



Citizens Advice Scotland
Spectrum House
2 Powderhall Road
Edinburgh EH7 4GB

0131 550 1000
jamie.stewart@cas.org.uk
www.cas.org.uk

CAS Response to Infrastructure Commission for Scotland Call for Evidence

We thank you for the opportunity to respond to your call for evidence. Given the remit of the commission we welcome its establishment and look forward to engaging further over the coming year.

Who we are

The policy teams at Citizens Advice Scotland use research and evidence to put people at the heart of policy and regulation. We work with government, regulators and business to put people first, designing policy and practice around their needs and aspirations.

In this response we touch on many of the sectors defined by the Commission - water, energy, post, housing, telecoms, digital and internet. Given our remit to cover a number of different sectors we also provide a summary of cross cutting themes we think are important for future infrastructure development.

Our response to the specific questions focus around a number of key areas:

Energy

- Affordable heat as an infrastructure priority
- The need for inclusive development of energy network infrastructure

Water

- The role of Scottish Water in a low carbon economy
- The need to balance investment with water charges

Housing

- Investment in existing and new good quality affordable homes as a priority

Telecoms, digital and internet

- The need for digital access for inclusive economic growth – with appropriate provision for those who may never be online
- The need for a holistic investment approach to digital infrastructure



Citizens Advice Network in Scotland

Citizens Advice Scotland (CAS), our 60 member Citizen Advice Bureaux (CAB), the Citizen Advice consumer helpline, and the Extra Help Unit, form Scotland's largest independent advice network. Advice provided by our service is free, independent, confidential, impartial and available to everyone. Our self-help website Advice for Scotland provides information on rights and helps people solve their problems.

In 2017-18 the Citizens Advice Service network helped over 295,100 clients and dealt with almost 800,000 advice issues for clients living in Scotland. With support from the network clients had financial gains of almost £142.2 million and our self-help website Advice in Scotland received approximately 3.2 million page views.

Our extensive footprint is important in helping us understand how issues impact locally and nationally across the country and the different impacts that policies can have in different areas. From our own extensive data set and experience of consumer advice and advocacy in Scottish, GB and EU markets, we believe that one or more of the following create a unique landscape for infrastructure development in Scotland:

- The demography of Scotland, with areas of high and low levels of population, and concentrations of relative wealth and deprivation. The projected population shifts within Scotland will also have infrastructure impacts.
- The geography of Scotland, the impact that has on the provision of infrastructure and delivery of services (for example with telecommunications, energy networks, water services and parcel deliveries).
- The climate of Scotland, which can lead to consumers needing, for example, high levels of energy usage for heating. Climate change, and its potential impact on infrastructure, now and in the future, can also have particular consequences for Scottish consumers.
- The different political, governmental and policy structures between Scotland and other areas of the UK, which can result in specific Scottish circumstances.

Cross Cutting Themes for Future Infrastructure Development

1) The importance of cross sector thinking

What has been set out by the Infrastructure Commission for Scotland points towards a future beyond 'siloes'. This will require sectors to plan together where there is more value in doing so, where it is more cost effective to do so and where it may take longer but deliver greater rewards in terms of economic and social benefits. Cross sector collaboration also allows for more integrated and resilient solutions and helps to develop leadership and expertise across disciplines.

Stronger and broader links across sectors will support the identification of greater efficiencies in terms of both how services are delivered, and will highlight where existing legislation constrains this approach and drives sectors to look inwards rather than outwards.

2) The need for collaboration and consultation with citizens and communities in infrastructure development

A vital element in moving towards a more resilient future is the inclusion of communities and citizens as equal partners by service providers. Partnership working between communities, organisations and citizens will ensure that infrastructure solutions are designed around the needs of those that use them. A good example of this is the way that energy network companies have been asked by the regulator Ofgem to establish a programme of enhanced stakeholder engagement¹. Network companies have established Customer Engagement Groups which CAS are involved with and we would happy to discuss further.

3) Understanding intergenerational equity

Studies are currently underway among water industry stakeholders to better understand legacy issues **around intergenerational equity**: how much we ask current customers to pay for infrastructure that will benefit future customers, and how much we should and can spend now to deliver more resilient infrastructure. Additionally, expectations among future generations are changing in terms of building a more sustainable planet, and the infrastructure companies and Government more broadly must consider how infrastructure can be future proofed to meet future needs. We would be keen to discuss the issue of intergenerational equity further with the Commission.

¹ <https://www.ofgem.gov.uk/network-regulation-riio-model/network-price-controls-2021-riio-2/riio-2-events-seminars-and-working-groups/riio-2-policy-enhanced-stakeholder-engagement>

4) Developing infrastructure that reduces social inequality whilst meeting carbon targets and reducing planetary impact

The Scottish Climate Change Bill will set out some of the world's most ambitious emission reduction targets for Scotland. We welcome the establishment of the Just Transition Commission² which we hope will help to ensure that policies designed to reduce emissions – such as changing the way people heat their homes – does not increase social inequality.

