Report by the Welsh Infrastructure Alliance (WIA)

The future wellbeing of Wales and the role of infrastructure

Introduction

The National Infrastructure Commission for Wales (NICW) was recently established by the Welsh Government as a non-statutory body to advise Ministers of Wales' future infrastructure needs. This followed a lengthy period of consultation and lobbying by stakeholders.

The Welsh Infrastructure Alliance (WIA) draws together like-minded organisations representing over 600 member companies and over 10,000 individual members from across the infrastructure sector. The Alliance sees itself as a source of advice and potential solutions to enable the delivery of "world class" infrastructure in Wales to drive our future wellbeing as a nation.

This short report offers some initial thoughts across a range of infrastructure "sub-sectors" and is designed to stimulate dialogue both within the National Infrastructure Commission for Wales and between the Commission and stakeholders with an interest in the infrastructure sector. We hope that it demonstrates the broad range of infrastructure knowledge across the Alliance partners and our ability to provide expert advice. It sets out, in simple terms, the current environment, some of the challenges faced within each "sub-sector" and the opportunities to meet future needs.

Infrastructure for the 21st Century

Infrastructure investment, whether it is maintaining existing networks or building new assets, is critical to our wellbeing. Most countries are not investing enough, which is hampering their future wellbeing and deferring an ever-increasing burden to the generations ahead. What does the future hold for the generations to come? What infrastructure do we need to support their wellbeing? How should projects be prioritized? Is there a role for the private sector alongside government? Where will the money come from? How can international interest be attracted?

Infrastructure will only support wellbeing and inclusivity when it is well aligned with the country's economic, social, environmental and cultural priorities. The Wellbeing of Future Generations (WFG) Act presents us with a unique opportunity in Wales to shape our future infrastructure needs against the 7 wellbeing goals set out in the Act and the 5 ways of working. Alongside this is the imperative to create a resilient infrastructure; capable of withstanding and responding to shocks and stresses. For example, climate change and the need to decarbonise our activities, disruptive technology with positive and negative implications, increased automation with implications for current livelihoods, demographic changes with people living longer, pursuing different lifestyles but also, in many cases, struggling with wellbeing issues. All this requires an adaptable infrastructure. So, this report focuses on the art of the possible, the challenges we face and the opportunities that could be embraced.

For ease of presentation we have considered infrastructure in terms of the following "sub-sectors":

- Transporting people and goods
- Digital connectivity
- Powering and energising our lives
- Managing our water resources

- Waste and the circular economy
- Sustaining our communities

Each of these "sub-sectors" is viewed in terms of how they could support future wellbeing and alignment with the WFG Act. The challenges of effecting change are briefly set out along with the opportunities for the future and what needs to happen to realise these opportunities including the skills required

Transporting people, goods and services

Wales must have a world class, sustainable and integrated transport system that drives its economy and connect its people not just throughout Wales and but across the rest of the UK and internationally. In this context transportation means road, rail, sea and air. Wales' transport systems must be resilient to accommodate fluctuating demand and climatic changes. People and service carriers need realistic choices that support sustainable economic growth and competitiveness. The ICE Wales Cymru 2013 State of the Nation briefing on Transport stated that "Wales had suffered from a lack of investment in Transport Infrastructure". As many government projects identified at that time have yet to receive start-up funding, this statement holds true.

We need to put the well-being of our future generations, how we address climate change and the challenge of decarbonising Wales by 2050 at the heart of how we plan. Providing healthy and active travel options within our infrastructure developments is a key objective. The Active Travel (Wales) Act creates huge opportunities and we would welcome the opportunity to support the Commission in championing better walking and cycling opportunities.

The wide-reaching proposals for transport, set out by the Welsh Government in Taking Wales Forward 2016-2021 are supported by industry who are keen to deliver them. This is not limited to 'hard' infrastructure and must embrace best practice in the operation of these networks, including enhanced digital infrastructure. These need to be fast-tracked if Wales is to benefit from a fully integrated public transport network underpinned by flexible, multi-mode smart ticketing systems for use anywhere within Wales.

