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National Infrastructure
Commission Wales

National Infrastructure Commission for Wales
Annual Report

2019

Contents

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Message from the Chair

In a move welcomed by all mainstream political parties, the Welsh Government set up the National Infrastructure Commission for Wales to bring a long term perspective to infrastructure planning in Wales. Following a public appointments exercise, Welsh Ministers appointed a strong team of commissioners with experience of academia, business, communications, economics, engineering, the environment and policy. They bring credibility, influence and vision to the task of providing evidence-informed advice and recommendations on integrated infrastructure in Wales.

The commission aspires to a Wales which has the infrastructure to enable opportunity for all. A Wales where infrastructure:

- gives everyone opportunities for improved social, economic, environmental and cultural well-being;

- connects markets and people to support a dynamic and resilient Welsh economy;

- supports rural and urban, young and old alike; and,

- enables Wales to be an outward looking and forward thinking place to work and live.

The commission is a non-statutory, advisory body to provide advice and recommendations to Welsh Ministers on the economic and environmental infrastructure needs of Wales over a five to thirty year period. Our remit extends to all sectors of economic and environmental infrastructure, including energy, transport, digital communications, water and sewerage, drainage solutions, flood and coastal erosion risk management and waste management. It includes both devolved and non-devolved infrastructure reflecting the devolution settlement and the cross-border nature of infrastructure. Our remit excludes re-opening decision-making processes where programmes and work have been decided by the government, or will be decided in the near future.

Commissioners have been eager to engage a wide variety of users and providers of infrastructure to understand their aspirations and concerns for the future. Wales is a diverse country with differing needs. During the year we have visited North, Mid and South Wales to hear about the opportunities and challenges in different parts of the country. We are grateful to the many people who have helped us.

Wales is also part of the UK and Wales' economic performance is closely linked to UK and global trends. We share UK wide systems for digital communications and energy. Transport networks cross the border as do river catchments. UK, or England and Wales, regulators control our services. Decisions made by the UK Government about UK and English infrastructure have significant effects in Wales. While there is no formal relationship between our commission and the National Infrastructure Commission set up by the UK Government, we have developed informal links with it and with the Infrastructure Commission for Scotland.

This is our first annual report and fulfils the requirement to report within a year of our formation. It sets out our early thinking and identifies priorities for further investigation. We seek evidence in respect of those issues and include instructions for submitting evidence.

As well as further annual reports, we will produce our first "state of the nation" report by November 2021. We may also produce occasional reports on particular topics.

The work of the commission will influence discussion in the National Assembly and the decisions of Welsh Ministers.

John Lloyd Jones
OBE FRAgS Hon FLI

Interim Chair of the National Infrastructure Commission for Wales

Executive Summary

The National Infrastructure Commission for Wales was established in 2018 as a non-statutory body to advise and make recommendations to Welsh Ministers on economic and environmental infrastructure over the next five to thirty years.

Our primary objective is to give everyone in Wales the opportunity to improve their social, economic, environmental and cultural well-being by recommending infrastructure to build a dynamic and resilient economy.

In our first year, we have taken an overall view of the current state of Wales' infrastructure and gained some understanding of how changes in the economy, the environment and technology will demand new forms of infrastructure.

We have spoken to stakeholders across Wales to understand both the unique characteristics of our country and the variety of ways people live, work and play in our diverse urban and rural communities.

This has led us to some provisional views on future infrastructure for which we are now seeking further evidence. We have also compiled key issues relating to energy, digital communications and transport which we seek to investigate in greater detail.

Wales is shaped by its scale, history and topography. Once a country of coal, slate and steel, it is now home to cutting edge industries and services. It is a key supplier of food and energy to the UK. Employment is relatively high and supported by strong further and higher education sectors. And we have a distinctive and strong cultural identity.

In terms of the environment, Wales offers huge potential to harness renewable energy. And we perform strongly in terms of household recycling.

But there are challenges to face. This is a small country, thinly populated compared to England and with few large population hubs. Productivity and skill levels are low, a relatively high proportion of jobs are in the public sector.

Spread in small communities, we have become over-reliant on private transport. Our population is ageing and the working age population is declining. And with the rest of the world we face the challenges of economic turmoil and climate change.

Our country's distinctive strengths, opportunities and challenges are helping us to frame our initial findings and key issues. But we must stress that this is still early in the process and we will not rush to make recommendations to the Welsh Ministers until we have found compelling evidence for infrastructure solutions.

Assessing the potential value of new infrastructure projects would be much more effective if there were better data on the performance of past projects. We will be exploring the potential for better evaluation driven by solid data.

The key themes we have identified are decarbonisation, connectivity and resilience.

The Welsh Government has set out a path to decarbonisation in Prosperity for All: A Low Carbon Wales. Infrastructure will be an important enabler of that change.

We will consider the future development of transport networks, congestion and the switch to electric vehicles. We will examine how digital connectivity should be delivered across Wales.

The question of infrastructure's resilience grows more important as climate change and rising sea levels bring fresh challenges.

The development of our infrastructure plan is in its early stages but we have reached some provisional views for which we seek evidence and we have identified key issues on infrastructure which we will consider in the coming year.

Digital Communications

The primary focus for public funds should be on extending superfast broadband to as many households as possible using the lowest cost technology. We seek evidence on whether the UK Government's focus on extending more expensive fibre to the home to every household in the UK will best serve the interests of Welsh citizens, including those who still lack access to superfast broadband.

We seek evidence on whether and what additional measures the Welsh Government could take to significantly improve mobile broadband coverage. Our provisional view is that 4G and 5G mobile broadband may be the lowest cost technology to provide superfast connections to some Welsh households and that a greater proportion of public funds should be allocated to mobile rather than to fixed broadband or other infrastructure objectives.

Energy

We seek to understand how the existing electricity grid is constraining the growth of renewable electricity generation and why these constraints arise. We seek further evidence on how to rapidly improve the relationship between Wales' energy grid and the future growth of renewable energy, including innovations in energy storage, electrical engineering, the planning system, and other government interventions.

We seek evidence on the potential for commercial scale cost effective marine energy generation in Wales and the measures required to realise it. Should potential economic benefits, in terms of jobs and investment in Wales, be offset against potentially higher costs of marine energy for consumers?

Our provisional view is that decentralised, community-based infrastructure projects could have an important role to play in transforming the energy supply chain. We seek evidence to understand how community schemes might be scaled up and what barriers there are to decentralisation, including the availability of electricity grid and distribution infrastructure. We seek evidence on how these projects might be financed. Should potential economic benefits, in terms of jobs and investment, be offset against potentially higher costs of renewable energy?

Transport

Improving connectivity along the strategic East West Wales corridors, to/from England, in North East and South East Wales is a transport priority. How can capacity be increased and congestion reduced?

Connecting local areas to major economic centres has the potential to support economic development and regeneration, for example in the Heads of Valleys. Which parts of Wales most need such developments and what are the most effective means of connectivity?

Wales has potential to improve connectivity to the rest of the world by air and sea for passengers and freight. How could Wales maximise its connectivity to the rest of the world and what would the costs and benefits be?

The economic case for major road and rail developments between North and South Wales is not strong. We provisionally consider that connectivity between North and South Wales could be improved by supplementary developments such as better digital connectivity along major transport routes, improved passing places and rest facilities, EV charging infrastructure and improved rolling stock.

Wales' road infrastructure must be prepared for the move to zero emissions vehicles. We want to better understand how the transition to zero emission road transport can be enabled. We are interested in evidence of: Wales' readiness compared to other parts of the UK, the infrastructure barriers to zero emissions and how they can be overcome, especially in rural areas where the market may not provide the solution.

Transport in Wales poses different challenges and requires different solutions in urban and rural areas. How we can ensure an appropriate transport strategy for each?

If there were less need for people to travel then congestion and carbon emissions could be reduced. Options for reducing the need for travel should be explored. How can public policy in other areas reduce the need for people to travel?

In due course the commission will set out its plan for Wales' infrastructure, which will enable the Welsh Government to develop an affordable strategy for our infrastructure needs and help us have a prosperous future in which all can share.

Context

What do we mean by infrastructure?

The commission will provide advice on Wales' economic and environmental infrastructure. There is no standard definition of infrastructure but in our view the definition offered by the World Economic Forum[1] is appropriate. It describes economic infrastructure as:

"projects that generate economic growth and enable society to function. Examples include transport facilities (air, sea and land), utilities (water, gas and electricity), flood defences, waste management and telecommunications networks."

And infrastructure is not limited to physical assets. Data assets such as statistics, maps and real-time sensor readings will be increasingly important to build and manage the physical infrastructure of the future.

Importantly, infrastructure is not an end in itself but a means to other ends.

What difference does infrastructure make to society?

Our long term aim is for Wales to be a place of clean air and water, cohesive communities, energy security and good jobs. Infrastructure is key to achieving this.

We rely on infrastructure every day…

To travel for work and pleasure, and to transport goods to shops or directly to us

Wales has about **35,000 km** of road

Over 30 million rail journeys a year are made within Wales / between Wales and England

For gas and electricity to heat and power our homes

A typical household uses about **3,100 KWh** of electricity a year, enough to power an electric oven for almost 2 months

To turn on a tap for clean running water

An average 4 person household uses about **450 litres** of water a day

To make phone calls and connect to the internet

73% of Welsh indoor premises are covered by **4G services** from all four providers

An ever-increasing amount of public and private services are being **delivered digitally**

To deal with our waste and recycling

Every household in Wales produces on average about **1 tonne** of waste per year

Infographic data sources:

StatsWales Road length (Km), by type of road and year, Wales https://stat-swales.gov.wales/Catalogue/Transport/Roads/Lengths-and-Conditions/roadlength-by-typeofroad-year

StatsWales Rail passenger journeys to, from or within Wales and total journeys in Great Britain by year https://statswales.gov.wales/Catalogue/Transport/rail/rail-transport/railpassengerjourneystofromwithinwales-sandtotaljourneysingb-by-year

Ofgem, infographic: Bills, prices and profits, May 2019 https://www.ofgem.gov.uk/publications-and-updates/infographic-bills-prices-and-profits

Consumer Council for Water https://www.ccwater.org.uk/households/using-water-wisely/averagewateruse/

Ofcom, Connected Nations Update, Spring 2019, https://www.ofcom.org.uk/__data/assets/pdf_file/0021 /146613/connected-nations-up-date-spring-2019.pdf

Analysis for the NICW based on:Department for Environment Food and Rural Affairs, Digest of Waste and resource Statistics, 2018 Edition https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/710124/Digest_of_Waste_and_Resource_Statistics_2018.pdf and Estimated numbers of households in England and Wales, Scotland, Northern Ireland, 2004 to 2016, ONS https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/adhocs/008777estimatednumbersofhouseholdsinenglandan-dwalesscotlandnorthernireland2004to2016

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1 Strategic Infrastructure: Steps to Prioritize and Deliver Infrastructure Effectively and Efficiently. www3.weforum.org/docs/WEF_IU_StrategicInfrastructure_Report_2012.pdf

How does infrastructure develop?

Infrastructure has economic, social, cultural and environmental significance. We can develop infrastructure to meet the needs of today; whether powering our homes and businesses, commuting to work or protecting our communities.

But infrastructure can be very long lasting and sometimes reflects our past as much as our present. The ports and railways we have today are remnants of our industrial heritage. Parts of our water and sewerage systems were constructed in Victorian times. Even the location of our communities, in some cases, reflect the economic opportunities of a previous age. And it can take years to develop infrastructure from inception to completion, so infrastructure development is long-term and strategic.

Infrastructure can also help us to both shape and adapt to the future. We develop new settlements, cleaner ways to generate energy, better ways to travel and ways to communicate without the need for travel.

Who is responsible for infrastructure in Wales?