There is a groundswell of interest in the need to accelerate policy change to protect our natural environment and to reduce our usage of natural resources from three planets to one. This approach is supported within SEPA's sector planning process, which we have welcomed and supported, as we think the process has a key role in bringing together different sectors to identify how they can deliver greater benefits for both consumers and the environment.

Scottish Water has an essential role in the provision of water and wastewater services to the people and businesses of Scotland, however, it also has a wider role in terms of the contribution it makes to national agendas such as Scottish Government's National Outcomes, One Planet Prosperity, etc. and growing areas of concern such as flooding.

Response to Specific Questions

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?

Strategic drivers:

- Securing Scotland's international competitiveness
- The markets and connections Scotland requires for goods, services and people
- How to prioritise investment to deliver inclusive economic growth and low carbon objectives
- Demographic and other social change factors
- Place-making
- Technological change and innovation

² <https://www.gov.scot/groups/just-transition-commission/>

- Considerations around development, ownership and financing of infrastructure, including Fair Work

1. In response to question **1a** CAS broadly welcomes the definitions set out by the commission but suggest that the commission also considers reduction of inequalities (particularly of wealth) to be a key strategic driver.

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

2. In response to question **1b**, the links between income and wealth inequality and productivity are well documented (e.g. By the [IMF](#) and the [OECD](#), amongst others).

The implications and expectations of climate change policy on people in Scotland

3. In 2018 CAS research *Changing Behaviour in a Changing Climate*³ examined the expectations of people as a result of current Scottish Government Climate policy in the energy and water sectors. The research examined the type of behaviour changes (both one-off and habitual) that could be expected of consumers and the steps being taken by the Scottish Government and others to facilitate these changes.

The key expectations are noted below:

One off behaviour changes	Habitual behaviour changes
Upgrading domestic heating	Adopt energy saving behaviours (heat)
Completing energy retrofits	Adopt energy saving behaviours (electric/water)
Install of smart meters	Purchase energy efficient equipment
Switch to electric vehicles or ultra-low emission vehicles ULEVs	

Figure 1 - One off vs habitual behaviour changes. Taken from CAS report *Changing Behaviour in a Changing Climate*⁴

³ <https://www.cas.org.uk/publications/changing-behaviour-changing-climate>

⁴ [https://www.cas.org.uk/system/files/publications/changing behaviour in a changing climate.pdf](https://www.cas.org.uk/system/files/publications/changing%20behaviour%20in%20a%20changing%20climate.pdf)

4. While many co-benefits and potential side-effects are noted for each behaviour, a number of common impacts are seen. Multiple behaviours such as upgrading domestic heating, completing energy efficiency retrofits and switching to ULEVs may provide savings for consumers over time, but they rely on an upfront financial investment. While financial support or incentives may be needed to encourage consumers to undertake these changes (especially for those in vulnerable situations), a number of behaviours are not dependant on an initial upfront investment. These behaviours, such as reducing energy use in the home, are dependent on consumers changing their lifestyles, which although initially challenging can lead to long term savings. As noted by the research team this can lead to positive health and well-being outcomes for individuals and for society.

5. The research⁵ identified some recurring factors that were noted to have the potential to affect the impact on people more than, or differently to, other people in different situations. These factors are noted below and more details can be found in the report:

- rural/ urban divide
- local government
- socio-economic status
- tenure
- physical and mental health

6. Providing the appropriate support for those disadvantaged or less able to engage with infrastructure development – such as the roll out of electric vehicles – will be important in ensuring that carbon targets are met.

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?

Scottish Government describes infrastructure as:

"The physical and technical facilities, and fundamental systems necessary for the economy to function and to enable, sustain or enhance societal living conditions. These include the networks, connections and storage relating to enabling infrastructure of transport, energy, water, telecoms, digital and internet, to permit the ready movement of people, goods and services. They include the built environment of housing; public infrastructure such as education,

⁵ <https://www.cas.org.uk/publications/changing-behaviour-changing-climate>

health, justice and cultural facilities; safety enhancement such as waste management or flood prevention; and public services such as emergency services and resilience."

7. CAS is supportive of the definitions – and is particularly interested in the work of the Commission given the overlap with CAS' policy work in this area - water, energy, post, housing, telecoms, digital and internet.

8. We also particularly welcome that housing is recognised in the Commission's description of Scottish infrastructure. The Citizens Advice network in Scotland advised on 46,777 housing related issues in 2017-18, making it the fourth most common topic that people sought advice on that year.

9. We also see the development of affordable energy infrastructure as a key theme. As reported in a recent survey by Which⁶ consumers in Scotland in 2019 said that energy prices were their highest concern –alongside fuel prices and public spending cuts. In 2017-18 the Citizens Advice Network in Scotland helped clients with over 41,000 issues relating to energy.

Telecoms, digital and internet are recognised as essential infrastructure

10. In response to question **2a**, CAS welcomes that telecoms, digital and internet are recognised in the Commission's description of Scottish infrastructure. Media devices/accessories/repairs, and communication services were amongst the top five reasons for contacting the Citizens Advice Consumer Service in 2017-18. We also welcome the inclusion of the 'movement of goods' as part of this definition. A complementary relationship between telecoms and postal services exists through the delivery of goods bought online. While the provision of postal services is a reserved matter, Scottish consumers –including SMEs – based north of the Central Belt pay on average 30-50% more than other consumers for the delivery of goods bought online due in some part to Scotland's infrastructural challenges, like the cost of ferry services and poor road conditions.