The in-development update of the Wales Transport Strategy that reflects leaving the EU and new legislation, such as the Future Generations Act must have an ambitious, yet realistic delivery programme set out in an updated Wales Infrastructure Investment and National Transport Plans.

We look forward to seeing the newly established Transport for Wales delivering improved and new services across the transport portfolio as well as their emerging strategy for integrated transport. The new rail franchise provides opportunities for improvements and enhancements in services across Wales and the borders of England. The southeast and northeast Metro proposals will provide further integration opportunities.

Cancellation of electrifying the railway between Cardiff and Swansea was a blow, but modern hybrid trains deliver some service improvements. Across the Welsh rail network we need traction methods that contribute positively to decarbonising targets and reduce whole life costs as well as completing infrastructure enhancements to improve line speed and service reliability.

Welsh bus services have neither the status nor the funding that rail has, and yet buses provide for three out of every four public sector journeys (circa 100M per annum). Services are declining due to public sector cuts and there are too many operators providing services that lack integration and coordination. The deficiencies of existing market-led bus deregulation policies compound the inefficiencies of bus operations in Wales. The recent Welsh Government consultation sets out ambitious plans for reforming the planning and delivery of local bus services and licencing of taxis and private hire vehicles in Wales.

The potential to implement a Joint Transport Authority (JTA) in Wales would be challenging but such a transformational change is essential if Wales is to achieve a truly integrated transport network. Roads provide vital and highly effective transport links; the issue is how we use them.

The rapid development of new technologies, particularly with autonomous, connected and electric vehicles, will see significant change in traveller behaviour and private car ownership. The integration and public acceptance of these new technologies will need careful planning for people's wellbeing as significant change in infrastructure will be required. Wales must plan to deal properly with new forms of waste and recycling from electric power that come from these new technologies.

Significant investment is required in Wales' TEN-T and Trunk Road Network. More certainty is required on the delivery timescales of schemes set out in the National Transport Plan. We already have considerable transport assets across Wales that need significant investment if their full potential value is to be realised. The recent decision to not proceed with the M4 Relief Road around Newport will need fresh thinking and significant investment to address traffic congestion, carbon reduction and air quality problems on this vital transport link in South East Wales. The condition of the local road network is of concern and we must invest more to maintain the safe standards needed for our communities. Motorways, Trunk Roads and local roads must have properly funded asset management plans.

Transport by sea and the development of Wales' natural deep-water ports as part of an integrated transport network is becoming an in increasing priority, particularly since these powers were devolved to the Welsh Government. The expansion of these facilities as economic hubs, along with improved access and connectivity to the wider road, rail and air transport networks, is an important factor in increasing sustainable economic growth for these sometimes-deprived areas of Wales.

Wales needs a positive strategy for its airports and surrounding areas building on the Welsh Government's investment in Cardiff International Airport and taking advantage of the opportunities resulting from the expansion at Heathrow. There are opportunities to expand the highly skilled, technology services associated with the aviation industry as well as investing in the infrastructure and services necessary to compete with other regional airports.

To maximise competitiveness on the world stage and the well-being of Wales' citizens it is vital that the value of enhancing all transport systems is fully recognised to give Wales the world class, sustainable, integrated transport network it needs.

Digital connectivity

Digital connectivity is no longer a "nice to have" for businesses, communities and people – it's a basic need! And it's critical to supporting thriving communities across Wales, both urban and rural, and helping us to create a much "greener" economy. But it's not just about communication, it's about having digital infrastructure in place to support the sharing of knowledge and asset information to make our buildings, transport systems and lifestyles "smarter". It's about enabling people to create a new business environment. It's about supporting the greater use of electric vehicles to move people and goods about. It's about creating an inclusive and fairer society.