Various actors share responsibility for infrastructure in Wales including UK Government, Welsh Government, local authorities, regulators and private companies. Although we will make recommendations to Welsh Ministers, our recommendations may also touch on the responsibilities of other actors.
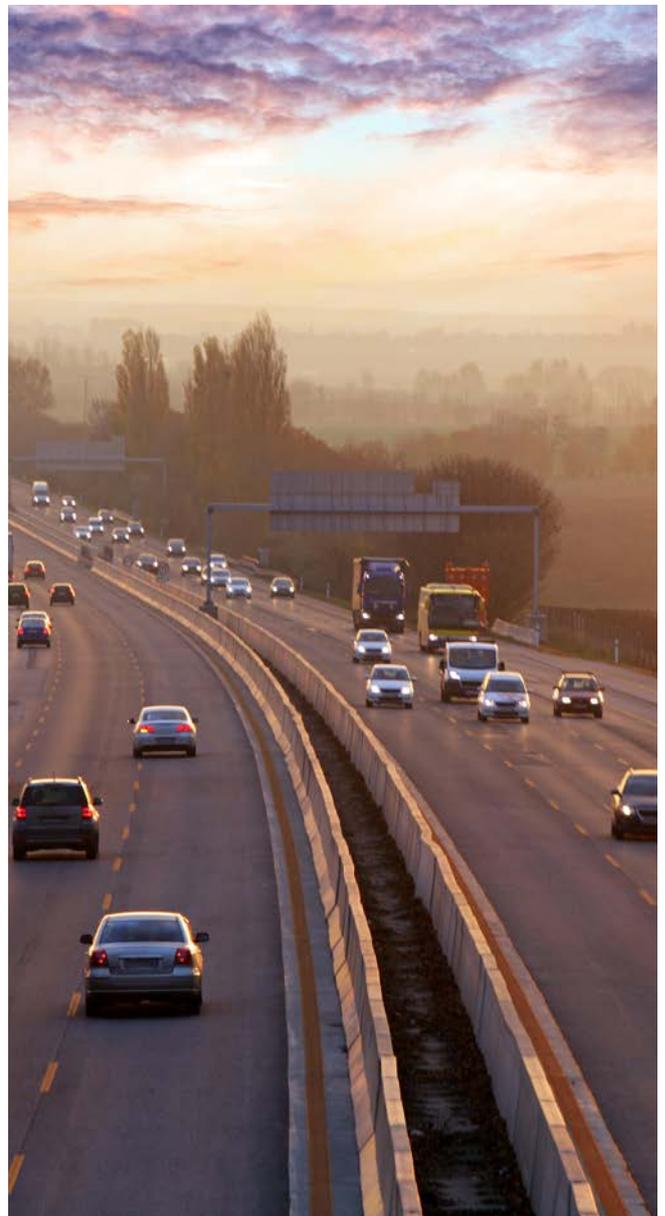
Wales' infrastructure today

How much is spent on infrastructure?

Infrastructure is provided by many different organisations. Ultimately, it is all paid for by households, either directly through bills and charges or indirectly as taxpayers. We attempted to calculate indicative costs per household for various types of infrastructure. However, for some sectors we were unable to separate the cost of infrastructure from the overall charges.

For that reason, the figures do not represent comparable infrastructure costs for different sectors. However, they do allow comparison between countries. The calculations are described in Annex 1 and the results are shown below.

Average annual household expenditure on utilities
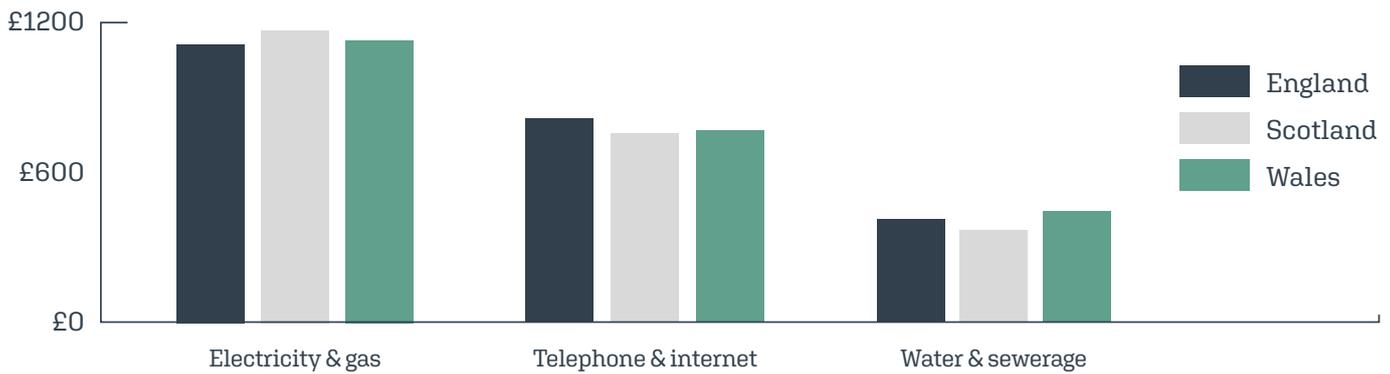
Average annual public spending per household on services, Apr 2013 - Mar 2018
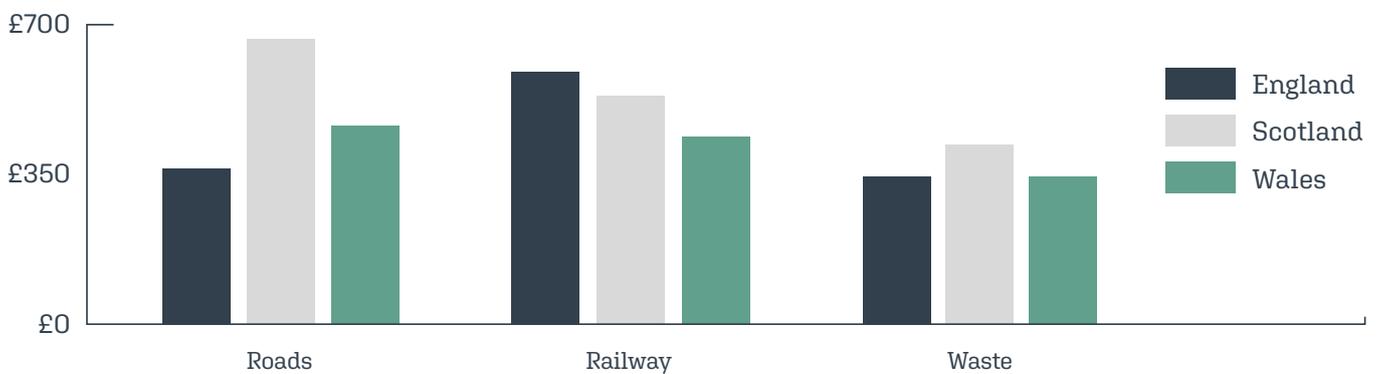
Households on average spend more on gas and electricity than on telephone & internet and more on telephone & internet than on water and sewerage.

On average, water costs households in Wales more than those in England or Scotland. Household spending on energy is a little higher in Wales than in England but a little lower than in Scotland. Households in Wales spend a similar amount on telephone & internet services as those in Scotland while those in England spend more. Public spending[2] per household on roads and waste is higher in Wales than in England but lower than in Scotland.

Public spending per household on rail is higher in England and Scotland than in Wales.

What is the need for infrastructure in different parts of Wales?

Wales is diverse in its landscape and its economy. The demographic and socio-economic characteristics of the regions are different as is the geographical context.

The undulating topography hinders physical and digital communications in some areas. Wales' history of mining and industry shaped the development of settlements and transport infrastructure. Clustering of firms and workers in urban areas or industrial locations such as cities are known as agglomeration. There is wide evidence that agglomeration helps to drive productivity and economic growth. Links to England continue to be important with goods, services and workers flowing both ways across the border. The value of Welsh trade with the rest of the UK is believed to be greater than that of Welsh international exports although there is a shortage of data to confirm this.

We have visited the regions of Wales to learn about opportunities and challenges for infrastructure in different places. Some of the main findings are described below.

North Wales

(The data in this section are taken from Summary statistics for Welsh economic regions: North Wales[3] unless otherwise indicated)
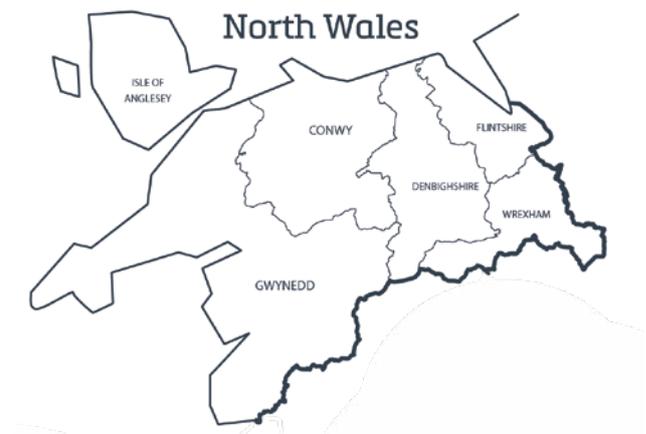
With about 698,400 residents (22% of Wales' population) and an area of 6,150 square km (30% of Wales' land area), North Wales has a population density of 114 persons per square km[4]. The population of North Wales is more evenly distributed across its local authorities than in the other two regions. Settlement sizes are generally small with over 80% of the population living in settlements of fewer than 25,000[5]. North Wales is the only region without a settlement of over 100,000 residents.

Between 1997 and 2017, North Wales saw the lowest population growth of the three economic regions at 6.3%. The population is projected to increase by 2.1% between 2018 and 2028 and by 3.1% between 2018 and 2038. Welsh-speakers in North Wales form a higher proportion of the population than in other regions.

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2 Public spending includes spending by central government, local government and public corporations.
3 Welsh Government Summary statistics for Welsh economic regions: North Wales https://gov.wales/summary-statistics-economic-regions-2019
4 StatsWales: population density by local authority and year
  https://statswales.gov.wales/Catalogue/Population-and-Migration/Population/Density/populationdensity-by-localauthority-year
5 Welsh Government National Development Framework 2020-2040 Consultation Draft: 7 August – 1 November 2019
  https://gov.wales/draft-national-development-framework

North Wales has an ageing population. Between 1997 and 2017, the proportion of the population aged 65 and over increased from 19% to 23%, while the proportion of the population aged 15 and under fell from 20% to 18%.

The employment rate in North Wales is consistently higher than the other economic regions and employment levels are distributed more evenly across North Wales' local authorities relative to the other two regions[6]. For the year ending March 2019 the employment rate in North Wales was 75.4%.

Gross Value Added (GVA) is the value generated by the production of goods or services.
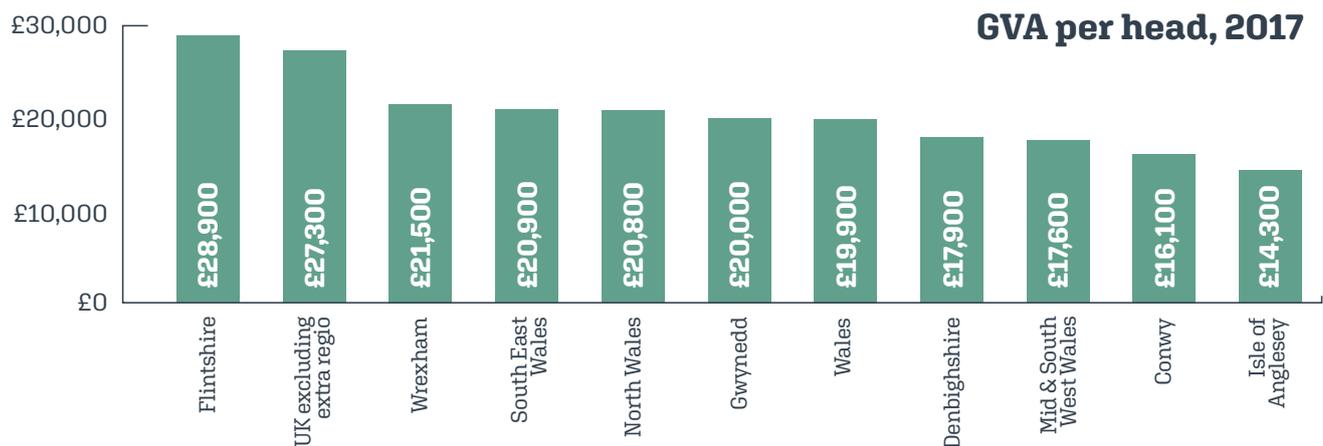
Total GVA in North Wales in 2017 was £14.5 billion, up 4.4% over the year and up 90.7% since 1999. In comparison, Wales saw

an increase of 3.1% over the year and an increase of 87.6% since 1999[7]. GVA per head in North Wales was £20,800, up 4.4% over the year and up 80.2% since 1999. In comparison, Wales saw an increase of 2.7% over the year and increase of 74.1% since 1999.
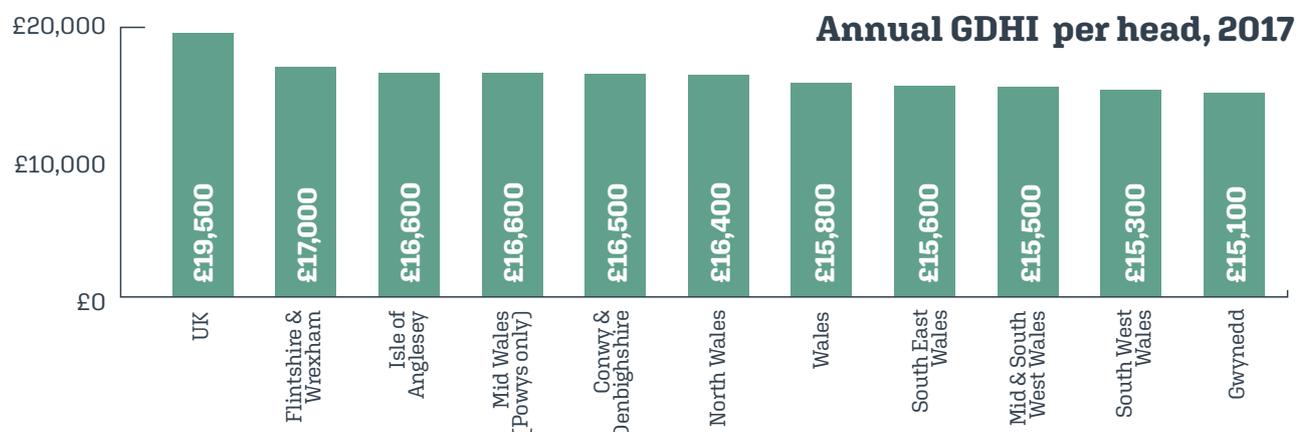
Gross disposable household income (GDHI) is an estimate of the amount of money that households have available for spending or saving.