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

Energy – Affordable heat as an infrastructure priority

11. Energy is an essential service. In Scotland 24.9% of households are in fuel poverty⁷ -they spend 10% or more of their incomes on energy bills to have sufficiently warm houses. The provision of affordable heat for people in Scotland should be considered an infrastructure

⁶ <https://consumerinsight.which.co.uk/reports/consumer-insight-report-2019-scotland>

⁷ <https://www2.gov.scot/Topics/Statistics/SHCS>

priority given the negative health and societal impacts that are associated with living in cold and dampness.

12. In 2016, the Scottish Fuel Poverty Strategic Working Group identified four 'drivers' of fuel poverty. Each of these drivers can have a different impact upon the affordability of heating.

These recognised drivers are:

- Energy inefficient buildings
- High fuel costs
- Low income
- The way in which heating systems are used

13. It has become clear that in order to successfully address fuel poverty in Scotland, all four drivers of fuel poverty must be tackled. For example, previous research carried out by CAS, along with the findings of the Strategic Working Group on Fuel Poverty, indicate that eradicating energy efficiency as a driver of fuel poverty alone is unlikely to eradicate fuel poverty.

14. Our report *Speaking Up*⁸ highlights the support needs of those living in fuel poverty and found that certain groups were more likely than others to report struggling financially or to have problems heating their homes, and were likely to express a greater need for support. These included:

- Households in rented flats, both in the private and socially rented sector
- Households in rural areas
- Households that rely on electric heating
- Younger, working age households

Energy - Electric Heating – an infrastructure issue

15. Around 11% of Scottish households rely on electricity for heating. As detailed in our research *Hard Wired Problems*⁹ electric heating can be three times more expensive than mains gas as a whole house heating option and 51% of this group are defined as being in fuel poverty – nearly twice as many as the population as a whole. Our report finds that there is a need for additional support to develop specialised, holistic advice services dealing with electric heating, the expansion of locally-delivered, face-to-face advice services, efforts to improve awareness of

⁸ <https://www.cas.org.uk/publications/speaking-understanding-fuel-poverty-support-needs>

⁹ <https://www.cas.org.uk/publications/hard-wired-problems>

existing support services, more specialised training for advisers, longer-term funding for advice services, and targeted support for upgrades to electric heating systems.

16. However the electrification of heat is often credited as a decarbonisation option – as noted in the Scottish Governments Energy Strategy.¹⁰ If the electrification of heat is taken forward as a decarbonisation option, policy decisions will need to be taken to reduce the unit cost of electricity to bring it more in line with that of mains gas. If this does not happen fuel poverty rates will increase in Scotland and the Scottish Governments target of reducing fuel poverty levels to less than 5% before 2040¹¹ will again be missed.

Energy - the importance of energy efficient housing stock

17. As noted above – although energy efficiency alone cannot eradicate fuel poverty- improving Scotland's housing stock should be an infrastructure priority and is a no regrets option.

18. In 2016 Citizens Advice Scotland (CAS), in association with Glasgow Caledonian University, Andrew Faulk, and the Energy Agency, conducted a review of energy efficiency and fuel poverty schemes in Scotland¹². The research was framed by policy goals adopted by the Scottish Parliament to eradicate fuel poverty as far as it was reasonably practical by 2016, and to limit annual greenhouse gas emissions¹³. Energy efficiency measures were considered essential to achieving these policy aims. Modelling in the report indicated that the energy efficiency of Scottish homes was improving, driven largely by installations of loft cavity wall and cavity wall insulation as well as more efficient boilers. The review concluded that retrofitting existing housing stock is central to eradicating fuel poverty and limiting greenhouse gas emissions in Scotland.

19. The report predicted that there would be downward pressure on public spending, which would impact the amount of resources available to meet the challenges posed by energy efficiency and fuel poverty, even as the measures needed to meet these challenges become more expensive. This scenario is complicated by the relationship between energy efficiency and fuel poverty; although more efficient homes can help alleviate fuel poverty, the most cost effective energy efficiency measures are not always the most effective ways of helping fuel poor households. Potential energy efficiencies are almost never fully realized, due to a lack of awareness, understanding, and behavioural changes required to limit energy use. Moreover, most fuel poor households in existing schemes were identified through proxies such as receipt of benefits, which was not found to be a completely thorough or accurate way of identifying households in fuel poverty.

¹⁰ <https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/>

¹¹ As set out in the draft Fuel Poverty Bill

¹² <https://www.cas.org.uk/publications/taking-temperature>

¹³ See Housing (Scotland) Act 2001 and Climate Change Scotland Act (2009).

20. Additionally, CAS cautioned that the complex delivery landscape featuring multiple schemes makes delivery more challenging and confusing for consumers and that scheme design would need to account for rurality and the higher risks of fuel poverty in rural areas.

