Institution of Civil Engineers

THE STATE OF THE NATION BRIEFING

WEST MIDLANDS

INFRASTRUCTURE 2014

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Changes in the climate and its impact on our weather systems have highlighted the fragility and interdependency of our infrastructure network. Our organisation and regulatory systems now need to adapt to ensure these impacts are understood, managed and funded across all sectors.

UK OVERVIEW

Infrastructure is vital to society – our quality of life depends on it functioning effectively and our reliance becomes painfully evident when infrastructure systems fail.

The UK's ability to compete in the global race and to generate and sustain economic growth with appropriate quality of life depends on infrastructure networks that provide predictable energy generation and distribution, water supply, waste management and the transportation of people and essential goods into and around the UK by rail, road, sea and air.

State of the Nation is ICE's flagship report on the current state of the UK's infrastructure. The 2014 State of the Nation Infrastructure report assesses the performance, capacity and condition of the UK's economic infrastructure networks, and determines the actions required in order to improve and enhance performance, and importantly, to ensure that our infrastructure is resilient when faced with the many challenges ahead – from climate change to population growth.

Since ICE West Midlands published its 2010 State of the Nation Briefing, there have been many positive developments across all sectors. Nevertheless, as infrastructure rises up the political agenda, a void in regional planning and funding resulting from the removal of the Regional Development Agency leaves a lack of an integrated and strategic leadership in some sectors and difficulties in gaining an overview of performance and challenges. The flooding of Winter 2013/14 demonstrates that, while individual bodies perform well, there is a lack of overall strategic planning in our interdependent infrastructure systems. Infrastructure management should be at the very centre of UK policy and this report aims to show how the coordination of this approach will provide better solutions for all users across the region and the country.

The resilience of our infrastructure is increasingly interdependent on the continued operation of its contributing systems. The West Midlands is a centre for innovation within the UK and now, more than ever, must ensure that it has the systems and infrastructure security in place to enable continued economic prosperity and innovation.

This report provides an overview of five infrastructure sectors and recommendations on what should be done to develop a more resilient and intelligent structure for infrastructure policy, strategy and decision-making in the West Midlands.

ENERGY

Energy infrastructure in the West Midlands will undergo significant changes in the coming years. The EU Large Combustion Plant Directive to limit emissions that effect air quality will mean the 1GW Ironbridge plant will close in 2015. Having installed desulphurisation equipment to ensure it complies with emissions limits, Rugeley on the River Trent will be the sole large plant in the region. However, abandonment of plans for a partial conversion from coal to biomass mean the long-term future of the plant is uncertain.

GRADE **C**

ENERGY

RECOMMENDATIONS

Ensure that secondary legislation to implement the Electricity Market Reform is enacted by the end of this Parliament to establish long-term investor confidence and entrench cross-party support for electricity decarbonisation.

Establish a clear decarbonisation target for 2030, in line with the recommendations of the Committee on Climate Change (CCC), alongside a robust, long-term carbon price signal clarity to underpin investment decisions.

Accelerate policy responses to demand-side measures to improve energy efficiency, manage demand and increase energy storage.

The West Midlands has some of the lowest levels of renewable energy capacity and generation in England[1]. Nevertheless, renewable electricity has increased in the region with installed capacity rising by a third from 201 MW to 307 MW between 2010 and 2012, inclusive[2]. In terms of electricity generation, this translates as an increase from 938 GWh to 1,007[3], around 4% of electricity consumed in the region[4], short of the West Midlands Regional Energy Strategy target of 5% by 2010[5] and to 10% by 2020.

1. DECC (2013) 'Energy Trends: September 2013' **2.** DECC (2011) 'Renewable electricity in Scotland, Wales, NI and the regions of England in 2010' and Decc (2013) 'Renewable electricity in Scotland, Wales, NI and the regions of England in 2012' **3.** Ibid **4.** DECC (2013) 'DUKES 2013 Chapter 5: Electricity' **5.** West Midlands Regional Assembly (2004) 'West Midlands Regional Energy Strategy' **6.** DECC (2014) 'RHI and Renewable Heat Premium Payments quarterly statistics, March 2014' **7.** The Renewable Heat Premium Payments Householder scheme ran from 2011 to March 2014. However, as only capacity data was collected it is not comparable to RHI data.

The Government launched the Renewable Heat Incentive (RHI) in 2011. Initally only open to businesses, the scheme was expanded to households this year. Since its introduction, across Britain, 706 MW capacity producing 909 GWh of renewable heat has been installed; 94% of which was from biomass boilers. Of this, the West Midlands accounts for around 12% or 110 GWh[6]. While noting that not all renewable heat generation receive accreditation under the RHI and that the current figures are for businesses only[7], it would appear actual heat generation from renewables has fallen short of targets[8].

