THE STATE OF THE NATION BRIEFING

WALES CYMRU

INFRASTRUCTURE 2014

THE STATE OF THE NATION INFRASTRUCTURE 2014

Infrastructure in Wales requires continued attention to ensure that it is fit for purpose and contributes to the economic growth, social well-being and environmental vibrancy of Wales and the UK.

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.

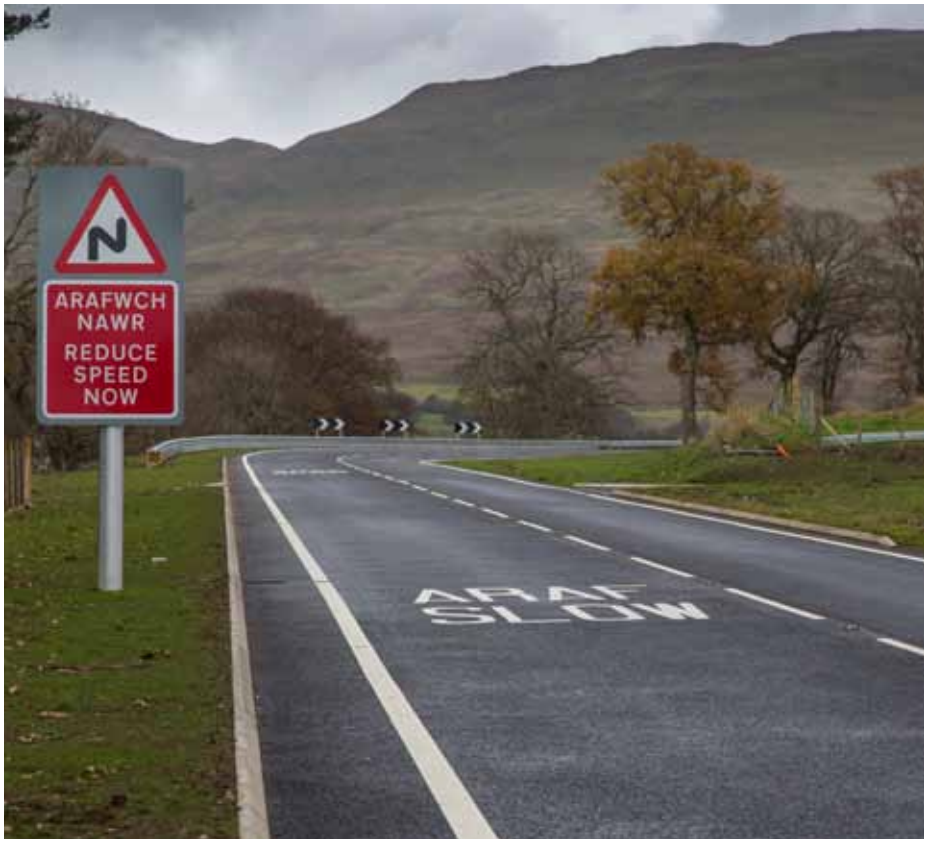
The UK's ability to compete in the global race and to generate and sustain economic growth with appropriate quality of life depends on infrastructure networks that provide predictable energy generation and distribution, water supply, waste management and the transportation of people and essential goods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

The overall responsibilities for the sectors assessed in this report vary in degrees of devolution. In most cases the sectors require coordination across a range of bodies, including the public and private sector. It is important the interdependencies of infrastructure and the communication among those responsible for its maintenance and operation are clear and coherent.

Resilience of all infrastructure sectors is key to the delivery, maintenance and operation of infrastructure networks. Impacts of climate change and demand pressures from population growth will add to the pressures already exerted on these networks. These challenges should be faced head on.

The Institution of Civil Engineers Wales Cymru is keen to work with governments, local government and the private sector to ensure that timely action is taken now.



TRANSPORT

INTRODUCTION

Clear strategic leadership is required for transport infrastructure and services. However, the Welsh transport strategy is outdated and control of most of the network by twenty-two local authorities militates against integration.

