%20age%20Executive%20summary.ashx>

¹⁷ <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2019.pdf>

Therefore, the priority areas for infrastructure investment in order to enable these future needs and demands to be met should be:

- **Digital connectivity** and Fourth Industrial Revolution technologies. SCDI's *Automatic... For the People?* (2018) report discusses the impact which the Fourth Industrial Revolution will have on the Scottish economy, and how its technologies can be harnessed to deliver higher levels of growth and productivity.¹⁸
- **Smart, integrated, low-/zero-carbon mass transit systems**, including to drive a modal shift from individual mobility and private car use. SCDI's Connectivity Commission report, *Scotland's Big Mo: Industrial Strategy, Inclusive Growth and the Future of Mobility* (2018), discusses the opportunities and challenges for the Scottish economy in achieving a smart, integrated and zero-carbon connectivity system.¹⁹
- **Resilience and climate change mitigation/adaptation** across all infrastructure categories, including managing and reducing the risk of disruption to public, private and freight transport during increasingly frequent extreme weather events. Adaptation Scotland, a programme of the Scottish Government, is "providing advice and support to help Scotland be prepared and resilient to the effects of climate change" and has done some analysis of Scotland's exposure to environmental risks and threats.²⁰ Research by WWF Scotland found that 85% of large employers in Scotland judge climate change to be a "business risk".²¹

However, investment in human capital will be required to deliver the hard infrastructure priorities above. The current capacity of Scotland's construction sector, which is essential to support the construction and maintenance of infrastructure stock, is limited. Record-low levels of unemployment have resulted in a tight labour market and a restricted supply of labour. Skills shortages are of particular concern in sub-contract areas such as curtain walling, mechanical services and electrical services. The higher and further education sectors, alongside inward migration, play a vital role in developing the technical skills and future workforce required to deliver Scotland's infrastructure projects. Moreover, the existing model of public procurement should also be reformed in response to the collapse of Carillion and Interserve, in order to support SME growth; ensure more rigorous financial scrutiny; and reduce the risks associated with public sector outsourcing to a small number of large businesses.

e. Where do you see future convergence of need and demand having an impact across infrastructure classes?

See answer to Question 3 c).

¹⁸ <https://www.scdi.org.uk/policy/automatic-for-the-people/>

¹⁹ <https://www.scdi.org.uk/policy/scotlands-big-mo-industrial-strategy-inclusive-growth-and-the-future-of-mobility/>

²⁰ <https://www.adaptationscotland.org.uk/>

²¹ <https://www.wwf.org.uk/updates/new-poll-majority-companies-scotland-say-climate-change-risk-business>

4. In relation to approaches to infrastructure assessment and prioritisation and across all the infrastructure assets identified:

a. What is your view on existing approaches to evaluation and assessment of infrastructure in Scotland?

The Scottish Government should broaden its assessment methods for investment in improvements to and the operation and maintenance of infrastructure networks as well as consider how such investment decisions can be prioritised across critical enabling infrastructure such as digital and energy networks.

Traditional methods used for the assessment of infrastructure investment, such as Benefit-to-Cost-Ratio, will need to be augmented by new approaches based on Multi-Criteria Decision Analysis. These may include, for example, contribution to Scotland's National Outcomes, reliability and resilience, revenue generation for Scotland's tax base and the potential for alternative solutions to hard infrastructure.

Given the uncertainties about future developments, scenario-based assessments are recommended, with infrastructure future-proofed so that it has compatibility and functionality for a range of scenarios, recognising that the extra costs will still be much lower than the costs of retro-fitting infrastructure. Public sector modelling should blend its data sets with the generally more mobile modelling of the private sector, which includes predictive analysis and more closely involve operators of services.

In addition, in relation to the UK Industrial Strategy, the Commission has a role in promoting opportunities to test, develop and commercialise investments from global industry.

b. What is your view of good practise approaches to evaluation and assessment of infrastructure internationally?

The Commission should consider international examples of good practice approaches, where appropriate. Scotland's National Performance Framework incorporates the United Nations Sustainable Development Goals. However, there should also a recognition that Scotland's needs, circumstances and priorities will differ from other countries, and a tailored approach is probably required. The apparently substantial additional costs of new infrastructure projects in Scotland and the UK compared to most other European countries should be fully analysed and addressed.

c. What is your view of existing approaches to the criteria and principles for investment prioritisation in Scotland?

As large population centres and powerful engines of growth, Scotland's cities are often the focus of infrastructure investment. SCDI's Rural Commission has found a perception in much of Scotland beyond the Central Belt that this investment is disproportionate or puts the rest of the country at a disadvantage. The Commission was established in 2018 to examine the challenges and opportunities that exist outwith central urban Scotland and ensure we harness the future economic potential of all of Scotland. It has identified Place, including

infrastructure and capital, as a key priority. Decisions are too often made at a distance from the communities which they affect, at a loss of key local knowledge and intelligence to inform sound decision-making. The Rural Commission is exploring whether coverage targets for 4G and 5G networks could, therefore, now be set and measured according to geographic mass rather than demographic mass, with public investment prioritised to address market failure.

d. What is your view of good practice approaches to the criteria and principles for investment prioritisation internationally?

See answer to Question 4 b).

e. What is your view on existing approaches and methodologies that enable cross infrastructure sector evaluation and assessment to be undertaken, and also the potential for further development of such approaches and methodologies?

There is a need for improved joining-up of public and private investment projects and plans, alongside more integrated regulation to maximise the benefits.

f. What is your view on existing approaches and methodologies that assess impact at different spatial levels, and also the potential for further development of such approaches and methodologies?

See answer to Question 4 c).

g. What is your view on good practice approaches to assessing and establishing the post-implementation impact on the desired outcomes from infrastructure investment?

The assessment of post-implementation impact is generally lacking at present. It is uncommon that a project is appropriately reviewed to definitively establish whether its implementation has delivered all of the benefits which were cited before or at sign-off. A good practice approach would include this as an integral part of the delivery of significant infrastructure projects to improve future decision-making and delivery.