In North Wales, GDHI per head has increased by 0.9% over the year, while Wales and the UK have both increased by 1.0%[8].

Average weekly earnings in North Wales were up 3.8% over the year compared with an increase of 2.1% for Wales and an increase of 3.5% for the UK[9].

GVA per head, 2017

	£
Flintshire	£28,900
UK excluding extra regio	£27,300
Wrexham	£21,500
South East Wales	£20,900
North Wales	£20,800
Gwynedd	£20,000
Wales	£19,900
Denbighshire	£17,900
Mid & South West Wales	£17,600
Conwy	£16,100
Isle of Anglesey	£14,300

Source: regional economic & labour market profiles – July 2019 gov.wales/sites/default/files/statistics-and-research/2019-07/regional-economic-and-labour-market-pro-files-july-2019-670.pdf. (Please note, these data are not available at the geographical level required to replicate the Wales economic regions, therefore the figures for some of the regions are regarded as approximations. In the chart above, Bridgend is included in the Mid and South West Wales economic region.)

Annual GDHI per head, 2017

	£
UK	£19,500
Flintshire & Wrexham	£17,000
Isle of Anglesey	£16,600
Mid Wales (Powys only)	£16,600
Conwy & Denbighshire	£16,500
North Wales	£16,400
Wales	£15,800
South East Wales	£15,600
Mid & South West Wales	£15,500
South West Wales	£15,300
Gwynedd	£15,100

Source: regional economic & labour market profiles – July 2019: gov.wales/sites/default/files/statistics-and-research/2019-07/regional-economic-and-labour-market-profiles-july-2019-670.pdf
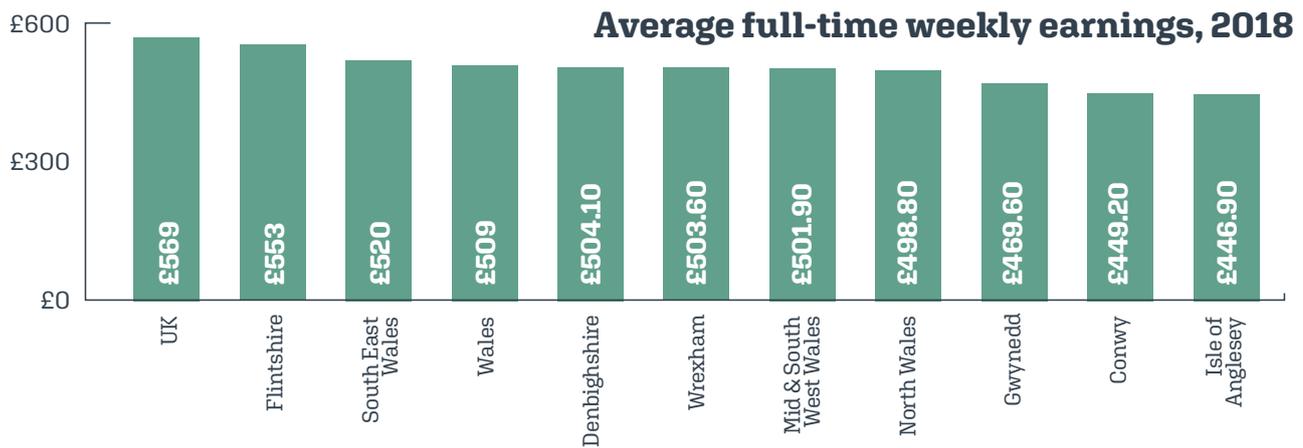
6 StatsWales: Key Economic Statistics, July 2019 https://gov.wales/sites/default/files/statistics-and-research/2019-07/key-economic-statistics-july-2019-024.pdf
7 Welsh Government Regional economic & labour market profiles – July 2019
  https://gov.wales/sites/default/files/statistics-and-research/2019-07/regional-economic-and-labour-market-profiles-july-2019-670.pdf
8 Ibid
9 Ibid

Average full-time weekly earnings, 2018

UK	Flintshire	South East Wales	Wales	Denbighshire	Wrexham	Mid & South West Wales	North Wales	Gwynedd	Conwy	Isle of Anglesey
£569	£553	£520	£509	£504.10	£503.60	£501.90	£498.80	£469.60	£449.20	£446.90

Source: Regional economic & labour market profiles – July 2019 https://gov.wales/sites/default/files/statistics-and-research/2019-07/regional-economic-and-labour-market-profiles-july-2019-670.pdf

The information and communication sector saw the largest percentage growth in workers between 2007 and 2017, while the greatest change in the level of employment was in the professional, scientific and technical activities; administrative and support service activities sector, which grew by 8,200 people. The production sector saw the greatest decrease in percentage terms. When considering the number of workers however, it was the wholesale, retail, transport, hotels and food sector that decreased the most over this period, in the region and across Wales, losing 9,300 workers across North Wales.

North East Wales is a centre of advanced manufacturing including aerospace and automotive sectors. The region has important links to the North West of England. North West Wales is an agricultural centre with potential for expansion of the food and drink sector. Areas of outstanding natural beauty support a thriving tourism sector which could be developed by extending the season and promoting higher value activities.

As in the rest of Wales and the rest of the UK, the vast majority of enterprises had fewer than 10 employees. North Wales has the highest proportion of small enterprises (10-49 employees) of the three regions.

A number of people cross the border into North Wales to work but 25,000 more travel out of the region. The net movement in and out of North Wales is the greatest of the three regions.

The developer's decision to pause the Wylfa Newydd nuclear power station on Anglesey was disappointing for many in North Wales. Since the site is regarded as being among the best in the UK for large nuclear projects (1GW-plus) a new build project may eventually come forward.
Further opportunities remain for the energy sector including renewable generation, energy supply chain and nuclear decommissioning.

Holyhead is the main port for freight and sea passenger transport with the Irish Republic and an important asset in the region. More than 80 per cent of goods carried on Irish registered HGVs between the Republic of Ireland and Europe pass through Wales, the majority through Holyhead[10].

The proximity to the coast of settlements and road and rail links make the infrastructure vulnerable to flooding. The risk will be exacerbated by climate change.

Stakeholders in North Wales told us that investment in digital connectivity, strategic road and rail networks, energy networks and business sites and premises would stimulate economic development across a range of sectors.

10 Welsh Government, Sea Transport, 2017 https://gov.wales/docs/statistics/2018/181128-sea-transport-2017-en.pdf

Mid & South West Wales

(The data in this section are taken from Summary statistics for Welsh economic regions: Mid and South West Wales[11] unless otherwise indicated.)

Mid & South West Wales is a diverse region including large, sparsely populated rural areas and larger population centres in the south including Swansea, Neath, Llanelli and Port Talbot. Overall, in 2018, its 907,400 residents (29% of Wales' population) were spread over 11,776 square km (57% of Wales' land area) giving it a population density of 77 persons per square km, the lowest of the three regions.

The largest authority in the region, in terms of residents, is Swansea, with an estimated population of around 246,000 (27% of the population of the region).

Between 1997 and 2017, the region's population grew by 7.3%, although growth was variable across the region.

Since 1991, more population change is attributable to net migration and other changes than to natural change (births and deaths). Over that period, more people have been moving into the region than have been moving out, while natural change has been almost entirely negative across the region, meaning that the birth rate has been lower than the death rate.

Mid & South West Wales is the region with the lowest projected population growth over the next ten and twenty years, with projected growth rates of 1.6% for the 2018-2028 period and 1.9% for the 2018-2038 period. Growth is projected to be greatest in Swansea.

There are signs of an ageing population in the region. Between 1997 and 2017, the proportion of the population aged 65 and over has increased from 19% to 23%, while the proportion of the population aged 15 and under has fallen from 20% to 17%.

Ceredigion and Carmarthenshire both have a high proportion of Welsh speakers.

Overall, the region has a lower employment rate than the other two regions but there is variation within Mid & South West Wales. For the year ending March 2019 the employment rate in Mid & South West Wales was 71.0%. Powys had highest employment rate in the region at 76.8%, while Swansea had the lowest at 67.3%.

Total GVA in Mid & South West Wales in 2017 was £15.9 billion, up 1.5% over the year and up 84.1% since 1999[12]. GVA per head in Mid & South West Wales was £17,616, up 1.2% over the year and up 71.8% since 1999.

In Mid and South West Wales, GDHI per head has increased by 0.9% over the year[13]. Average weekly earnings in Mid & South West Wales were up 3.3% over the year[14].

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11 Welsh Government Summary statistics for Welsh economic regions: Mid and South West Wales https://gov.wales/summary-statistics-economic-regions-2019
12 Welsh Government Regional economic & labour market profiles – July 2019
  https://gov.wales/sites/default/files/statistics-and-research/2019-07/regional-economic-and-labour-market-profiles-july-2019-670.pdf
13 Ibid
14 Ibid

GVA per head, 2017

Region	£
UK excluding extra regio	£27,300
South East Wales	£20,900
North Wales	£20,800
Wales	£19,900
Swansea	£19,300
Pembrokeshire	£18,400
Powys	£17,700
Mid & South West Wales	£17,600
Ceredigion	£17,500
Neath Port Talbot	£16,200
Carmarthenshire	£16,200

Source: Regional economic & labour market profiles – July 2019 https://gov.wales/sites/default/files/statistics-and-research/2019-07/regional-economic-and-labour-market-profiles-july-2019-670.pdf

Annual GDHI per head, 2017

Region	£
UK	£19,500
Powys	£16,600
North Wales	£16,400
Wales	£15,800
South East Wales	£15,600
Mid & South West Wales	£15,500
Swansea	£15,000
Bridgend & Neath Port Talbot	£15,000

Source: regional economic & labour market profiles – July 2019: gov.wales/sites/default/files/statistics-and-research/2019-07/regional-economic-and-labour-market-profiles-july-2019-670.pdf

Average full-time weekly earnings, 2018

Region	£
Neath Port Talbot	£586.70
UK	£569
South East Wales	£520
Wales	£509
Swansea	£501.90
Mid & South West Wales	£503.60
North Wales	£498.80
Carmarthenshire	£495.70
Ceredigion	£486.50
Powys	£476.10
Pembrokeshire	£457.30

Source: regional economic & labour market profiles – July 2019 https://gov.wales/sites/default/files/statistics-and-research/2019-07/regional-economic-and-labour-market-profiles-july-2019-670.pdf
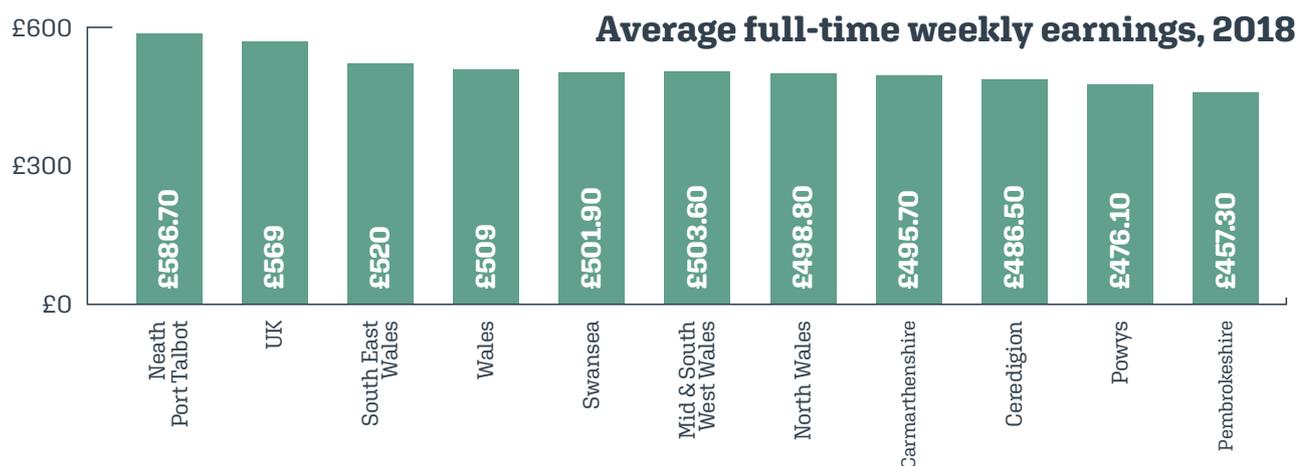
The information and communication sector saw by far the highest level of growth in workers between 2007 and 2017, while the construction sector saw the greatest percentage decrease. When considering the number of workers however, it was the wholesale, retail, transport, hotels and food sector that saw the greatest decrease over this period, with numbers declining by 8,000.