But we are starting from a very low base in Wales and we have significant challenges to overcome if we are ensuring that all communities in Wales benefit from full digital connectivity. The dispersed nature of Wales' population, particularly in rural areas, does not easily suit "market-led" decision making when it comes to investment, challenging topography and the constraints of protected areas add technical and commercial complexities to improved coverage and not all "levers" to extend coverage are devolved to Wales.

To move forward we need to agree what the future could hold and what infrastructure we need to support this e.g. increased home working (including remote areas), electric/automated/shared vehicles, "green" growth in rural areas, retaining younger people within rural communities, entrepreneurship, etc. We need to map out the technologies which could support this vision and develop the business cases to deliver, maximising the use of devolved powers and working with others to drive change, using the leverage of public/private partnerships to enable progress. And we need to align our digital infrastructure needs with improvements to the energy grid and transport infrastructure to create joint opportunities and greater value.

Powering and Energising our Lives

Wales is ideally placed to be an energy 'hub' for the UK and can play a significant role in clean energy production. Energy security is one of the key issues facing Wales (and the UK) today. We should ensure there are sufficient supplies of electricity to meet demands and avoid interruptions, reduce the reliance on imported energy supplies and on fossil fuels, reduce the production of harmful emissions, promote energy efficient measures and maximise sustainable energy sources – wind, tidal, wave, solar, stream.

To move forward there are a number of issues to explore including all viable forms of sustainable energy production to ensure a continuous supply and researching and investing in battery technologies to alleviate concerns on the imbalance of potential electricity demand/consumption to the availability of supplies, particularly at peak periods. We should undertake a comprehensive study of Wales' extensive coastline (with one of the highest tidal ranges in the world) to identify energy investment opportunities and invest in improvements to new and existing buildings to improve energy efficiency and reduce energy poverty. We should also use the National Development Framework to inform planning decisions on new energy developments, creating "preferred sites" for different energy generation types.

Managing our Water Resources

Wales is rich in plentiful supplies of water with a great potential to harness and benefit from this invaluable supply which is not only essential for communities but for business and industry.

With close knit communities that are well used to working together supported by an enabling environment, the existing facilities and supplies must be converted into opportunities for the future supporting Green Growth. However, climate change and flood risk management create resilience challenges in Wales, so both mitigation and adaptation remain essential. There is a clear need for positive planning and investment by a range of parties in respect of these challenges, based on the latest available research and information.

A number of specific challenges merit further research and/or development to improve the social and economic capital of Wales with regards to water. We need innovative low carbon ways to treat water so that it can be transferred between basins. Water is an increasingly valuable resource to share/sell, and if processes can be found which are more cost effective than local storage and or treatment, inter basin transfers could become economic. We should produce a long term strategic plan for water resources in the west of the UK – integrated with other plans to meet the needs of southeast England which is predicting significant shortfalls in water resources that can only be met through further local investments in water efficiency, aquifer recharge, new storage or desalination type assets and or through the safe and economic inter basin transfer of water. A communication strategy is needed to help the public to view water as a valuable resource. With the unit cost of water in Wales continuing to fall, so grey water recycling costs needs to significantly fall to make it more economic. We need to find ways of integrating water infrastructure such as our impressive impounding reservoirs into other branding efforts to create

win-win opportunities – e.g. tourism opportunities linked to water, recreation, sports, walking, our magnificent coastline, award winning beaches, fishing, canals, and rivers.

Waste and the Circular Economy

Towards Zero Waste, the waste strategy for Wales published in 2010, established targets for waste prevention and recycling to help meet the Assembly Governments one planet resource use goal. Importantly, it set Wales on a path towards a more circular economy that studies estimate will benefit the country by delivering economic savings of over £2 billion each year and create up to 30,000 new jobs. In addition, it will deliver other multiple benefits in respect of the goals set out in the Well-being of Future Generations (Wales) Act 2015.

Research, by the Ellen MacArthur Foundation (2013) has already identified that an opportunity exists to establish a circular economy model in Wales where recycled plastics are highly sought-after for the manufacture of products and packaging. The study found that this requires regional infrastructure for recycling and reprocessing plastic with the capability to produce high quality recycled materials for end users.