Energy - Current state of building stock in relation to energy efficiency

21. The 2017 Scottish Housing Condition Survey confirmed that many of the trends identified in the 2016 report have continued – 42% of Scottish homes rated EPC C or higher, and increase from 39% in 2016 and 35% in 2014. 94% of Scottish homes had the minimum standard levels of loft insulation, but levels of installation have slowed significantly since 2010, suggesting the presence of technical barriers. Fuel poverty has decreased in urban areas, but not rural ones; the rate of rural fuel poverty increased from 26% to 40% between 2016 and 2017¹⁴.

22. [Energy Efficiency Scotland](#)¹⁵, a new government programme focused on reducing carbon emissions and fuel poverty through improving the energy efficiency of Scottish housing stock launched pilots in 2018 with [mixed success](#)¹⁶. Local authorities carried out domestic measures including solid wall, cavity wall, and loft insulation, double glazing, and door replacement. Most local councils were able to identify households that needed improvement through data from local programs¹⁷. These data were most complete for council owned or ex-council owned housing stock, meaning that local authorities and their delivery partners often had limited knowledge about the conditions of privately owned properties, which created uncertainties about delivery targets, budgets, and contractors for the privately owned housing sector. Contractor pricing varied from pilot to pilot due to area, program structure, local environment and economic factors, and Energy Company Obligation (ECO) pricing details¹⁸.

23. Many of the future challenges identified in the 2016 report were present in the pilot programs of Energy Efficiency Scotland. Some were addressed, while others continue to pose challenges for administrators. More financial support has been made available to local authorities and property owners to install energy efficiency upgrades, however many households that qualified for funding or retrofit did not get the renovations needed due to the scale and cost of the improvement. Priority was given instead to low cost measures, demonstrating the point that the most cost-effective energy efficiency measures are not always the most needed energy efficient upgrades, especially for fuel poor households.

¹⁴ Scottish Government, (2017). Scottish Housing Survey, 2017. Scottish Government.

¹⁵ <https://www.gov.scot/publications/energy-efficient-scotland-route-map/>

¹⁶ <https://heatandthecity.org.uk/wp-content/uploads/2018/11/EES-Pilot-Evaluation-Phase-1-Final-Report1.pdf>

¹⁷ Home Energy Efficiency Scotland Area Base Scheme (HEEPS ABS), the Scottish Index of Multiple Deprivation, Council Tax bands, building types, tenure mix, data on fuel poverty, fuel bills, and energy performance certificates

¹⁸ Bush, R., McCrone, D., Webb, J., Wakelin, J., Usmani, L., Sagar, D. (2018). *Energy Efficient Scotland- Phase 1 pilots evaluation final report*. Scottish Government.

24. The more complex data used by local authorities in conjunction with fuel poverty data helped develop the identification of vulnerable households in need of energy efficiency upgrades, an improvement from the 2015 method of identifying fuel poor households through proxies such as receipt of benefits. Initial technical evaluations of households that participated in the pilot indicated that although internal temperatures increased, few households had saved energy. These findings, though based on limited data, could support the conclusion that energy efficiency measures alone are not enough to reduce energy bills, and that behavioural changes are needed as well.

25. The pilots were most limited by complexity of delivery, a challenge flagged by CAS in 2016. A lack of staff resources and capacity for strategic planning and development work within local authorities and delivery partners limited the scale and complexity of the programs. Complex delivery landscapes, the need for behavioural changes in energy consumption, and the disparity between cost effective and most effective energy efficiency measures continue to pose challenges in improving the energy efficiency of Scottish homes and reducing fuel poverty.

Energy Networks – their role in creating a low carbon economy and inclusive growth and ensuring that it is paid for in a fair way

26. The electricity and gas distribution networks take energy from the wires and pipes of the transmission networks and convert it into lower voltages and pressures so that it can be delivered safely into homes and businesses. Scottish and Southern Energy Networks (SSEN) and SP Energy Networks (SPEN) are the two electricity Distribution Network Operators (DNOs) serving Scotland. SGN is the sole Gas Distribution Network (GDN) serving Scotland.

27. These privatised networks operate as regulated monopolies, overseen by the energy regulator Ofgem, with standards set for performance and limits set on what the network operators can charge their customers. Network costs typically account for 26% of the average dual fuel energy bill¹⁹. In Scotland this equates to around £262 per household per year²⁰. However the charges that consumers face for network costs are not the same across the country. Ofgem's *Regional differences in network charges* report²¹ shows that consumers in the north of Scotland, pay some of the highest costs to access electricity (See figure 2).

28. Given that many properties in the north of Scotland are off the gas grid, have a high energy demand due to the colder climate and energy inefficient building stock and rely on electric heating this can lead to significantly high energy bills. Our 2018 consumer tracker survey²²

¹⁹ Ofgem, *Understanding your gas and electricity bills*. Information correct as of: August 2017

²⁰For an household with average UK single rate consumption. Based on Ofgem's Regional Differences in network charges report 2015.

²¹*Regional differences in network charges*. Ofgem 2015

https://www.ofgem.gov.uk/sites/default/files/docs/2015/10/reg_charges_final_master_version_23_october_2015.pdf

²²To be published summer 2018

showed that 73% of people in Scotland believed that all households should pay the same proportion of their energy bill on network costs, no matter how difficult it is to supply them.