A number of people travel into Mid & South West Wales to work but 8,000 more travel out of the region. This includes commuting across the Welsh border into areas such as Shropshire and Herefordshire. Swansea had the greatest influx of workers from other local authorities.

Mid & South West Wales generated more low-carbon energy (3.5 TWh) in 2017 than the other Welsh regions combined[15]. 64% of Wales' onshore wind projects, 62% of Wales' biomass projects and 54% of Wales' heat pump projects were based in the region.

The electricity grid will be a constraint on significant further energy generation unless capacity is expanded or alternative ways of storing or using the energy are implemented.

Agriculture, food and drink production and tourism are important sectors in Mid & South West Wales. Digital connectivity is a challenge in sparsely populated areas with undulating topography. Stakeholders tell us that suitable business sites and premises are in short supply to support growth in the economy.

Larger settlements in the south including Swansea, Neath, Llanelli and Port Talbot are served by road and rail but there are congestion issues and constraints on the rail network. The planned metro system has potential to ease congestion and increased cycling and walking could replace some local journeys.

The region has major ports at Fishguard, Milford Haven and Port Talbot.

South East Wales

(The data in this section are taken from Summary statistics for Welsh economic regions: South East Wales[16] unless otherwise indicated)

South East Wales is a growing population centre and home to almost half the population of Wales, although it accounts for only 14% of the land mass. Consequently the region's population density, at 546 persons per square km in 2018, was the highest in Wales. Cardiff, with an estimated 364,000 residents in 2018, represents nearly 24% of the population of the region and has a population density of 2,585 persons per square km.

The population of the region grew by 9.1% between 1997 and 2017. Inward migration has been greater than outward migration since the 2001-02 period. However, population change has been variable across the region's local authorities with valleys communities growing less than those near the coast.

South East Wales' population is projected to grow at a higher rate than the other two regions in the next ten and twenty years, with a projected increase of 92,800 people (or 6.1%) between 2018 and 2038. This projected population growth is largely driven by Cardiff which is projected to grow at a rate of 9.9 per cent in the next ten years, and 20.1 per cent by 2038.

15 StatsWales Low Carbon Energy Generation by Local Authority and Technology https://statswales.gov.wales/Catalogue/Environment-and-Countryside/Energy/low-carbonenergygeneration-by-localauthority-technology
16 Welsh Government Summary statistics for Welsh economic regions: South East Wales https://gov.wales/summary-statistics-economic-regions-2019

Of the three regions, South East Wales has the most even population distribution across all its age groups[17]. This can be partly attributed to the number of university students living in the area. Between 1997 and 2017 the proportion of the population aged 65 and over increased from 16 per cent to 18 per cent, while the proportion of the population aged 15 and under has fallen from 22 per cent to 19 per cent. South East Wales is the only Welsh region with a higher proportion of the population aged 15 and under than aged 65 and over.

For the year ending March 2019, the employment rate in South East Wales was 73.4%[18]. Within the region, Vale of Glamorgan had the highest employment rate at 80.4% and Caerphilly the lowest at 68.4%.

Total GVA in South East Wales in 2017 was £31.8 billion, up 3.4% over the year and up 88.0% since 1999[19]. GVA per head in South East Wales was £20,900, up 2.8% over the year and up 72.5% since 1999.

In South East Wales, GDHI per head has increased by 1.1% over the year, while Wales and the UK have both increased by 1.0%[20].

Average weekly earnings in South East Wales were up 2.5% over the year compared with an increase of 2.1% for Wales and an increase of 3.5% for the UK[21].

697,600 people worked in the region in 2017, representing almost half of all employment across Wales. The information and communication sector saw the highest growth in workers over the 2007-2017 period in percentage terms, while the greatest change in the level of employment was in the professional, scientific and technical activities; administrative and support service activities sector, which grew by 24,500 people. The construction sector saw the greatest decrease in percentage terms. When considering the number of workers however the wholesale, retail, transport, hotels and food sector saw the greatest decrease over this period in the region and across Wales, losing around 10,400 workers across South East Wales.

A number of people travel into South East Wales to work but 19,600 more travel out of the region. This can largely be attributed to workers commuting across the Welsh border into areas such as Bristol.

As in the rest of Wales, the vast majority of enterprises in South East Wales had fewer than 10 employees. The proportion of microenterprises in South East Wales was lower than anywhere else in Wales, whereas the proportion of large enterprises (250+ employees) was the highest of the three regions.

Stakeholders tell us that housing, transport and employment need to be better joined up to enable the region to function efficiently. East-west connectivity along the coastal strip is served by road and rail, although there are congestion issues. North-south links are also congested at peak times. Some locations suffer from high levels of nitrogen dioxide. Rail passenger journeys have increased in recent decades and there are plans to develop a metro and to encourage greater cycling and walking. The region has an international airport and major ports at Barry, Cardiff and Newport.

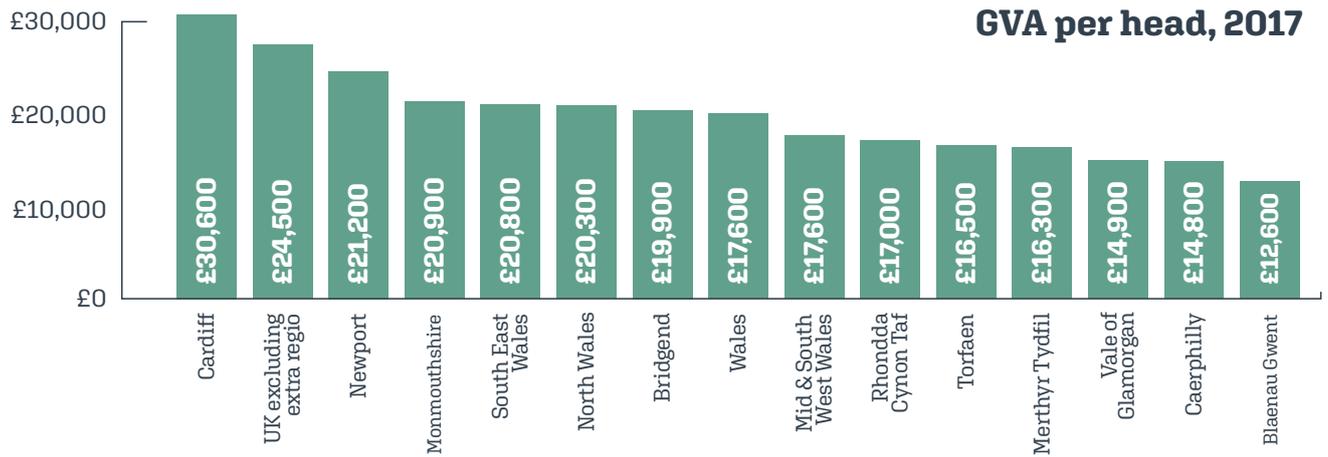17 StatsWales Summary statistics for Welsh economic regions: South East Wales
https://gov.wales/sites/default/files/statistics-and-research/2019-05/summary-statistics-for-welsh-economic-regions-wales-south-east-wales-540.pdf
18 StatsWales: Key Economic Statistics, July 2019 https://gov.wales/sites/default/files/statistics-and-research/2019-07/key-economic-statistics-july-2019-024.pdf
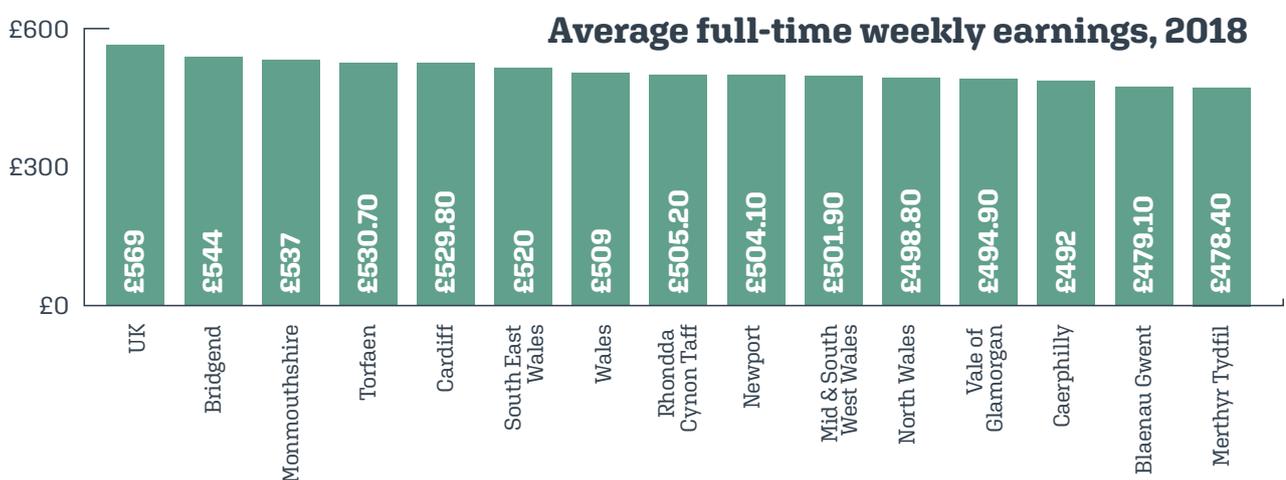19 Ibid
20 Ibid
21 Ibid

GVA per head, 2017

Region	GVA per head
Cardiff	£30,600
UK excluding extra regio	£24,500
Newport	£21,200
Monmouthshire	£20,900
South East Wales	£20,800
North Wales	£20,300
Bridgend	£19,900
Wales	£17,600
Mid & South West Wales	£17,600
Rhondda Cynon Taf	£17,000
Torfaen	£16,500
Merthyr Tydfil	£16,300
Vale of Glamorgan	£14,900
Caerphilly	£14,800
Blaenau Gwent	£12,600

Source: Regional economic & labour market profiles – July 2019 https://gov.wales/sites/default/files/statistics-and-research/2019-07/regional-economic-and-la-bour-market-profiles-july-2019-670.pdf

Annual GDHI per head, 2017

Region	GDHI per head
UK	£19,500
Monmouthshire and Newport	£17,300
North Wales	£16,400
Cardiff & Vale of Glamorgan	£16,400
Wales	£15,800
South East Wales	£15,600
Mid & South West Wales	£15,500
Gwent Valleys	£14,400
Central Valleys	£14,300

Source: Regional economic & labour market profiles – July 2019 https://gov.wales/sites/default/files/statistics-and-research/2019-07/regional-economic-and-la-bour-market-profiles-july-2019-670.pdf (Please note, these data are not available at the geographical level required to replicate the Wales economic regions, therefore the figures for some of the regions are regarded as approximations. In the chart above, Bridgend is included in the Mid and South West Wales economic region.)

Average full-time weekly earnings, 2018

Region	Weekly earnings
UK	£569
Bridgend	£544
Monmouthshire	£537
Torfaen	£530.70
Cardiff	£529.80
South East Wales	£520
Wales	£509
Rhondda Cynon Taff	£505.20
Newport	£504.10
Mid & South West Wales	£501.90
North Wales	£498.80
Vale of Glamorgan	£494.90
Caerphilly	£492
Blaenau Gwent	£479.10
Merthyr Tydfil	£478.40

Source: Regional economic & labour market profiles – July 2019 https://gov.wales/sites/default/files/statistics-and-research/2019-07/regional-economic-and-la-bour-market-profiles-july-2019-670.pdf

What is Changing?

The world is changing rapidly and the value of flexibility is greater than ever. Some longstanding trends will continue and Wales must adapt to them. Other trends will change or cease. In some areas we need to make change happen more quickly.

The economy tends to change relatively slowly and won't be radically different in 2030 from today. We expect the following trends to continue:

- A growing and ageing population. Wales' population is projected to age more than the UK as a whole;

- An increasingly urbanised economy with strong network effects. (Although, in the long run, ICT could counter this trend.) There will be implications within Wales but also for Wales' relationships within the UK and with the rest of the world;

- Changes to the structure of the economy – from manufacturing to services and increasingly to digital; and,

- Increasing automation in the workplace will bring new challenges and opportunities.

Other trends are less certain:

- There has been a shift from public to private sector provision in infrastructure, particularly in telecommunications and energy, but without a dominant model emerging. It is not impossible that this trend could be reversed. The not-for-profit model operated by Dŵr Cymru Welsh Water provides an interesting alternative;

- Many rural households are experienced at managing without connections to gas, sewerage and water networks. More recently, self-generation of energy, community broadband and sustainable drainage systems have been shown to work in some places. Decentralisation may become an increasing trend for certain services;

- The scale and shape of newer threats to infrastructure – from climate change and cyber security – are still emerging but both will be significant; and,

- There is uncertainty about the effects of Brexit.

Some things need to change quickly:

- Decarbonisation has begun but needs to accelerate rapidly;

- Poor air quality, where it occurs, is a threat to health that must be addressed[22]; and,

- The circular economy, in which far more materials are reused or recycled, has to become a reality.