Research has identified that the circular economy offers the best opportunity to stimulate regional economies through decentralised waste infrastructure that would allow the segregation of waste streams to realise resources and value as close to the point of discard as possible.

To achieve these ambitions a range of infrastructure solutions need to be put in place to store, treat and use the materials collected for recycling. These will include innovative facilities to manage recyclates, especially as niche materials are targeted, such as Absorbent Hygiene Products, mattresses, carpets and plastic film. There will also be a requirement for facilities for take-back, remanufacturing and repair services following the introduction of new policies for Extended Producer Responsibility and Deposit Return Schemes.

It has been recognised that the interdependency of infrastructure will create the greatest opportunities. The co-location of innovative technologies and reprocessing infrastructure, such as the development of Eco Parks, provide major opportunities and can drive resource efficiency and achieve operational, economic and environmental benefits.

A key element of ensuring that the capacity, location and type of infrastructure required to transition to a circular economy will be the collection and analysis of waste data. Timely, detailed and accurate information about the quantity, composition and location of waste arisings would support industry to have more confidence to invest in and deploy reprocessing infrastructure to grow the Welsh recycling circle as far as they can.

There is no doubt that the Welsh Government can play an important role in delivering a circular economy by supporting the infrastructure required for reuse, repair and remanufacturing with recycling which can deliver economic, social, environmental and cultural benefits for the well-being of the people of Wales.

Sustaining our Urban and Rural Communities

Census data shows that Wales has a significantly higher percentage of population living in rural areas than England. However, the localised urban areas growing at a faster rate than in rural areas. With population density concentrated in the South East and North East of Wales there is a significant area denoted as rural. This population pattern links to many of the sections above; driving transport, digital and connectivity requirements.

For transport infrastructure, this means a focus on connecting successful places of work with areas that can supply workers to them; relieving existing congestion hotspots and promoting a dense network of economic interactions that can support "knowledge spill overs". To be successful in driving wider economic growth, transport that achieves these aims, rather than connecting struggling areas, should be prioritised.

Transport hubs both within cities and at key nodes would help enable active transport and open up opportunities to communities who might otherwise be marginalised.

There is good evidence that investment in broadband infrastructure, especially in urban areas and where knowledge intensive businesses predominate, can drive positive outcomes for business and productivity. It can also address issues of population migration and respond to the public's desire for different working patterns including home working and remote living.

Energy opportunities using distributed community energy generation linked to mixed use developments address the sustainability agenda and offer opportunities for low or carbon negative communities. Combining this approach with the latest building technologies could have a hugely positive impact on the carbon footprint of new developments and refurbishments.

However, infrastructure alone will not deliver inclusive growth and sustainable communities. It needs to be combined with wider political and regional efforts to deliver an inclusive approach to growth, raising productivity and skills, attracting businesses and supporting innovation and collaboration between business, universities and other innovators.

The Skills to Deliver 21st Century Infrastructure

In order to develop the skills required to deliver 21st Century infrastructure, we must develop a skills strategy for Wales, continue to invest in apprenticeship initiatives – at academic/professional levels as well as vocational – and we must continue to progress accredited engineering courses to meet industry demands.

Infrastructure partners must work with Governments, colleges, universities to not just meet the demand but be at the forefront of the skills demand for future needs. Ensuring that we have the right skills in place is a key part of addressing the current productivity lag, improving infrastructure delivery and yielding economic growth. Conversely, challenges such as the 'pausing' of the Wylfa Newydd project, the cancellation of the M4 Relief Road or any major project, will disrupt the demand for skills, apprenticeships and training across Wales which will exacerbate impacts on prosperity.