Figure 2- DNO regions with combined distribution and transmission electricity network charge based on an average UK single rate consumption of 3100 kWh/y electricity and 12,500 kWh/y gas. Charges for those with electric heating (dual rate meters) or higher consumption than the UK average will have higher network charges than the referenced figure. Figures derived from Ofgem's Regional differences in network charges (2015)

29. CAS believes that given the already high network costs paid by those in the North of Scotland careful thought is needed on how the costs of delivering a decarbonised energy system – which may require significant new infrastructure developments – are shared both between GB consumers and between bill payers, government and industry.
30. We support the Scottish Government's proposal in their recently published *Energy Networks Vision*²³ to hold an Energy Networks Summit which can be used to discuss both how the network is developed from a consumer point of view and how it should be financed. We also welcome that the Vision recognises that:

²³ <https://www.gov.scot/binaries/content/documents/govscot/publications/publication/2019/03/vision-scotlands-electricity-gas-networks-2030/documents/vision-scotlands-electricity-gas-networks-summary-2019-2030/vision-scotlands-electricity-gas-networks-summary-2019-2030/govscot%3Adocument/vision-scotlands-electricity-gas-networks-summary-2019-2030.pdf>

"Consumers and their representatives need to be central in deciding how our networks develop."

Telecoms – the need for digital access for economic growth

31. In response to questions **2b, 2c, 2e, and 2f**, we have considerable evidence that lack of digital access can inhibit access to [other essential public services](#), and hamper economic growth through poor and variable broadband [limiting the turnover of rural businesses](#). This suggests that improving digital access (or ensuring that alternative infrastructure for accessing public services is available) could lead to improved service delivery, increased economic investment and reduce some of the inequalities such as physical infrastructure, affordability, skills, or access to devices.

Water – the role of Scottish Water in a low carbon economy

32. Scottish Water has the potential and ambition to become a leading circular economy company. Its infrastructure contains significant amounts of recoverable heat that could make a large contribution to Scotland climate change demands and ambitions. Scottish Water, as well as recovering energy and materials from its waste stream and wider infrastructure has the ability to generate energy from certain of its assets and which could contribute to the company, long term, having a higher capacity to become more self-financing. At present investment in more circular economy infrastructure may be more expensive in the short term and in competition with the need for other infrastructure investment needed to meet shorter term water quality compliance, environmental standards compliance and routine asset replacement. Further, because of the way the water industry is financed over 6 year horizons, the payback time for much of the investment opportunity is longer term and such investment is at a disadvantage over other forms of investment. Were Scottish Water more able to invest in the right infrastructure for the future, within a more flexible financial framework, this would bring significant societal and climate change gains.

33. Placing an increased value on natural resources may in some instances outweigh the application of traditional cost drivers, such as the Economic Level of Leakage, resulting in greater investment in infrastructure to reduce leakage. Additionally, a shift in values may result in Scottish Water spending more on infrastructure to reduce the number of environmental pollution incidents, which impact the natural environment where raw water for drinking is sourced.

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

Energy Networks – the need for inclusive development

The change to a lower carbon, smarter more flexible electricity network creates a risk that some people get left behind

34. The UK government, through the Department for Business, Energy and Industrial Strategy (BEIS), and Ofgem are working together to plan the transition of the energy system towards achieving carbon emissions reductions, as set out in the UK government's *Clean Growth Strategy* (October 2017)²⁴. This strategy sets out the UK government's current plan to meet legally binding long-term targets to reduce carbon emissions. BEIS and Ofgem published *Upgrading our energy system: smart systems and flexibility plan* (July 2017)²⁵, outlining specific developments in the energy system. In particular this report considers changes to the electricity system to enable higher volumes of variable renewable generation through smarter operation and more demand side flexibility and management.

35. While some of the network changes involved will have a negligible direct effect on consumers (apart from the potential effect on bills), **some may affect the consumer experience or even involve consumers directly**. For example, if the increase in distributed generation (DG)²⁶ places more of a strain on the electricity network, the network may need to be used in a more dynamic way by consumers. There may, therefore, be a growing role for network companies to directly engage with consumers to manage when electricity is used – what is known as 'Demand Side Response' (DSR)²⁷. As highlighted by a study by Imperial College London and The Carbon Trust, one estimate models that the UK could save £17- 40bn across the electricity system by 2050 by deploying flexibility technologies, such as DSR, that mitigate the need for expensive network capacity upgrades.

36. As noted in our research Pylons Pipes and People²⁸, compared to the rest of GB, Scotland has more ambitious targets and programmes to: increase renewable energy generation; accelerate the take up of EVs; tackle fuel poverty; expand the role of community and local

²⁴https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf

²⁵https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/633442/upgrading-our-energy-system-july-2017.pdf

²⁶ Distributed Generation (DG) – electricity generation that is often renewable and connected to the distribution network.