22 Public Health Wales estimates that the equivalent of around 1,600 deaths are attributed to PM2.5 exposure, and around 1,100 deaths to NO2 exposure, each year in Wales (as there are overlapping health impacts of individual pollutants, it is not possible to sum these). Air pollution plays a role in many of the major health challenges of our day, and has been linked to increased morbidity and mortality from respiratory diseases including asthma and chronic obstructive pulmonary disease (COPD), stroke and heart disease lung cancer and other effects. Both emissions of particular types of gas and particulate matter (particles suspended in the air) can be hazardous to health. Welsh Government, Well-being of Wales 2017-18 https://gov.wales/sites/default/files/statistics-and-research/2019-07/well-being-of-wales-2018_0.pdf

What Makes Wales Different?

Overall, Wales is older, poorer and more dependent on public sector employment than the UK as a whole.

Size and Population

Wales is a relatively small country with an area of 20,736 square km[23]. Within the UK, England (130,310 square km) and Scotland (77,911 square km) are larger although Northern Ireland (13,588 square km) is smaller[24]. Compared to EU-28 countries[25], only four (Malta, Luxembourg, Cyprus and Slovenia) are smaller in area than Wales.

Official estimates put the population of Wales at 3,139,000[26]. Again smaller than England (55,977,000) and Scotland (5,438,000) but larger than Northern Ireland (1,882,000). A quarter of EU-28 countries are smaller in population than Wales[27].

Putting area and population together, Wales, with a population density of 151 persons per square km is less densely populated than England (430 persons per square km) but more densely populated than Northern Ireland (138 persons per square km) and Scotland (70 persons per square km).

However, the UK is amongst the most densely populated countries in Europe. Compared to other EU-28 countries[28], Wales is relatively densely populated. Three quarters of all EU-28 countries have a lower population density than Wales. Even Mid & South West Wales`with its population density of 77 persons per square km is more densely populated than a quarter of all EU-28 countries[29].

The population of adults aged 65 and over in Wales is projected to grow at a higher rate than the total population over the next ten years[30]. This data should not be viewed as a forecast. However, the projected population changes do not compare favourably with other parts of the UK.

Percentage change in projected population, 2018 - 2038

Legend: Aged 15 and under | Aged 16-64 | Aged 65+
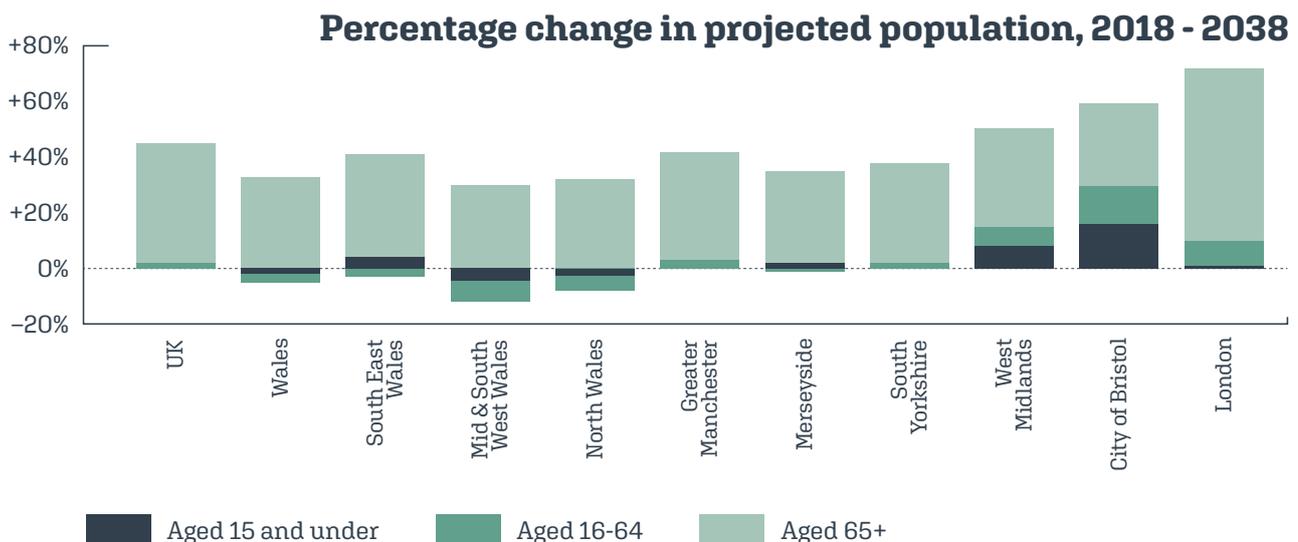
Source: Summary statistics for welsh economic regions: Wales
https://gov.wales/sites/default/files/statistics-and-research/2019-05/summary-statistics-for-welsh-economic-regions-wales-338_0.pdf,

23 Welsh Government, 2019, https://statswales.gov.wales/Catalogue/Population-and-Migration/Population/Density/populationdensity-by-localauthority-year

24 Commonwealth secretariat, 2019, http://thecommonwealth.org/our-member-countries/united-kingdom

25 EU, 2019, https://europa.eu/european-union/about-eu/figures/living_en

26 ONS, 2019, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/previousReleases

27 EU, 2019, https://europa.eu/european-union/about-eu/figures/living_en

28 EU, Living in the EU https://europa.eu/european-union/about-eu/figures/living_en#tab-1-1

29 Finland, Sweden, Estonia, Latvia, Lithuania, Bulgaria, Ireland and Croatia each has a lower population density than Mid & South West Wales.

30 Welsh Government, Summary statistics for Welsh economic regions: Wales https://gov.wales/summary-statistics-economic-regions-2019
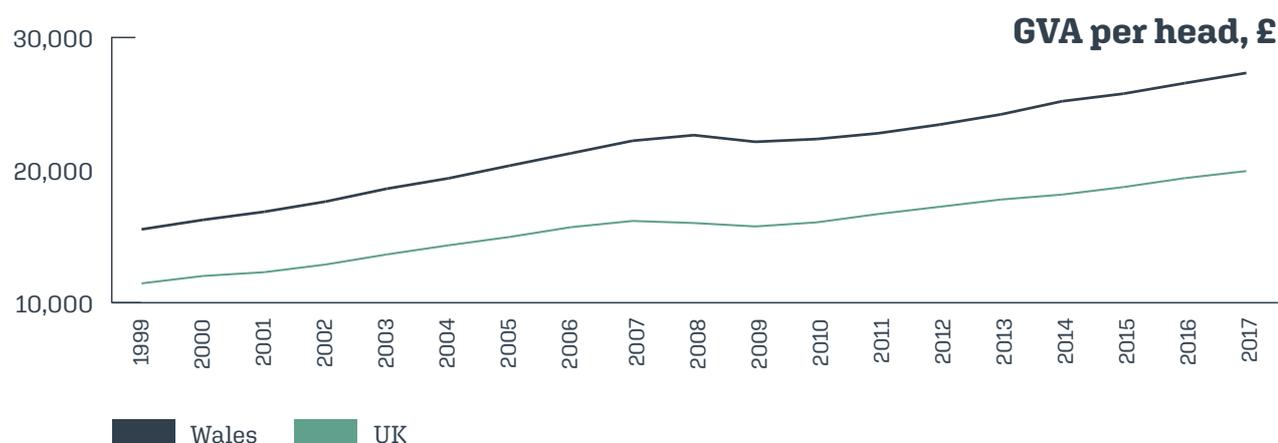
Prosperity

GVA per head, £

Source: StatsWales Summary statistics for Welsh economic regions: Wales. https://gov.wales/sites/default/files/statistics-and-research/2019-05/summary-statistics-for-welsh-economic-regions-wales-338_0.pdf

Regional Gross Value Added (GVA) is the value generated by the production of goods and services. GVA per head is a useful way of comparing regions of different sizes. It is not, however, a measure of regional productivity. GVA per head in Wales has risen but at a slower rate than the UK.

Estimates indicate that in 2018, 26% of employees in Wales were earning below the living wage (£8.75 in 2018, as defined by the Living Wage Foundation). The estimate for the UK was 22.8%[32].

Regional GVA[31], 2017

Region GVA, £ per head	GVA, £ per head
North East (England)	28,096
North West (England	20,129
Yorkshire & the Humber	23,918
East Midlands (England)	21,426
West Midlands (England)	22,713
East of England	24,772
London	48,857
South East (England)	29,415
South West (England)	23,499
Wales	19,899
Scotland	25,485
Northern Ireland	21,172

31 StatsWales Gross Value Added (£ per head) by area and year https://statswales.gov.wales/Catalogue/Business-Economy-and-Labour-Market/Regional-Accounts/Gross-Value-Added-GDP/gvaperhead-by-area-year

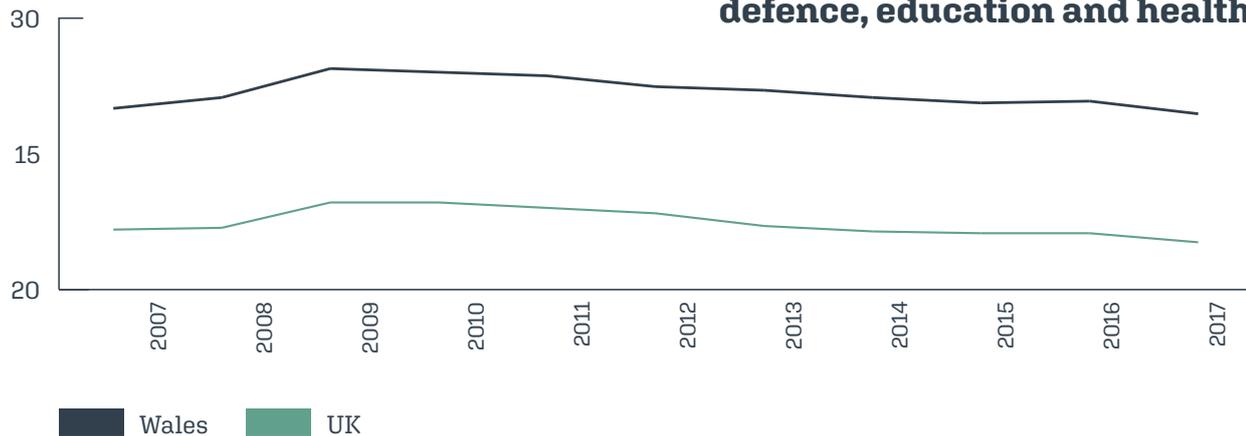32 Source: StatsWales Summary statistics for Welsh economic regions: Wales.
https://gov.wales/sites/default/files/statistics-and-research/2019-05/summary-statistics-for-welsh-economic-regions-wales-338_0.pdf

Public sector employment

Wales is more dependent on public sector employment than the UK as a whole. In February to April 2019, 9.4% of the population were in public sector employment compared to 8.2% in the UK[33].

Public administration contributes a greater proportion of overall GVA in Wales than it does in the UK as a whole.

Percentage of GVA from public administration, defence, education and health

Wales   UK

Overall, when compared to other parts of the UK, Wales has some long standing challenges including relatively low incomes and a high dependency on the public sector for jobs and services. Its ageing population is likely to exacerbate these problems. Brexit presents risks of further economic shocks in the short term.

But Wales also has great strengths that may be more important in the next 30 years. These include strong links to the rest of the UK, natural resources to address the challenge of decarbonisation, a strong national identity and an international outlook.

Strengths

- Leading centres of advanced materials and manufacturing, compound semi-conductors and financial services
- A base for internationally recognised firms
- A strong cultural identity

Weaknesses

- Low productivity
- Greater public sector reliance for jobs and finance
- Some big businesses but few headquarters, relatively few middle sized businesses

Opportunities

- The potential to harness renewable energy
- Plentiful water
- The ambition and commitment to bring about behaviour change e.g. world leading recycling rates

Threats

- Climate change
- Declining working age population
- Uncertainty about consequences of Brexit

33 Welsh Government, Key Economic Statistics, July 2019 https://gov.wales/sites/default/files/statistics-and-research/2019-07/key-economic-statistics-july-2019-024.pdf

Our Approach

Our purpose is to advise Welsh Ministers on Wales' long-term infrastructure needs. But the government's resources are limited and so our work involves a series of trade-offs and choices. Our aim is to provide advice which will maximise the benefits for current and future generations. We will consider environmental, social and cultural impact alongside economic considerations. And we will take account of impacts on equalities, the rights of the child and the Welsh language. Our approach will reflect the ways of working described in the Well-being of Future Generations Act.

Infrastructure developments can be very long-term. Thomas Telford's road linking London to Holyhead (along the route of the modern A5) was completed with the opening of the Menai Suspension Bridge in 1826. Nearly 200 years later, we see little prospect of the road falling into disuse.

Infrastructure presents opportunities for prevention. Flood prevention is an obvious example. Infrastructure can also enable us to change our travel behaviour which will help to reduce adverse impacts on the climate. Throughout our work we will seek improvements across a range of well-being outcomes.

We have begun to involve people around Wales to develop our understanding of the opportunities and challenges ahead. We will continue to collaborate with stakeholders and our work will be open and transparent.