Combined Heat and Power (CHP) can reduce carbon emissions by up to 30%[9]. Our 2010 Briefing highlighted assessments that the deployment of CHP could potentially treble across the region. Here, progress has been good with the number of CHP plants in the West Midlands increasing from 126 in 2010 to 163 in 2012 with heat output rising from 708 GWh to 762 GWh[10]. While most CHP plants operate in single, large buildings such as factories or office blocks, in the West Midlands there has been an increasing number of CHP district heating schemes. There are currently 40 operating in the area including Birmingham City Council's District Energy Scheme has current capacities of 60 MW of heat and 6.7 MW of electricity[11] over four city centre areas and potential to expand both in the city centre and to new clusters at Birmingham University and Birmingham Airport.

The low carbon generation mix of the future will need to balance conventional generating capacity with increasing amounts of renewable generation from a variety of sources. As the region's Universities are home to some of the country's leading centres of bioenergy and fuel cell research, the West Midlands is well placed to lead this. However, to harness the full potential, industry and academic collaboration needs to be encouraged.

WASTE AND RESOURCE MANAGEMENT

The focus on waste management has been on the reduction in municipal solid waste (MSW). The 33 West Midlands local authorities spend over £400m collecting and processing over 2.6 million tonnes of MSW each year[12]. In 2012/13 the region recycled or composted 42% of its MSW, the same as the English average. However, it landfilled 23% - well below the 34% national average. This was mainly due to increased energy from waste (EfW) recovery - 34% compared to the average of 22%[13].

MSW is only a small proportion of the total waste produced in the region. The commercial and industrial (C&I) sector is thought to produce around 30% (5.3m tonnes per annum), furthermore, construction and demolition waste accounts for around 55% (estimated at 9.8m tonnes in 2005)[14]. However, these are estimates - the available figures are outdated and often inaccurate.

Our 2010 ICE West Midlands Infrastructure Briefing highlighted a waste capacity study by Advantage West Midlands, which forecast that by 2020 the West Midlands would see a significant gap in waste infrastructure capacity[15]. We also noted a number of waste processing developments planned for the region and that securing the funding and PFI credits for procurement would be critical.

Funding has proved to be a problem with two of the major projects mentioned in the Briefing: Project Transform, and Hereford and Worcestershire Councils. Project Transform was a joint proposal by Solihull, Warwickshire and Coventry waste authorities to develop a new EfW facility in Coventry. It collapsed in 2010 when central government decided to withdraw its PFI credits, citing adequate national progress in meeting landfill diversion targets[16]. A second highlighted plan, Hereford Council and Worcestershire County Councils' 16 MW EfW plant in Kidderminster was announced in 2009. Here, some progress was made with planning consent granted in 2013 but has now been hit by delay due to funding renegotiations.

GRADE **C**

WASTE AND RESOURCE MANAGEMENT

RECOMMENDATIONS

An Office for Resource Management located in the Department for Business, Innovation and Skills (BIS) should be established to provide strategic leadership over resource management policy and embed the circular economy across government in England.

Improved waste data in the commercial and industrial sector is required to prevent further loss of investor confidence.

Despite these complications, over the past four years the West Midlands region has seen significant development of waste processing facilities and technology research. The region has currently over 2.1 million tpa of residual waste treatment capacity either operating or under construction[17]. For example, the third featured project in our 2010 Briefing - Staffordshire County Council's 23MW EfW plant at the Four Ashes Industrial Estate in Wolverhampton - began operations in November 2013. This follows Biffa's opening the UK's largest anaerobic digestion plant with a capacity of 6MW at Cannock in 2010.

Further significant facilities are planned. For example, Birmingham City Council has designated the area around the existing Tyseley Energy Recovery Facility as an Environmental Enterprise District. This will include a recovered wood gasification plant that will divert 67,000 million tpa from landfill and produce 10MW of electricity.

In contradiction of predictions, the region now has an over-capacity of EfW plants[18]. Whether this means the region is importing waste or facilities are running at under-capacity is not clear due to a lack of data around C&I waste arisings. Either way, it is clear EfW development presents a major economic opportunity for the West Midlands.

To realise this opportunity there is a need to adopt a regional approach. From 2009 to 2012 the West Midlands Waste Alliance (WMWA) pulled together senior waste management officers in the region to examine more efficient ways of working. It identified local authorities partnerships as essential[19]. The WMWA programme has now ceased, but the need for collaborative working remains - to further increase the amount of waste recycled and composted and to build the area into an EfW centre of excellence.