²⁷ Demand Side Response (DSR) – financially incentivises energy users to turn down or turn off non-essential energy use at times of peak demand to ensure that electricity supply balances with demand.

https://www.citizensadvice.org.uk/Global/Migrated_Documents/corporate/take-a-walk-on-the-demand-side-final-2.pdf

²⁸https://www.cas.org.uk/system/files/publications/cas_pylons_pipes_and_people_energy_networks_in_scotland_august_2018.pdf

authority-led energy action and asset ownership; encourage district/communal heating; improve the efficiency of the Scottish housing stock and decarbonise remaining heat supply. This creates what might be considered an accelerated context in Scotland for the anticipated energy system changes, affecting the network companies' Scottish license areas sooner than the rest of GB.

37. In addition to this policy context, other characteristics of Scotland are relevant to this potentially accelerated context for the future of energy networks:

- the numbers of island and remote rural communities (which may need smarter energy system solutions which involve domestic consumers sooner than other places where there may be more large electricity users to provide the required demand side flexibility).
- the high number of community renewable energy initiatives²⁹.
- the high penetration of on-shore wind power which tends to create localised network challenges - for example where electricity supply exceeds demand.
- The relatively high proportion of homes not connected to the gas network, relying on electricity for heat (mainly in storage heaters) - which increases local electricity demand

38. For the reasons noted the impact on consumers may be comparatively greater in these areas – with a possible need for domestic consumers to be more flexible with their electricity usage. This could be through mechanisms such as time of use tariffs or smart appliances which use variable off-peak electricity. It must be noted though that consumers in Scotland who use Time of use tariffs with restricted meters currently pay some of the highest prices to heat their homes – something that must be addressed in a transitioning energy system.

39. Our research *Pylons Pipes and People*³⁰ made a number of recommendations in relation to the transition in energy infrastructure:

- A forward thinking approach with the appropriate support for consumers is needed to ensure that no one in Scotland gets left behind in the transition to a smarter electricity network.
- Fuel poor households could also be financially supported to install measures which will reduce their bills such as solar pv and in home battery storage. Alongside financial support, households will also need the appropriate post-installation advice and support to maximise fuel bill savings.

²⁹ There are 294 Community Energy Projects in Scotland <http://www.communityenergyscotland.org.uk/projects.asp>
³⁰

https://www.cas.org.uk/system/files/publications/cas_pylons_pipes_and_people_energy_networks_in_scotland_august_2018.pdf

- Consumer protections, such as appropriate redress and complaint handling, for vulnerable consumers within community energy projects and new flexibility services must be prioritised.

40. We are strongly supportive of the Scottish Government's Energy Network Vision³¹ and its ambition to have:

- an inclusive transition to a decarbonised energy system
- a whole system approach across heat, transport and electricity, and
- smarter, local energy models.

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?

Future of the gas network – an example of renewals vs new infrastructure

41. In Scotland 83% of homes are connected to the gas network³² - currently the principal and most affordable source of fuel for heat for households.³³ However the Scottish and UK targets to cut carbon emissions also drive the need to decarbonise the heat we use in homes and businesses within the next 30 years. This brings into question the future use of the gas network - since the use of fossil fuel gas will not be feasible within legally binding carbon budgets.

42. However significant investment has been put into the gas network both to connect new homes (through Ofgem's Fuel Poverty Network Extension Scheme) and to replace iron gas pipes with plastic ones to align with requirements from the Health and Safety Executive.

43. Decisions about the future of the gas network and whether it is made redundant are dependent on there being a viable green gas alternative such as hydrogen or biomethane which could deliver low carbon heat for households. Importantly this decision will also depend on which option – hydrogen or electrification of heat – will be the most cost efficient. In this case

³¹ <https://www.gov.scot/binaries/content/documents/govscot/publications/publication/2019/03/vision-scotlands-electricity-gas-networks-2030/documents/vision-scotlands-electricity-gas-networks-summary-2019-2030/vision-scotlands-electricity-gas-networks-summary-2019-2030/govscot%3Adocument/vision-scotlands-electricity-gas-networks-summary-2019-2030.pdf>

³² <https://www2.gov.scot/Topics/Statistics/SHCS>

³³ As detailed in our research *Hard Wired Problems* electric heating can be three times more expensive than mains gas as a whole house heating option. <https://www.cas.org.uk/publications/hard-wired-problems>

the decision about whether to replace the gas network with alternative heating options is likely to be made in the 2020s and is being constrained by the need to meet decarbonisation targets.

44. Before this decision is made by the UK Government it seems appropriate that investment in the gas network is focussed on renewals and maintenance rather than the development of new infrastructure – where it is safe to do so.

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?

Energy

45. As noted by the Energy Networks Association the UK energy networks are amongst the most reliable in the world and across GB, customers on average experience a power cut on average once every two years and an interruption to gas supply once every 40 years³⁴. While the energy system has become increasingly reliable, some regional variation does exist and the continued improvement of reliability for those who experience more than the average number of power cuts should be seen as a priority. Given the reliance for many in Scotland on electricity for heating – reliability of the electricity system is particularly important and especially for vulnerable households.