We will recommend how infrastructure can contribute to the goals and targets of the Welsh Government. Our advice will take account of the spatial plan set out in the National Development Framework and existing infrastructure plans such as the Wales Infrastructure Investment Plan and the National Transport Finance Plan. Where relevant, we will consider whether the advice provided by the UK National Infrastructure Commission to the UK Government is appropriate for Wales.

We will look at opportunities to fund infrastructure through, for example, charging for use and land-value capture i.e. taxes and charges which seek to capture, for the public benefit, increases in land value that arise from public policy decisions or specific developments. And we will consider access to alternative finance streams such as the mutual investment model and pension funds.

It will be important to consider the spatial balance of infrastructure investment and the different types of infrastructure investment that may be suited to different regions of Wales. We will consider how infrastructure can be used to exploit the benefits from clustering around urban centres. For rural settings a key question is how infrastructure can best connect people to opportunities for learning, work and socialising.

The assessment of the potential value of new projects could be more effective if there were better data on how past projects have performed. We will explore the potential for post-hoc evaluation and opportunities to collect and publish better data in future.

Data is transforming the way policy is made and the way infrastructure is designed, built and managed. The volume of data needed to manage a distributed energy system is far greater than the requirements of a centralised system. Mobile phones can provide a rich source of intelligence about the journeys we make and the way we make them. Business Information Modelling (BIM) gives professionals the insight and tools to plan, design, construct and manage infrastructure more efficiently.

Wales is rich in public data assets such as Companies House, the Driver and Vehicle Licensing Agency (DVLA), the

Office of National Statistics (ONS) and the Patent Office. The Lle Geo-Portal[34], developed as a partnership between Welsh Government and Natural Resources Wales, serves as a hub for data and information covering a wide spectrum of topics. We will consider how Wales can continue to develop and use its data infrastructure to enable progress in other areas.

All of our work will be informed by evidence. In the next chapter we set out some key issues on which we seek evidence. Annex 2 explains how to submit evidence.

Key Issues

Themes

Our considerations to date have led us to identify three key themes for our work: Decarbonisation, Connectivity, and Resilience.

Decarbonisation

(Data in this section are sourced from Prosperity for All: A Low Carbon Wales[35] unless otherwise stated.)

Wales' largest greenhouse gas emitting sectors are:

1. Power accounted for 34% of Welsh emission in 2016. 99.9% of these emissions were from power stations. Wales hosts a disproportionately high proportion of the UK's gas power generation capacity.

2. Industry accounted for 29% of Welsh emissions in 2016. Iron and steel production and petroleum refining dominate industrial emissions making up 11% and 4.9% of total Welsh emissions respectively.

3. Transport accounted for 14% of Welsh emissions in 2016. Cars, trucks and buses contributed 11.9% of total Welsh emissions.

Heating our homes is another challenge given the current dependence on fossil fuels and the energy inefficiency of old housing stock. Emissions from residential buildings accounted for 7.5% of total Welsh emissions in 2016.

The Welsh Government has set out a path to decarbonisation in Prosperity for All: A Low Carbon Wales. Infrastructure will be an important enabler of that change and we will consider how it can contribute to emissions reduction in Wales.

Connectivity

The ability to connect to and communicate with one another is fundamental to society. Evidence suggests that better connected people, businesses and places are generally more productive and successful in achieving growth. The quality of our infrastructure underpins cohesive and connected communities, enabling people to access the services they need to stay healthy, to learn and engage with others. We will consider the capacity of transport networks to meet demand and seek ways to tackle congestion. Digital connectivity brings new opportunities for people, businesses and public services. We will consider how digital connectivity can be delivered where it is needed and at a price that can be afforded.

Resilience

The capacity to adjust to and recover from difficulties is vital to the successful operation of our infrastructure. Inspection and maintenance have always been needed, particularly as infrastructure ages. Climate change will bring significant additional challenges for which we must be prepared.

The UK Climate Change Risk Assessment 2017[36] reported that infrastructure across Wales is exposed to a range of climate hazards. Impacts on some assets have the potential to cascade on to others as part of interdependent networks. Flooding poses the greatest long-term risk to infrastructure performance from climate change, but the growing risks from heat, water scarcity and slope instability caused by severe weather could be significant.

To maintain the resilience of our infrastructure, investments in infrastructure assets will need to take account of climate risks. As part of our work we will consider the resource implications of maintaining resilience.

Within the themes of decarbonisation, connectivity and resilience we will focus our work over the coming year on digital communications, energy and transport

36 UK Committee on Climate Change, UK Climate Change Risk Assessment 2017 Evidence Report, Summary for Wales https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Wales-National-Summary.pdf

Digital Communications

Telecommunications is a reserved matter and competence is not devolved to Welsh Ministers.

Telecommunications infrastructure investment is very much market led with Ofcom, the UK telecommunications regulator, overseeing the market to stimulate, protect and develop competition in the marketplace for infrastructure and services. Where there is a limit in the extent to which competition and market-led investment in infrastructure drive service availability, then there are EU-wide established processes in place to identify market failure and allow UK public bodies to develop intervention schemes to address that market failure. On this basis, the natural order for UK digital infrastructure investment is:

- market-led investment and deployment;
- regulatory remedies to correct, adjust and improve market-led investment; and,
- market failure remedies.

Given that this is a reserved matter, the presumption is that the UK Government should lead the charge in securing and committing UK public sector investment to address UK market failure. Other agencies may also have a shared interest and may choose to co-invest. The European Commission, for example, identified digital infrastructure as a key economic and social enabler and has a track record of investing in market failure activities across member states. The Welsh Government has invested funding in market failure schemes using economic development powers to achieve and enable various economic and social policy goals.

Superfast vs Gigabit connections

Superfast Cymru[37] has extended superfast fixed broadband coverage (at download speeds of 30 Mbit/s and above) to around 730,000 households, enabling 93% of the Welsh population to have a superfast broadband connection in January 2019[38] at a cost of £200

37 Welsh Government https://gov.wales/go-superfast/about-this-campaign
38 Ofcom Connected Nations Update: Spring 2019 https://www.ofcom.org.uk/__data/assets/pdf_file/0021/146613/connected-nations-update-spring-2019.pdf

million, or £350 per home. Only about 10% of the homes receiving public subsidy have been served by fibre to the home technology (which is capable of much higher 'gigabit' speeds). 90% are served by cheaper, fibre to the cabinet technologies which are currently the primary means by which BT delivers broadband services in the UK.

The UK Government has since set a target that every home in the UK should be connected to 'gigabit' fibre by 2033[39]. Fibre to the home can be costly and widespread roll out will require significant investment. The latest Welsh Government programme[40] will use fibre to the home technology to connect an additional 26,000 Welsh households at a cost of £22 million or over £1000 per home, leaving over 50,000 households without any access to superfast broadband. Other initiatives, such as voucher schemes, may enable some of these households to obtain access.

Issue 1: Our provisional view is that, while a significant number of premises in Wales still don't have access to superfast broadband, the primary focus for public funds should be on extending superfast broadband to as many households as possible using the lowest cost technology and that the public funds that would be required to extend fibre to every home in Wales by 2033 should be assessed against other possible uses. We seek evidence on whether the UK Government's focus on extending more expensive fibre to the home, gigabit technology to every household in the UK will best serve the interests of Welsh citizens, including those who still lack access to superfast broadband

Fixed vs mobile broadband

Many parts of rural Wales experience comparatively poor mobile coverage today, with only around 60% of Wales geographic area having 4G coverage by all mobile operators in January 2019, compared to 83% in England. The UK Government and Ofcom have undertaken various initiatives to improve mobile coverage in rural areas but without Wales seeing significant improvements. The mobile industry has recently made its own proposals to share existing sites in lieu of further coverage obligations in new 5G spectrum licences which Ofcom is expected to allocate later this year. These obligations would otherwise extend coverage to over half of the Welsh premises not currently served by any mobile operator.

Through the mobile action plan the Welsh Government is working with the mobile industry and Ofcom to address nine key levers to improve mobile connectivity in Wales. For example, changes to planning regulations in April 2019 permit masts of 25 metres instead of 15 metres to be erected without full planning consent. In addition, the new UK emergency services network which has been commissioned by the UK Government may support some improvement in coverage, particularly along highways, in Wales.

Issue 2: Our provisional view is that: 4G and 5G mobile broadband may be the lowest cost technology to provide superfast connections to some Welsh households; that mobile connectivity delivers significant additional economic and social benefits in rural communities; and that, therefore, a greater proportion of public funds should be allocated to mobile as opposed to fixed broadband infrastructure or other infrastructure objectives. We seek evidence on whether and what additional measures the Welsh Government or local authorities could take (independently of Ofcom, the operators themselves, or the UK Government) to significantly improve mobile broadband coverage, including 5G, in Wales. What should our objectives for mobile coverage be?

39 Department for Digital, Culture, Media and Sport, Future Telecoms Infrastructure Review https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/732496/Future_Telecoms_Infrastructure_Review.pdf
40 Welsh Government https://gov.wales/deal-bring-faster-broadband-additional-premises-announced

Energy

Wales uses around 89 TWh of energy per year[41], enough to run almost 150 billion washing machine cycles. Consumption has reduced by around 18% since 2005. This is because of declining industry and greater energy efficiency in the home. In 2015 domestic buildings accounted for around 28% of current consumption, mainly for heating of properties and water. Transport accounted for a further 25% whilst industrial consumption, principally in Neath/Port Talbot and Pembrokeshire, represented almost 50% of total energy consumption[42].

It is clear that both demand for and supply of energy throughout the world will need to change both fundamentally and rapidly in order to reduce fossil fuel dependency and greenhouse gas emissions.

This is a very complex task. During the year, the commission heard evidence from the Institute of Welsh Affairs, which has been undertaking a multi-year study of the changes which it considers would be required to enable Wales to meet all of its projected energy demands from renewable sources by 2035. The UK National Infrastructure Commission also made recommendations in its National Infrastructure Assessment that the UK focus on renewables rather than nuclear power or carbon capture and storage, that it develop heat pumps and hydrogen as sources of domestic heating, and that it take measures to improve the energy efficiency of buildings.

41 Welsh Government, Electricity Generation in Wales 2017 https://gweddill.gov.wales/docs/desh/publications/181212-energy-generation-in-wales-2017-en.pdf
42 IWA Re-energising Wales Project: Half- Hourly Energy Demand Profiles for Wales
    https://www.iwa.wales/wp-content/uploads/2019/03/20190312-UPDATED-FINAL-Half-Hourly-Energy-Demand-Profiles-for-Wales-for-2016.pdf

In July, the UK Government's Energy Statement[43] outlined a strong role for nuclear for the foreseeable future. The nuclear sector in Wales is seen by some as providing significant economic development opportunities and the Trawsfynydd site in particular is viewed as a key potential low carbon hub focused on the deployment of the UK's first small modular reactor technology.

It is clear that actions will be required both to reduce the overall energy consumption of households (through investments in energy efficiency measures) and drivers, as well as changing the way in which energy is generated and distributed. In the coming year, the commission proposes to focus on some of the key infrastructure challenges for energy policy whilst recognising that there are many other aspects to the energy challenge.

Electricity consumption currently accounts for 16% of Welsh energy consumption, with the remaining 84% being gas, oil and petrol that are used primarily for heating, transport and industrial processes. However, electricity consumption as a proportion of total energy consumption is expected to increase significantly in the coming years with the adoption of electric vehicles and the replacement of fossil fuels with other sustainable sources of domestic heating[44].

Wales is currently a net exporter of electricity and in 2017 generated more than twice the electricity it consumed. Of the electricity generated, almost 80% was from fossil fuels and 20% from renewables. The Welsh Government has limited devolved powers over energy but has set a non-statutory target for Wales to be generating 70% of its electricity consumption from renewable energy by 2030.

Wales is well served with natural resources with the potential for electricity generation. Approximately 65% of renewable electricity generated in Wales already comes from wind, of which 30% is generated by the 726 MW of offshore wind projects off the Welsh coast and 35% by just over 1GW of onshore wind. Whilst solar PV makes up 31% of installed renewable capacity, its lower capacity factor means that solar PV provides just 13% of renewable electricity. Biomass electricity, hydroelectricity and other technologies make up the remaining 22% of renewable electricity generation.

The technologies for these sources of renewable energy generation are proven, are being produced on a global scale and are expected to continue to reduce in cost. However, the commission has heard evidence that some renewable energy projects, including onshore wind facilities, have not been pursued due to limitations of the existing electricity transmission and distribution networks, particularly in Mid Wales[45].