The focus on investment to aid economic growth in city regions and Enterprise Zones provides some useful direction. However, further development of governance structures is required before this approach can be properly implemented.

The continued evolution of the Wales Infrastructure Investment Plan should assist in updating Wales transport strategy and plan, and in developing the forward plans around skills and capacity for delivery.

Future capital and revenue streams for transport, particularly road infrastructure and for buses, appear likely to be inadequate to maintain and improve the network. Maintenance issues exacerbated by severe weather will require continuing focus.

ROADS

The Welsh highway network continues to merit ongoing investment to support economic growth. While the condition of local roads has benefited in recent years there are ongoing issues and a backlog of maintenance work, worsened by the very poor weather conditions over the winter of 2013/14.

In south Wales, the major problem remains with the M4 around Newport, as it is the primary road entry for the south Wales economy. In north Wales, the lack of diversionary routes means A55 is also vulnerable. The failure to deal with the impacts of increased rainfall has affected the resilience of many of Wales' roads - particularly the local network in rural areas - and some parts of the rail network.

Local authority and Welsh Government revenue budget cuts are affecting asset management strategies with a drive to ensure that a low maintenance approach is integral to new infrastructure, whilst impacts on existing transport infrastructure will become more evident.

RAIL

Wales' rail network is limited by low line speeds as a result of outdated signalling. Capacity has been increased by double-tracking on the South Wales mainline and passing loops on the Aberstwyth line but the Marches line remains restricted.

Reading station's upgrade and the electrification of the Great Western route from London to Swansea is critical. However, difficulties around the electrification of the Valleys lines must be resolved to ensure delivery of effective rail connectivity. Capital costs must be controlled and responsibility for them resolved. Rolling stock also needs to be secured shortly to allow an adequate service.

ACTIVE TRAVEL

The Active Travel (Wales) Act 2013 should make it easier for people to adopt healthier transport modes in their day to day activities. Wales is the first country in the UK to enable such pioneering legislation, which requires local authorities to assess, plan and deliver improved walking and cycling infrastructure.

GRADE **C**

TRANSPORT

RECOMMENDATIONS

The Welsh Government should update its transport strategy in the context of the Wales Infrastructure Investment Plan for Growth and Jobs

Effective and timely resolutions by the Welsh and UK governments to the challenges and problems of congestion on the M4 around Newport are required

Further cost effective rail electrification should be implemented throughout Wales to bring economic benefits and lay the foundations for an integrated transport system

CASE STUDY

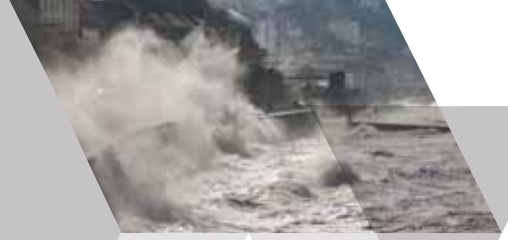
M4 CORRIDOR AROUND NEWPORT (I.E. M4 RELIEF ROAD / NEW M4 PROJECT)

The M4 is the main transport artery for south Wales and beyond. However, it has serious capacity and resilience problems around Newport -journey times are unreliable and congestion occurs, particularly at peak times. Major disruption to the highway network results, with implications felt across the region and problems are likely to worsen in the future.

ICE Wales Cymru has called for improvements for many years[1] and consider that a new motorway link is essential. The Welsh Government has recently consulted on proposals for a new motorway south of Newport, with complementary measures including reclassification of the existing M4 as a non-motorway trunk road and cycling and walking friendly infrastructure.

This would provide a long term, sustainable solution, enabling economic growth and benefits across much of Wales. The combination of an enhanced M4 with the Cardiff City Region Metro will deliver the holistic transport network that Wales needs and deserves.