Water

46. There are regional disparities in water infrastructure where some rural areas have high levels of private arrangements for water supply (180,000 people across Scotland consumer private water at home and work) and waste water treatment and disposal, and are responsible for the full cost to serve. Often private water sources are inadequate to meet demand and are of substandard quality. This has potential economic and social consequences when considering fully inclusive regional and national growth. To rectify these regional disparities, the current funding arrangements may depend on current charge payers paying more to connect private water communities to the public mains which could come at a high cost. This could in turn provide a constraint to potential regional investment opportunities.

Housing

³⁴

<http://www.energynetworks.org/assets/files/20171201%20How%20the%20GB's%20gas%20and%20electricity%20networks%20work.pdf>

47. In response to question **3a and 3b**, our evidence suggests that there are issues in housing availability, affordability and quality that may be relevant to the Commission's remit. We would be glad to issue the commission with more detail in these areas, along with case studies, if required. In addition to our evidence, while there is positive improvement in some of Scotland's National Performance Framework housing indicators, progress on the majority has stalled. In particular, the [Scottish House Condition Survey](#) suggests that some 68% of homes in Scotland have some degree of disrepair, and 40% of Scottish homes fail to meet the Scottish Housing Quality Standard (SHQS). This is particularly acute in Scotland's fastest growing housing sector, the private rented sector, where 48% fail the SHQS, a higher proportion than any other tenure type.

Telecoms

48. In response to question **3a and 3b**, our evidence demonstrates current inequalities in access, whether that is as a result of physical infrastructure, affordability, skills, or access to devices. These inequalities are found across different geographic areas in Scotland, but also across different demographic groups, with those who live in rural areas or who are on lower incomes tending to be missing out most. [45% of rural SMEs](#) told us that their broadband is often, or usually poor, for example, while CAB clients who live in the most deprived areas [are much less likely](#) to use the internet compared to those in the least deprived areas.

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?

Energy – The need for infrastructure to facilitate the smart and flexible electricity system

49. The low carbon, smart and flexible energy system – described earlier in this response will be reliant on significant change and development over a five and 30-year time horizon. We have set out what the key areas of change and development will likely be over a 5 and 30 year time horizon:

5 year:

- Successful smart meter roll out across Scotland
- Increased public awareness of the benefits of change in the energy system

30 year:

- Accessible and reliable electric vehicle charging infrastructure across Scotland in both urban and rural areas
- Smart enabled Electric Vehicle charging
- Increased numbers of devices with flexible demand – heat pumps, domestic batteries smart washing machines etc.
- Increased renewable electricity generation

- Low carbon gas (bio-methane or hydrogen) being utilised in the mains gas network or the electrification of heat

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

Energy - The need for investment in affordable low carbon heating systems for off-gas properties

50. As noted previously 17% of properties are not connected to the gas grid in Scotland³⁵. Although low carbon technologies exist such as heat pumps and biomass boilers these alternatives require significant upfront investment. As noted previously in this response those who use electric heating can face a number of issues³⁶. 25% of households in the Highlands and Islands rely on oil heating and as our research *Clubbing Together*³⁷ showed prices can be highly volatile – a 74% increase was seen between January 2016 and January 2018.

51. We think that financial investment in alternative heating systems for fuel poor households in off-gas areas should be an infrastructure priority. We are pleased to see that the Scottish Government are consulting³⁸ on their off-gas decarbonisation strategy to understand the best options for heating homes that are not connected to the gas network and that currently rely on high carbon fuel sources such as oil and LPG.

52. In our report *Pylons Pipes and People*³⁹ CAS make a number of recommendations about the future of heat.

- Provision for affordable heat for vulnerable consumers should be a central component of future heat strategy.
- Exploration should take a whole system approach including electricity, gas, the heating system, the building fabric and the household and look at how different policy drivers in Scotland interact.

³⁵ <https://www2.gov.scot/Topics/Statistics/SHCS>

³⁶ <https://www.cas.org.uk/publications/hard-wired-problems>

³⁷ https://www.cas.org.uk/system/files/publications/2018-10-04_clubbing_together_report_final.pdf

³⁸ <https://www.gov.scot/publications/energy-efficient-scotland-future-low-carbon-heat-gas-buildings-call-evidence/>

³⁹

https://www.cas.org.uk/system/files/publications/cas_pylons_pipes_and_people_energy_networks_in_scotland_august_2018.pdf

- The consumer impacts of different heating methods, such as cost and ease of use, must be considered for Scottish consumers and must take regional differences such as fuel costs and energy demand into consideration.
- Overall strategy for the future of the gas grid, should build on the local heat and energy efficiency strategy (LHEES) work currently being done by each local authority in Scotland.

Water – Balancing charging with infrastructure development

53. The Scottish Government’s National Infrastructure Mission supports planned and scaled-up investment to drive improved growth and national wealth. However, within the water sector it could be argued that investment follows growth rather than leads it, in so far as significant sums of annual expenditure enable already planned housing and economic growth, where that growth challenges existing infrastructure capacity.