43 www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2019-07-22/HCWS1789/

44 National Infrastructure Commission National Infrastructure Assessment, Chapter 2. https://www.nic.org.uk/wp-content/uploads/CCS001_CCS0618917350-001_ NIC-NIA_Accessible.pdf#page=33. The IWA project 21 TWh electricity demand for Wales in 2035. This compares to around 13 TWh today. See IWA, p12 https://www.iwa.wales/wp-content/uploads/2018/04/IWA_WP3.2_EconomicCostsandBenefits-4.pdf

45 We note the IWA asked us to consider this issue in their 'Re-energising Wales' report, p.32 https://www.iwa.wales/wp-content/uploads/2019/03/IWA_Energy_WP6_ Digital-2.pdf

Issue 3: Our provisional understanding is that electricity grids in Wales were not planned in a pattern that eases energy transmission from our untapped renewable energy sources to consumers, creating constraints on both the development of new grid connections and new renewable generation. We seek to understand how the existing electricity grid is constraining the growth of renewable electricity generation and why these constraints arise. We seek further evidence on approaches to rapidly improve the relationship between Wales' energy grid and the future growth of renewable energy, including innovations in energy storage, electrical engineering, the planning system, and other government interventions.

The sea is another energy source readily available to Wales but one about which there currently remains a far greater degree of uncertainty than many of the other sources of renewable energy referred to above. Energy from waves, tidal stream and tidal range could all be harnessed in future, but these technologies are at a much earlier stage of development. This is a sector in which Wales could be a world leader but it is also one where we cannot rely on developments elsewhere in the world, or on a global supply chain, to ensure that the technology becomes feasible. Significant investments would need to be made in Wales if marine energy were to become a significant source of renewable energy, including investment in port infrastructure. This creates the promise of significant economic benefits that would be retained within Wales, but also involves significant risks and potentially substantially higher costs than other renewable technologies.

Issue 4: We seek evidence on the potential for commercial scale cost effective marine energy generation in Wales and the measures that are required to realise it. What proportion of Wales' electricity needs could be met by marine sources by 2030? Should potential economic benefits, in terms of jobs and investment in Wales, be offset against potentially higher costs of marine energy for consumers?

Decentralisation involves closer links between sources of energy supply and demand via local networks, and consumers or local communities take a more active part in managing their energy needs. In a decentralised world, far more small-scale energy supplies connect to the distribution networks. The electricity system has already become more decentralised but it remains to be seen how far this can be expanded. One of the Welsh Government's objectives is to drive more locally owned energy developments to retain more economic benefits from generation within Wales.

In 2017, Wales had 750 MW of renewable energy capacity in local ownership. This compares to the Welsh Government's target of 1 GW by 2030 (representing less than 10% of the total electricity capacity in Wales). This included 529 MW of locally owned renewable electricity capacity (most of it domestic rooftop solar PV) and 221 MW of locally owned renewable heat capacity. The Welsh Government expects that all new renewable energy projects in Wales will have at least an element of local ownership by 2020. The Institute for Welsh Affairs proposes that any renewable project above 5MW should have between 5% and 33% local ownership[46].

46 https://www.iwa.wales/wp-content/uploads/2019/03/IWA_Energy_WP6_Digital-2.pdf p.25

Issue 5: We provisionally consider that decentralised, community-based infrastructure projects could have an important role to play in transforming the energy supply chain, as well as in meeting other infrastructure challenges such as community broadband. We seek evidence to better understand how community energy generation schemes might be scaled up in Wales, and the measures that might be required to achieve this. We also seek evidence on existing barriers to decentralisation, including (but not limited to) the availability of electricity grid infrastructure referred to earlier.

We seek evidence on how community energy infrastructure might be financed and the role, if any, for public authorities including local authorities. We are also interested in evidence as to whether local ownership requirements might impact the development of renewable energy infrastructure in Wales, either positively or negatively. Should potential economic benefits, in terms of jobs and investment in Wales, be offset against the potentially higher costs of renewable energy generated by community schemes?

Transport

Transport is a hugely varied and diverse sector; from private transport such as cars and bicycles, through mass public transportation to the challenge of moving goods around Wales and beyond. Much of the existing network is a legacy of infrastructure designed to transport raw materials and manufactured goods out of the country. We find ourselves at a turning point in terms of the current infrastructure's physical capacity, environmental sustainability and financial affordability. For that reason we believe that future transport investment decisions need to be considered on a broad strategic basis that balances these elements.

A focus on well-being in the round leads us to consider:

- what is the fundamental purpose of transport and what are the social and practical drivers that may change travel and shipping behaviour in the future;

- what social, cultural, health and environmental benefits should we look for in future transport investments in addition to economic stimulus; and

- what would the elements of a decision-making framework for future transport investments be in this context, and how would they be judged in a robust and impartial manner?

Context and background

The UK National Infrastructure Commission (NIC) outlined three headline challenges for the UK's infrastructure: congestion, capacity and carbon.[47] We believe these are equally relevant to Wales.

47 National Infrastructure Commission, Congestion, Capacity, Carbon: Priorities for National Infrastructure. https://www.nic.org.uk/wp-content/uploads/Congestion-Capacity-Carbon_-Priorities-for-national-infrastructure.pdf

In terms of spatial planning, the Draft National Development Framework:[48]

- prioritises movements east-west in North & South Wales and places emphasis on the Cardiff Capital, Swansea Bay and North East Wales regions; and,

- promotes strategic growth predominantly in existing urban centres in South East, South West and North East Wales.

Our visits to North, Mid and South Wales reinforced these as possible priorities to steer our plans for future transport infrastructure investment.

Active travel

Cycling and walking can improve health, safety and community cohesion, reduce congestion and decarbonise. We need to break down the barriers to everyday walking and cycling for people who currently would not consider making their local journeys by foot or bike.

Public transport

For longer distance trips we need to transform the image and the reality of public transport to make people want to use it. Integrated public transport is a key transport aim throughout the UK but is especially important for Wales with its mix of cities and large rural hinterland. The strategic major arteries need to work in tandem with the community and rural dispersed network. Making sure all these work together as an integrated strategy is an important overarching priority.

Bus services provide access to education, training, work, healthcare and leisure activities. However bus services in Wales, as in many parts of the UK, are in decline.

Rail serves only a part of the country and, whilst growing, has less than a third of the passenger journeys of buses. The rail network was not built as a single standardised system, resulting in constraints on operations today. Infrastructure improvements already underway include the South East Wales Metro and there is potential for metro systems in North Wales and Swansea Bay.

Road transport

Transport in Wales is dominated by the car, more than any other region or nation in the UK. The A55 in the north and the M4 in the south are vital links. Both are vulnerable to congestion at peak times.

In 2018, the Economy, Infrastructure and Skills Committee of the National Assembly concluded that Wales' roads are in no worse condition than those in other parts of the UK but the Committee had concerns about long-term maintenance.[49]

A key challenge for future road transport is decarbonisation. UK NIC has advocated that the UK should prepare for 100% ultra low emission vehicle sales by 2030, 10 years ahead of current UK Government policy.

48 Welsh Government, National Development Framework 2020-2040 Consultation Draft: 7 August – 1 November 2019 https://gov.wales/sites/default/files/
consultations/2019-08/Draft%20National%20Development%20Framework.pdf
49 National Assembly for Wales (October 2018): Economy, Infrastructure and Skills Committee.
The State of Roads in Wales http://www.assembly.wales/laid%20documents/cr-ld11791/cr-ld11791-e.pdf

The government needs to provide the right environment to support and encourage the switch. While battery EV is likely to be used for private transport, different technology solutions may appear for buses and heavy goods vehicles. As a result, the road network will require new charging and refuelling infrastructure for drivers to locate and use that is affordable, efficient and reliable. In rural areas, and mid Wales in particular, the economics of making charging infrastructure profitable will be challenging and the public sector may need to step in.

Shared mobility and autonomous vehicles (AV) are likely to increase in demand over the long-term, although the latter is unlikely to develop much before the late 2030s.[50]

Freight

For freight transport too, road is the most important mode. In recent years, small freight has increased as more goods are bought online and delivered. Decarbonisation of freight traffic will need to be achieved. That may be through the use of battery EVs although other options, such as hydrogen EVs, may have advantages.

The main east-west routes also connect to Wales' main ports and the international airport. These provide important connections to Ireland, Europe and the rest of the world. These links may become more important as our trading patterns change in future. Although many of Wales' ports were built for purposes which no longer exist, some have been repurposed. A more strategic approach to their use may be beneficial

Overall priorities and issues for transport

We seek evidence from stakeholders on the following key issues.

Issue 6: We seek evidence to better understand how strategic connectivity can be improved in the following settings:

a) We provisionally consider that improving connectivity along the strategic East West Wales corridors to/from England, in North East and South East Wales is a transport priority. We seek evidence to better understand how capacity can be increased and congestion reduced in these strategic corridors.

b) We provisionally consider that connecting local areas to major economic centres has potential to support economic development and regeneration for example in the Heads of Valleys. We seek evidence to better understand the areas of Wales where such developments are most needed and the means of connectivity that would be most effective.

c) We provisionally consider that Wales has potential to improve connectivity to the rest of the world by air and sea for both passengers and freight. We seek evidence to better understand how Wales could maximise its connectivity to the rest of the world and the costs and benefits of doing so.

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50 Bloomberg NEF (May 2019). Electric Vehicle Outlook 2019 https://about.bnef.com/electric-vehicle-outlook/

Issue 7: We provisionally consider that the economic case for major road and rail developments between North and South Wales is not strong. Connectivity between North and South Wales could be improved by supplementary developments such as better digital connectivity along major transport routes, improved passing places and rest facilities, EV charging infrastructure and improved rolling stock. We seek evidence to inform thinking about how supplementary developments could improve existing north/south transport links.

Issue 8: Wales' road infrastructure must be ready for the move to zero emissions vehicles by 2040 at the latest. We seek evidence to better understand how the transition to zero emission road transport can be enabled. We are interested in evidence of: Wales' readiness compared to other parts of the UK; the infrastructure barriers to zero emissions road transport; and how the barriers can be overcome, particularly in rural areas where the market may not provide the solution.

Issue 9: Transport in rural Wales poses different challenges and requires different solutions to those in urban Wales. We seek evidence to better understand how transport in rural Wales can be improved.

Issue 10: As well as improving transport infrastructure, it is self-evident that if there were less need for people to travel then congestion and carbon emissions could be reduced. Options for reducing the need for travel should be explored. We seek evidence to better understand how public policy in other areas can reduce the need for people to travel.

Longer term considerations

At present, we only seek evidence in relation to the key issues above. In the longer term, we will consider other aspects of our remit including the following.

Flooding and Coastal Erosion Risk Management

Over 60% of the Welsh population live and work on the coast[51]. Our coastlines and riverbanks add great value to our well-being with their natural beauty, biodiversity and recreation opportunities. Flooding of homes, businesses and infrastructure is an unwelcome risk to many people living in Wales and can have severe detrimental impacts on quality of life including mental health. Over 245,000 properties in Wales are at risk of flooding from rivers, the sea and surface water with almost 400 properties also at risk from coastal erosion[52]. Welsh Government policy for managing these risk is set out in the National Strategy for Flood and Coastal Erosion Risk Management.

Sea level rise must be considered over the whole lifetime of coastal assets. Infrastructure assets such as roads and railways can last a hundred years or more. All current estimates agree that sea levels will continue to rise globally for the next few hundred years due to global heating driving the melting of ice caps and thermal expansion of our oceans. Predictions of sea level rise over the next century vary significantly, depending largely on the rate of decarbonisation. Historically the higher range of emissions scenarios have more closely matched observed emissions, as observations have followed upper bound emissions scenarios. The predicted sea level rise for Wales by 2100, relative to 2019 levels, is between 0.8m and 1.6m (H++ Scenario)[53]. Similarly, flood risk from rivers is expected to increase due to climate change. Current estimates predict a 20-70% increase in river flood flows by 2070[54].

Since 2011, over £320 million[55] has been invested across Wales, reducing risk to communities. The coastal flooding seen in Wales in the winter of 2013/14 affected homes, businesses, road and rail networks and utilities as well as causing damage to FCERM assets around the coastline. Over 300 properties flooded with a further 1400 properties evacuated. In addition, more than 15 km of road was affected by flooding, blocked by beach material or temporarily closed for safety. However, the Wales Coastal Review (2014)[56] estimated that our network of assets and defences protected 99% of the properties and land at risk and prevented £3 billion of damages.

Areas protected by flood defences tend to become increasingly developed, requiring continued protection against rising sea-levels at increasing cost. How can this growing expense be managed and limited?

Working with natural processes, for example by regenerating forests, and managed realignment of our coastlines to reduce flood defence costs and increase wetland habitat are approaches that could aid prevention and mitigation of flooding. Where flooding cannot be prevented, we may need to plan to enable coastal towns to roll-back in a managed way.