1. Institution of Civil Engineers Wales Cymru (2013) State of the Nation: Transport Briefing, p1; Institution of Civil Engineers Wales Cymru (2013) State of the Nation: Infrastructure 2010 Briefing, p3; Institution of Civil Engineers Wales Cymru (2013) State of the Nation: Defending Critical Infrastructure Briefing, p1



FLOOD MANAGEMENT

INTRODUCTION

Wales' flood and coastal risk management infrastructure is in good condition overall and significant investment has been made over the last few years, but there is concern about long term funding and maintenance requirements. The predicted impacts of climate change and an increasing asset base mean that continued and increased investment will be needed to minimise the impacts of flooding. Improvements to long term asset management are required, and more can be done in working with the natural environment.

STRATEGIC LEADERSHIP

The EU Floods Directive, the Flood and Water Management Act (2010) and Pitt Review have all driven collaboration among Flood Risk Management authorities. Dŵr Cymru Welsh Water, Natural Resources Wales and the Lead Local Flooding Authorities are seeking synergies in their work to improve collaboration, efficiency and effectiveness. Legislation and government reviews have increased the awareness of surface water flooding.

Catchment management could be used more effectively for Flood Risk Management. Lead Local Flooding Authorities and Dŵr Cymru Welsh Water should coordinate their efforts through their flood risk plans and the AMP period to optimise flood management opportunities. These could be aligned to identify similar issues, drive joint solutions and improve effectiveness.

RESILIENCE

Since 2010 communities have a better understanding of Flood Risk Management resilience and how they can contribute to it due to the Lead Local Flood Authority plans. There remains an issue regarding reinstatement of flooded properties to a pre-flood state. Properties should be made more resilient in a post-flood event and insurance companies should provide incentives for households and business to undertake such work.

Legislation has helped to identify interdependencies with other sectors. The water sector has a better understanding of its assets at risk from flooding. Roads have also improved; however, there are still drainage asset issues. Local resilience forums and the partner organisations have made good progress with the coordination of resilience, response and preparedness for flooding; however concerns exist regarding the capacity and resources across all organisations to address widespread or prolonged flooding across Wales.

ECONOMIC AND SOCIAL

The wider economic benefits of Flood Risk Management are not always effectively communicated or understood. Investment in flood projects returns an average benefit to cost ratio of 8:1. This generous return on investment should be highlighted and disseminated to attract private investors. There will be a new round of EU funds available soon and in order to win this funding Flood Risk Management projects will have to illustrate the wider social, economic and environmental benefits.

GRADE **B**

FLOOD MANAGEMENT

RECOMMENDATIONS

Ongoing funding of and planning for maintenance is required, particularly in the medium to long term

'Soft engineering' opportunities for managing water in different ways to reduce flooding problems, such as Water Sensitive Urban Design or upland management, need to be utilised to complement the hard engineering projects

Welsh government and Natural Resources Wales should put resilience at the centre of the flood management policy

CASE STUDY

THE LOWER SWANSEA VALLEY FLOOD SCHEME

The £7 million flood scheme in Swansea uses a range of measures to increase the river's capacity and reduce flood risk. 284 businesses and 16 homes are at risk of flooding from the River Tawe in the Lower Swansea Valley, an important area for Swansea's economy, and was last flooded in 1998. The consequence of a flood could be very serious, with high river levels and fast flowing water travelling across 2km from the river. To tackle this, flood banks along 4km of the river were raised at low spots and three low bridges that had risked restricting flood flows were removed. A new bridge was installed above the level of flood flows for cyclists and pedestrians. Upstream there is now more space for water to flow after the old flood banks were removed and new banks constructed away from the river channel. This has also created 6 hectares of wetland wildlife habitat and community space. Other community amenity improvements include the upgrade of approximately 3km of cycle path, forming part of the national cycle network.

The project also improved flood warning, community flood awareness and piloted a multi-agency flood plan. This scheme has already proved its worth, successfully preventing flooding in October last year. The project is supported by European Regional Development Fund and Welsh Government.

WATER

INTRODUCTION

The Welsh Government is developing a water strategy with consultation processes underway. These will consider how water resources are managed to support communities and drive green growth. The aim is for a water resource that is resilient, sustainable and managed in a way that optimises the benefits for Wales. In addition the Welsh Government is developing a draft Environment Bill. The main challenges to protecting the aquatic environment in Wales relates to legacy mining issues and diffuse pollution from agriculture.