54. Furthermore, water sector investment can be constrained by household and business charge acceptability considerations as the investment is financed for the most part through charges (with limited amounts of annual Scottish government borrowing available) and not from the national tax base. This means that investment will be constrained by what the water charge base may be considered capable of bearing at any given time, rather than with a view to wider national infrastructure considerations. Within this, an important consideration of water charges will be their affordability to lower income households and households on benefits, where water charges are not rebated unlike Council Tax payments. To some extent therefore it might be argued that policy on affordability, where there is not a comprehensive and targeted charge reductions system, could constrain greater infrastructure investment within the industry where it might otherwise be affordable for most consumers.

55. The borrowing that Scottish Water has access to from the Scottish government is generally measured over 6 year periods and has held steady at circa £120 million per annum for a number of years. The nature of the borrowing regime means that the debt carried by Scottish Water grows annually and the interest on that debt has to be met from customer charges. Taking a long term view, in effect, the amount Scottish Water borrows will simply pay for the interest of the borrowings taken some 20 years previously. It is questionable whether this is the best use of financial resources or sustainable in the long term. It is worth noting that in terms of the control totals for public spending, the current borrowing could be given in the form of a grant, which would make no difference to public spending. The Scottish Government in the longer term would not receive as much interest on the accumulated debt, with those annual interest payments already broadly equating to the value of the annual borrowing.

Housing - investment in good quality affordable homes as a priority

56. In response to **3d**, CAS would see investment in good quality affordable homes as a priority – with a focus on ensuring existing stock is a) available for long term occupants, not left empty or used as holiday accommodation, b) affordable for those on low and middle incomes to rent, or buy, and c) of an acceptable safety, quality and energy efficiency standard. While investment in new housing stock is also vital, we know that 85% of today's homes will still be in use by 2050, and there are [around 80,500 properties currently lying empty, 24,900 second homes](#), and many more properties used for short-term and holiday lets.

Telecoms – a holistic investment approach to digital infrastructure

57. In response to **3d**, CAS is aware of significant investment in improving elements of digital infrastructure already. However, we would suggest that truly adequate digital infrastructure is about more than networks and cabling, and a more holistic investment approach considering skills, affordability, and device access may be required.

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

The need for community and citizen engagement in infrastructure development.

58. As noted at the start of our response it is highly important that users of infrastructure such as citizens and communities are given the opportunity to influence how the infrastructure around them is developed -both because they are often paying for the infrastructure through bills or taxes and because they will be the ones using it.

59. A good example of how citizens are being involved in infrastructure development is in energy networks. Ofgem regulate the network companies through a price control known as RIO⁴⁰. Network companies have been incentivised to establish Customer Engagement Groups who's primarily role is to test whether companies have carried out appropriate stakeholder engagement (with organisations and individual consumers) while creating their business plans. The companies are expected to carry out primary consumer research and shape the way their business plan develops to reflect customer needs and wants.

60. Recent research by Citizens Advice *Strengthening the voice of consumers in energy networks' business planning*⁴¹ highlighted (see table below) the differing levels of stakeholder

⁴⁰ Revenue = Incentives + Innovation + Outputs

⁴¹https://www.citizensadvice.org.uk/Global/CitizensAdvice/Energy/CitA_Strengthen%20Consumer%20Voice%20in%20Energy%20Networks%20Price%20control_2018.pdf

engagement that organisations can carry out to make sure that business plans and investment priorities are appropriate and align with the aspirations of bill payers. As the table shows this increases from an initial level of 'informing' stakeholders about company practice to a level where end users become the decision makers. Although this research focussed on energy networks, the methodology can be used across sectors and can be used by both private companies and Governments.

Level and Purpose	Promise to consumers and stakeholders	Examples of methods
Inform to provide consumers with balanced and objective information	<ul style="list-style-type: none"> • We will keep you informed • We will not withhold relevant information 	<ul style="list-style-type: none"> • Company website • Direct mail to consumers • Information distributed as part of the billing process • Media campaigns
Consult to obtain consumer feedback on analysis, alternatives and/or decisions	<ul style="list-style-type: none"> • We will keep you informed • We will listen to and acknowledge your concerns and aspirations • We will be open to your influence • We will provide feedback on how your input has influenced the outcome 	<ul style="list-style-type: none"> • Surveys • Formal consultation papers • Focus groups • Randomised control trials
Involve to work directly with consumers to address a pre-set question and understand their concerns and aspirations	<ul style="list-style-type: none"> • We will keep you informed • We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed • We will provide feedback on how your input has influenced the outcome 	<ul style="list-style-type: none"> • Focus groups • Deliberative workshops • Citizens Assemblies • Deliberative polling
Collaborate to partner with consumers in each aspect of the decision, including defining the issue, developing alternatives and identifying preferred solutions	<ul style="list-style-type: none"> • We will look to you for advice and innovation in formulating solutions • We will incorporate your advice and recommendations into the decision-making process to the maximum extent possible 	<ul style="list-style-type: none"> • Stakeholder Groups • Citizens Juries • Action Research
Empower to place final decision-making in the hands of consumers - to delegate	<ul style="list-style-type: none"> • We will implement what you decide 	<ul style="list-style-type: none"> • Negotiated settlements • Participatory budgeting

Figure 3 – Typology of levels of engagement