51 Institute of Welsh Affairs https://www.iwa.wales/click/2018/06/ocean-plastic-crisis-wales-chance-take-plunge/

52 Welsh Government, The Draft National Strategy for Flood and Coastal Erosion Risk Management in Wales https://gov.wales/sites/default/files/consultations/2019-06/consultation-document-flooding-strategy.pdf

53 Welsh Government, Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales https://gov.wales/sites/default/files/publications/2019-06/adapting-to-climate-change-guidance-for-flood-and-coastal-erosion-risk-management-authorities-in-wales.pdf

54 Ibid

55 Welsh Government, The Draft National Strategy for Flood and Coastal Erosion Risk Management in Wales https://gov.wales/sites/default/files/consultations/2019-06/consultation-document-flooding-strategy.pdf

56 Wales Coastal Flooding Review Phase 1 Report http://naturalresourceswales.gov.uk/media/1936/wales-coastal-flooding-review-phase-1.pdf

Freshwater flood risk is changing, with increased rainfall intensity expected, causing higher flood levels more frequently. How can we work better with natural processes to reduce flood risk? And can we increase the role of flood resilience (i.e. measures to reduce flood damage experienced at properties in a flood event) in areas where defences cannot provide value for money?

Waste Management & the Circular Economy

The Welsh Government is aiming for Wales to be zero-waste country by 2050[57]. To date Wales has achieved one of the best recycling rates in the world for household waste (63%). To achieve the targets set out in Towards Zero Waste, Wales needs to build on its success as a high recycling nation.

Wales has developed a legislative landscape that could accelerate green growth by increasing resource efficiency, renewable energy and supporting innovation towards a more circular economy. This will bring significant challenges for infrastructure to ensure Wales has the facilities to make the necessary changes.

Investment in infrastructure is needed to ensure good quality reused and recycled materials are available. Further work is needed to generate markets for recycled and reused materials. Uncertainty over markets for recycled materials will not encourage their use.

Work is also needed to ensure products are capable of being reused, remanufactured, recovered, and recycled. It is common for infrastructure to be built with a design life beyond Wales' targeted 2050 zero waste date, using materials and products that are not able to be reused or recovered and whose only end of life option is landfill.

A lack of quality assurance, traceability and the absence of certification means that even products and components that are capable of being recovered are often not identified and segregated. Planned obsolescence in products is widespread, limiting reuse, repair, refurbishment and recovery opportunities.

Wales has shown the ambition and commitment to become a world leader in recycling household waste. We can continue our progress to become a truly circular economy.

Water

Like other sectors, the water industry in Wales faces challenges of decarbonisation and climate change. We do not underestimate the difficulty of sustaining water supply and drainage in the event of increasingly extreme weather events bringing both flood and drought.

Even so, Wales does not seem to be facing the water shortages anticipated in South East England for example. Dŵr Cymru Welsh Water abstracts around 3% of annual effective rainfall for public supply, compared to around 50% in the south and east of England[58]. In fact, we may need to be prepared for debate about more water transfers in future.

The distribution of our population brings other challenges. Growing urban centres need more water, drainage and sewerage while dispersed rural communities result in many small water processing assets to be maintained.

Increasing digital connectivity and new technologies will undoubtedly bring other changes.

Improvements to water infrastructure need to be balanced against the cost to the consumer, with prices in Wales already relatively high when compared to other parts of GB.

57 Welsh Government 2019, Towards Zero Waste https://gov.wales/towards-zero-waste-our-waste-strategy
58 Ibid

# Annex 1: Spend on Infrastructure per Household

Electricity & gas

Electricity & gas infrastructure is largely funded from customer revenue. Although, only a proportion of customer revenue is spent on infrastructure.

In Wales, the average annual household expenditure on electricity was £603 and average annual household expenditure on gas was £530 between 2016 and 2018[59].

This compares to expenditure in England of about £577 on electricity and about £541 on gas. In Scotland average annual household expenditure on electricity was £640 and average annual household expenditure on gas was £536.

Compared to other European countries, the UK ranks below average on gas prices and about average on electricity prices[60].

The breakdown of a typical dual fuel energy bill is shown below. We might assume that the network costs and an unknown part of the wholesale costs are infrastructure costs but we cannot estimate the proportion of a typical bill that contributes to infrastructure.
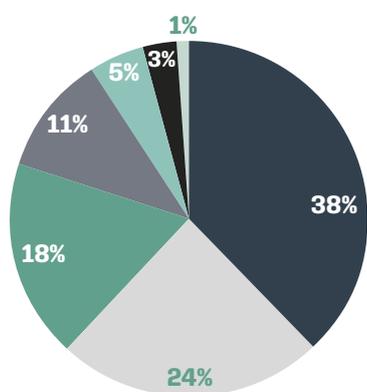
Breakdown of a dual fuel bill

- Wholesale costs — 38%
- Network costs — 24%
- Operating costs — 18%
- Environmental and social obligation costs — 11%
- VAT — 5%
- Supplier pre-tax margin — 3%
- Other direct costs — 1%

Source: Ofgem, Breakdown of a dual fuel bill, August 2019. www.ofgem.gov.uk/data-portal/breakdown-dual-fuel-bill

59 ONS, household expenditure on gas and electricity, 2016-2018 https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/detailedhouseholdexpenditurebycountriesandregionsuktablea35
60 Ofgem (2019) https://www.ofgem.gov.uk/publications-and-updates/infographic-bills-prices-and-profits

Dual fuel energy bills include:

- Wholesale energy costs: The price that energy suppliers pay to obtain electricity and gas for customers;

- Network costs: The fees that energy suppliers pay to use the electricity and gas distribution networks;

- Environmental and social obligations: The contribution to funding renewable energy and helping vulnerable customers;

- Operating costs: The expenses associated with the maintenance and administration of energy suppliers' businesses;

- VAT: This is set by the UK government at 5% on all home energy bills;

- Supplier pre-tax margin: Energy suppliers' profit or loss; and ther direct costs.

Railway

In the 5 years from April 2013 to March 2018, public spending per household on railway in Wales each year was about £375[61] on average.

This compares to about £506 in England, £458 in Scotland and £105 in Northern Ireland.

Roads

In the 5 years from April 2013 to March 2018, public spending per household on roads in Wales each year was about £397[62] on average.

This compares to about £311 in England, £572 in Scotland and £446 in Northern Ireland.

Telephone services & internet subscription

Telephone & internet infrastructure is largely funded from consumer revenue but only a proportion of customer revenue is spent on infrastructure.

In 2016-18, the average annual household expenditure on telephone services & internet subscription fees in Wales was £770[63].

This compares to about £816 in England, £759 in Scotland and £801 in Northern Ireland.

Waste

In the 5 years from April 2013 to March 2018, public spending per household on waste management in Wales each year was about £296[64] on average.

This compares to about £294 in England, £360 in Scotland and £266 in Northern Ireland.

Water and sewerage

Water and sewerage infrastructure is largely funded from consumer revenue but only a proportion of customer revenue is spent on infrastructure.

Average annual household combined water and sewerage bills, for water companies serving customers in Wales are about £444[65] for April 2019 to March 2020.

By comparison the average annual bill in England and Wales is £415. The average annual bill in Scotland is £369[66].

61 Analysis for NICW based on:
   • HMT Country And Regional Analysis November 2018
   https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/759560/Country_and_Regional_Analysis_November_2018_rvsd.pdf, and
   • Estimated numbers of households in England and Wales, Scotland, Northern Ireland, 2004 to 2016, ONS. https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/adhocs/008777estimatednumbersofhouseholdsinenglandandwalesscotlandnorthernireland2004to2016
62 Analysis for NICW based on:
   • HMT Country And Regional Analysis November 2018
63 ONS, Household expenditure on telephony and internet services, 2016-2018. https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/detailedhouseholdexpenditurebycountriesandregionsuktablea35
64 Analysis for NICW based on:
   • HMT Country And Regional Analysis November 2018
   https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/759560/Country_and_Regional_Analysis_November_2018_rvsd.pdf, and
   • Estimated numbers of households in England and Wales, Scotland, Northern Ireland, 2004 to 2016, ONS. https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/adhocs/008777estimatednumbersofhouseholdsinenglandandwalesscotlandnorthernireland2004to2016
65 Discover Water https://discoverwater.co.uk/annual-bill
66 Scottish Water https://www.scottishwater.co.uk/en/Your%20Home/Your%20Charges/Your%20Charges%202019%202020

Annex 2: Call for Evidence

All of our work will be informed by evidence. Below we set out the key issues on which our work will focus over the next year, and for which we now seek further evidence.

Key Issues

Digital Communications

Issue 1: Our provisional view is that, while a significant number of premises in Wales still don't have access to superfast broadband, the primary focus for public funds should be on extending superfast broadband to as many households as possible using the lowest cost technology and that the public funds that would be required to extend fibre to every home in Wales by 2033 should be assessed against other possible uses. We seek evidence on whether the UK Government's focus on extending more expensive fibre to the home, gigabit technology to every household in the UK will best serve the interests of Welsh citizens, including those who still lack access to superfast broadband.

Issue 2: Our provisional view is that: 4G and 5G mobile broadband may be the lowest cost technology to provide superfast connections to some Welsh households; that mobile connectivity delivers significant additional economic and social benefits in rural communities; and that, therefore, a greater proportion of public funds should be allocated to mobile as opposed to fixed broadband infrastructure or other infrastructure objectives. We seek evidence on whether and what additional measures the Welsh Government or local authorities could take (independently of Ofcom, the operators themselves, or the UK Government) to significantly improve mobile broadband coverage, including 5G, in Wales. What should our objectives for mobile coverage be?

Energy

Issue 3: Our provisional understanding is that electricity grids in Wales were not planned in a pattern that eases energy transmission from our untapped renewable energy sources to consumers, creating constraints on both the development of new grid connections and new renewable generation. We seek to understand how the existing electricity grid is constraining the growth of renewable electricity generation and why these constraints arise. We seek further evidence on approaches to rapidly improve the relationship between Wales' energy grid and the future growth of renewable energy, including innovations in energy storage, electrical engineering, the planning system, and other government interventions.

Issue 4: We seek evidence on the potential for commercial scale cost effective marine energy generation in Wales and the measures that are required to realise it. What proportion of Wales' electricity needs could be met by marine sources by 2030? Should potential economic benefits, in terms of jobs and investment in Wales, be offset against potentially higher costs of marine energy for consumers?

Issue 5: We provisionally consider that decentralised, community-based infrastructure projects could have an important role to play in transforming the energy supply chain, as well as in meeting other infrastructure challenges such as community broadband. We seek evidence to better understand how community energy generation schemes might be scaled up in Wales, and the measures that might be required to achieve this. We also seek evidence on existing barriers to decentralisation, including (but not limited to) the availability of electricity grid infrastructure referred to earlier. We seek evidence on how community energy infrastructure might be financed and the role, if any, for public authorities including local authorities. We are also interested in evidence as to whether local ownership requirements might impact the development of renewable energy infrastructure in Wales, either positively or negatively. Should potential economic benefits, in terms of jobs and investment in Wales, be offset against the potentially higher costs of renewable energy generated by community schemes?

Transport

Issue 6: We seek evidence to better understand how strategic connectivity can be improved in the following settings:

a) We provisionally consider that improving connectivity along the strategic East West Wales corridors to/from England, in North East and South East Wales is a transport priority. We seek evidence to better understand how capacity can be increased and congestion reduced in these strategic corridors.

b) We provisionally consider that connecting local areas to major economic centres has potential to support economic development and regeneration for example in the Heads of Valleys. We seek evidence to better understand the areas of Wales where such developments are most needed and the means of connectivity that would be most effective.

c) We provisionally consider that Wales has potential to improve connectivity to the rest of the world by air and sea for both passengers and freight. We seek evidence to better understand how Wales could maximise its connectivity to the rest of the world and the costs and benefits of doing so.

Issue 7: We provisionally consider that the economic case for major road and rail developments between North and South Wales is not strong. Connectivity between North and South Wales could be improved by supplementary developments such as better digital connectivity along major transport routes, improved passing places and rest facilities, EV charging infrastructure and improved rolling stock. We seek evidence to inform thinking about how supplementary developments could improve existing north/south transport links.

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How to respond

Please identify to which issue(s) your evidence refers. Responses should be emailed to:

NationalInfrastructureCommissionfor Wales@gov.wales ComisiwnSeilwaithCenedlaetholCymru@ llyw.cymru.

Evidence should be submitted before Friday 27 March 2020. Evidence submitted after that date may not be considered.

If further information or clarification is required, the commission secretariat will contact you. If you need to submit a hard copy, please send your response to the:

Office of the National Infrastructure Commission for Wales

Planning Department
Welsh Government
Cathays Park
Cardiff
CF10 3NQ

The commission secretariat would be happy to answer any questions you may have on this call for evidence by e-mail at the address above.

FOI and privacy statements

We may publish any responses received. If you believe there is a reason why your response or any part of it should be considered confidential, please provide details. Information provided in response to this call for evidence, including personal information, may be subject to publication or disclosure in accordance with the Freedom of Information Act 2000 (FOIA) or other relevant legislation.

If you want information that you provide to be treated as confidential please be aware that, under the FOIA, there is a statutory code of practice with which public authorities must comply and which deals, amongst other things, with obligations of confidentiality.

In view of this, it would be helpful if you could explain why you regard the information you have provided as confidential. If the commission receives a request for disclosure of the information, it will take full account of your explanation, but cannot give an assurance that confidentiality can be maintained in all circumstances.

The commission will process your personal data in accordance with relevant data protection law.

Large print, Braille and alternative language versions of this document are available on request.