8. The 2004 West Midlands Regional Energy Strategy set a target for heat from renewable sources as 250 GWh by 2010 and 650 GWh by 2020. **9.** DECC (2013) 'Guidance: Combined Heat and Power' **10.** DECC (2013) 'Combined Heat and Power in Scotland, Wales, NI and the regions of England 2012' **11.** DECC (2013) 'Summary evidence on District Heating Networks in the UK' and Cofley-GDF Suez (2014) 'Birmingham City Council' **12.** IEWM (2013) 'Delivering Waste Efficiencies in the West Midlands' **13.** Defra (2013) 'Local Authority Collected Waste Statistics - November 2012'

WATER

ICE West Midlands has increased our rating of the regional water supply network over the past four years due to the reduction in leakage and overall improvement in network flexibility and resilience. The water networks have withstood most of the increased pressure on them caused by higher rainfall, with only a few reported incidents of flooding and sewer overflowing during the period.

The next generation of water management contracts will see a shift to focus on asset renewal and maintenance, carbon reduction as well as long-term security enhancement: projects such as the Elan Valley aqueduct refurbishment, which has required the installation of network flexibility across the region prior to it going ahead. It is unclear how the changes to the abstraction licences may affect the amount of water available to water companies and other abstractors. There is a need to address water scarcity issues from both the supply and demand side. Metering and the construction of more storage will be important as part of this mix of solutions.

Severn Trent is working to produce energy from its waste and land, including an anaerobic digestion plant in Coleshill, wind turbines in Lichfield and a biomethane upgrade plant at Minworth, Birmingham. The water company has successfully reduced its energy needs by 25%[20] and is seeking further ways to reduce carbon emissions through smarter treatment of effluent. More investment in plant efficiency and hydro generation at reservoirs will lead to increases in this over the next five years[21].

GRADE **B**

WATER

RECOMMENDATIONS

In order to address the changing climate and population growth, we need – through an integrated national strategy – to manage all uses of water and achieve the following outcomes over the next 30-40 years:

- Reduced demand for public drinking water.
- Reduced flows into urban sewerage networks.
- Increased security of public, agricultural, industrial and environmental water resources.

Total Expenditure (TOTEX) approaches and the use of soft engineering, such as catchment management, should be fully incentivised through the regulatory system.

FLOOD RISK MANAGEMENT

In 2012, severe weather resulted in homes flooding and a closure of Birmingham Airport, together with severe disruption to the West Coast Main Line. In the floods of winter 2013, rainfall was 145%[22] greater than seasonal average and at its very highest levels in many areas, including Worcester. Rising groundwater levels may also pose a serious threat as they increase surface water flooding and spread pollutants into inland water resources.

Catchment management planning has been widely discussed and is being rolled out in some parts of the country, but the events of this winter have highlighted the need for coordinated decision-making and planning. Lack of overall leadership is hampering progress in identifying and delivering efficient and sustainable infrastructure.

The resilience of business and domestic property to flooding is still a concern. There are particular areas prone to repeated flooding, and developers, owners and those involved in flood risk management must work together to improve resilience and post-flood reinstatement of properties. Adequate, identified resources are required, but further cuts to local authority and Environment Agency budgets will affect the delivery of these essential works.

Flood risk management must tackle all forms of flooding in an integrated way and should fully exploit the amenity potential of water, waterways and wetlands in both urban and rural environments. This combines flood defences with a holistic management of fluvial and surface water flood risk, and upstream catchment measures to improve building and infrastructure resilience to floods. For example, if inundation is to be prevented annual maintenance of gullies, ditches and waterways needs to be included as part of an asset management regime. In addition, the importance of providing Sustainable Urban Drainage Systems (SUDS) in new and altered drainage networks must be recognised and supported by planners and developers alike: we must allow space for water.

GRADE **C**

FLOOD RISK MANAGEMENT

RECOMMENDATIONS

A whole systems approach to flood management, including upstream catchment measures, flood defences and increased infrastructure and buildings flood resilience, should be part of governments' flooding strategy and implemented by practitioners.

The government's Cost Benefit Analysis methodology for deciding where to target flood management investment should be reviewed in light of the 2013/14 experience and should be modified to include infrastructure components.

Government should commit to a long term capital and maintenance programme for Flood Management beyond the current 5 year timeframe. This programme should arrest the decline in maintenance funding.