Moving Forward

In an "ideal world" we would have clarity and a common understanding of how we could live our lives in future – and the infrastructure we need to fulfil that vision. In the "real world" things are obviously not that simple. However, we have approached this report from the perspective of "the art of the possible" which is very much the approach promoted by the Office of the Future Generations Office. It is difficult to envisage what the future will look like but by considering potential technological advances in infrastructure we can offer scenarios for how our wellbeing as a nation could be supported and enhanced. This approach could also identify the opportunities to align and link up different infrastructure "sub-sectors" to maximise value whichever options are pursued e.g. linking up our digital infrastructure with improvements to our energy grid or transport network and the skills needed to deliver. We have highlighted some of the challenges ahead of us and the barriers to change and as a first

step we should map out where we are today, in terms of our infrastructure assets and our skills base, against where we'd like to be and then start developing the business cases to get us there.

We trust this brief report demonstrates both the broad range of infrastructure knowledge across the Alliance partners and our ability to provide focused expert advice. We look forward to supporting the National Infrastructure Commission for Wales as best we can in their consideration of Welsh infrastructure challenges and opportunities for the future.

Members of the Welsh Infrastructure Alliance (WIA):

Association of Consulting Engineers (ACE)

Association of Consultancy and Engineering (ACE) – Trade association for the UK's professional consultancies and engineering companies operating in the social and economic infrastructure sectors championing infrastructure to government and other stakeholders, representing the views of around 450 members. Our members employ over 60,000 in UK and 250,000 worldwide, contributing more than £15 billion to the UK economy.

Chartered Institution of Highways and Transportation (CIHT)

The Chartered Institution of Highways & Transportation (CIHT) is a charity, learned society and membership body with 12 UK nations / regions and a number of international groups. CIHT represents and qualifies professionals who plan, design, build, manage, maintain and operate transport and infrastructure. CIHT offer routes to qualifications including Chartered Engineer, Incorporated Engineer and Engineering Technician, the SoRSA Certificate of Competency and Transport Planning Professional.

CIHT is the leading voice of the highways and transportation infrastructure profession. We are the prime source of advice for national and local government and other strategic stakeholders when they are seeking technical expertise and knowledge to guide future policy and investment.

Chartered Institution of Water and Environmental Management (CIWEM)

CIWEM represents and supports a community of thousands of members and organisations in over 89 countries who are dedicated to improving water and environmental management for the benefit of the public.

Our aim is to work towards a safer, more sustainable world. Our mission is to build a global community of water and environmental professionals dedicated to working for the public benefit.

Chartered Institution of Wastes Management (CIWM)

CIWM is the leading institution for resources and waste management. CIWM Cymru Wales has 400 waste and resources management professionals in Wales meeting at technical and social events for development, debate and networking.

Civil Engineering Contractors Association (CECA) Wales

The Civil Engineering Contractors Association (CECA) Wales represents 60 of Wales' largest and smallest civil engineering contracting businesses with a cumulative annual turnover in excess of £1bn and employing over 6,000 people. These businesses play a huge part in supporting communities across Wales and make a significant contribution to the economic prosperity of our nation. Our members are also major providers of training and apprenticeship opportunities.

On a more fundamental level it is our members who will build the infrastructure that our nation needs to prosper.

Constructing Excellence in Wales (CEW)

Constructing Excellence in Wales is the united voice of Welsh construction, representing every part of the supply chain. We are an independent, self-funding membership body campaigning to highlight the industry's role in creating a built environment in Wales that's fit for the future.

Construction Industry Training Board (CITB)

CITB is dedicated to ensuring the construction workforce has the right skills for now and the future.

Institution of Civil Engineers (ICE)

Founded in 1818, the Institution of Civil Engineers (ICE) is a UK-based international organisation with over 92,000 members, ranging from students to professionally qualified civil engineers. As an educational and qualifying body, with charitable status under UK law, we support our members throughout their careers, and help society to have trust and confidence in infrastructure professionals. Under our Royal Charter, ICE has become recognised worldwide for its excellence as a centre of learning, a public voice for the profession and a leading source of expertise in infrastructure and engineering policy.

Institution of Structural Engineers (IStructE)

IStructE leads and supports the development of structural engineering worldwide in order to secure a safe and resilient built environment for all.