14. West Midlands Resource Technical Advisory Body (2013) 'Waste Planning and Management Trends in the West Midlands 2011/12' **15.** Advantage West Midlands (2008) 'Waste –A Future Resource for Businesses: Developing the evidence base for a targeted market intervention strategy for the West Midlands' **16.** Defra (2010) 'Changes to PFI Programme' **17.** Eunomia (2013) 'Residual Waste Infrastructure Review High-level Analysis - Issue 5' **18.** Imperial College (2014) 'Waste Infrastructure Requirements for England' **19.** IEWM (2013) 'Delivering Waste Efficiencies in the West Midlands' **20.** Severn Trent (2013) 'Changing Course' **21.** Severn Trent (2013) 'Delivering the future of water'

TRANSPORT

ROADS

Our 2013 review of Transport Infrastructure in the West Midlands identified many areas requiring investment or review. We are pleased to see so many recommendations subsequently adopted by Government, but there are still areas for improvement.

While the Strategic Road Network has received investment, the state of our minor roads is in increasing need of serious attention. The cuts in local authority spending over the past four years has led to a reduction in maintenance budgets which will lead to an increased need to reconstruct rather than resurface in the future.

There will be benefits in local authorities working together and sharing asset management projects to maximise the benefit of maintenance contracts[23] and the formation of Integrated Transport Authorities within areas of shared economic benefit should be encouraged.

RAIL

Birmingham has the highest number of passengers travelling outside London, with 36,000 passengers on trains arriving into the city centre in the morning peak and 40,000 in the afternoon peak[24]. However, the strong growth in rail passenger numbers has made capacity a prime issue. For example in autumn 2011, four of the 10 most overcrowded trains in England either terminated in or passed through Birmingham[25].

The completion of Birmingham New Street station improvements will be realised in 2015 allowing greater passenger capacity within the station, but continued investment in capacity increase across our network is required.

ICE supports the development of a new high speed rail network from London-Scotland as the best option for increasing rail capacity and reducing journey times. We further support David Higgins' recent recommendations that the project timescales can be accelerated. The benefits will be far reaching – not least the cost savings which could result from greater continuity between the two project phases and the positive impact on the UK's engineering skills base.

Government's efforts to make the case for HS2 must continue and importantly, it should position the project as an integral part of a national transport and economic strategies rather than a project developed in isolation. This includes further work to help strengthen connectivity for those locations not directly served by HS2.

AVIATION

Birmingham Airport will complete its runway extension during 2014. This will allow it to open up to more long haul carriers and increase potential passenger throughput to 27 million passengers[26]. Further expansion or capacity is heavily reliant on the delivery of High Speed 2 and will also require improved transport integration across the networks.

Quality international connectivity is vital to the UK's economic wellbeing. Our national hub airport, Heathrow, operates at almost full capacity. This limits the scope for improving connections to new markets and for UK regional connecting flights, exacerbating delays and limiting resilience to shocks such as severe weather.

The Davies Commission is charged with recommending the optimum aviation capacity solution and Government should act decisively following the Commission's report in 2015.

CYCLING AND WALKING

The potential for cycling and walking to reduce our traffic congestion and carbon emissions is recognised but still largely untapped[27].The recent award of £26m to improve the cycling network in Birmingham with the City Council's Cycling Infrastructure project including greater use of resurfaced canal towpaths should encourage a greater number of users.

Image courtesy of Centro

View the full report online at ice.org.uk/stateofthenation

GRADE **C**

TRANSPORT

RECOMMENDATIONS

Government should deliver the legislation to re-create the Highways Agency as a Government-owned company with a strategy and funding set in statute within the current Parliament.

ICE calls for further investment in improving rail capacity and resilience, particularly by:

- Continuing electrification and re-signalling
- Improved asset management of structures and earthworks
- Greater use of the network for freight, including through more effective support for strategic interchange hubs

ICE recommends the extension of the proposed new High Speed rail network on from the North-West to Scotland as the best option for increasing rail capacity and supports the acceleration and extension of Phase 1.

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22. Environment Agency (2014) 'West Midlands Flood Summary' **23.** See: Coventry City Council, Solihull Metropolitan Borough Council & Warwickshire County Council Procurement Strategy 2010-15' **24.** DfT (2012) 'Rail passenger numbers and crowding on weekdays in major cities in England and Wales: 2011' **25.** DfT (2012) 'England and Wales 'top ten' overcrowded train services: autumn 2011' **26.** Birmingham Airport (2013) Airports Commission: Proposals for providing additional airport capacity in the longer term' **27.** West Midlands Local Transport Plan (2006) 'West Midlands Local Transport Plan'