The current administrative boundaries do not reflect the area resource management plans. Single Integrated Plans could make better use of resources; however, the administrative boundary issue will have to be addressed. The current structure does not allow for the most appropriate body to deliver the services required. The Williams Review[2] has sought to address this.

The relationship between the natural and built environments is important to the resilience and future proofing of the sector. Catchment management is an important part of the overall hydrological cycle and best practice in catchment management can provide benefits across the built environment. It also reduces the level of pollutant treatment that water companies need to undertake and can be used to manage flood risk management. It also helps to manage diffuse pollution from rural and urban sources.

The ecological status of some water courses are failing against EU Directives both in terms of quality and quantity.

There are some strategic issues that require attention. Parts of Wales, e.g. Pembrokeshire, are considered water deficit zones. Leakage and ageing infrastructure in these areas exacerbates this deficit. In order to manage and improve these issues it would be useful to understand the various demands on water resources, so that users can be incentivised to use water more effectively.

ECONOMIC AND SOCIAL

The Welsh Government recognises the link between good water supplies and economic growth. Currently, Wales has plentiful rainfall and can position itself to attract business but must also consider water security and possible periodic scarcity. Maintaining the quality of Wales' water sources is important, particularly for tourism. Continued economic growth and population increase requires water companies and consumers to consider their use of water, reducing consumption and carbon. Demand management practices, such as metering, should be extensively implemented to drive behaviour change and increase understanding of the importance of water use.

RESILIENCE

There is good resilience in the drinking water network across Wales although both the natural and build environment need future proofing. Some areas of Wales will be more impacted than others by climate change e.g. Pembrokeshire. Ongoing leakage and ageing infrastructure issues must continue to be addressed.

There is a significant challenge in establishing which organisation and/or individual owns and has responsibility for underground assets. This has become particularly challenging during the period of funding cuts as organisations have to make difficult strategic choices.

The continuing establishment and updating of asset registers and records is important if we are to continue to understand where underground assets and structure exist and the number of them. There has been an improvement in the knowledge of underground assets since the Flood and Water Management Act 2010 was enacted.

GRADE **B**

WATER

RECOMMENDATIONS

The Welsh government should progress its water strategy to promote the economic, social and environmental benefits of water resource management

Greater partnerships are required including all sectors, agencies and other groups such as land owners to deal with diffuse pollution to improve the aquatic environment

Devolved governments and regulators should introduce metering, complemented by social and discretionary tariffs, throughout the UK. This will enable water and sewerage companies to monitor leakage more accurately, and more effectively incentivise water conservation, without adversely impacting low income households

The use of geospatial technology to map and capture these underground assets could be effective. This will provide a much clearer understanding of where and how many underground assets exist and which of these assets are vulnerable. Mapping is undertaken as part of the development process.

Placing the time capsule in Coed Dolwyd Service Reservoir foundations

2. http://wales.gov.uk/newsroom/improvingpublicservices/2013/130614-commission/?lang=en

CASE STUDY

COED DOLWYD SERVICE RESERVOIR

Welsh Water has invested £9million constructing a brand new above ground storage reservoir at Coed Dolwyd in north Wales. The brand new facility, recently completed in 2014, will store enough clean water to fill nine Olympic size swimming pools, will provide 70,000 customers living in the Colwyn Bay and Llandudno area with additional security of supply. This is the first site of its kind that has been built in north Wales since 1995 and it will be particularly important during the busy tourist periods when additional pressures are placed on the drinking water network and in the face of any future population growth in the area. Work on this large scale engineering scheme began in October 2012 and was recently commissioned.

CASE STUDY

RainScape GlawLif

GREENER GRANGETOWN

Before

After

Greener Grangetown is an exciting collaboration between Dŵr Cymru Welsh Water, Cardiff City Council and Natural Resources Wales that will retrofit a variety of surface water management techniques. This is aimed at reducing the amount of surface water entering the combined sewer system in the Grangetown area whilst also enhancing local amenities, improving the perception of the area and increasing network resilience to climate change for the local area. Greener Grangetown provides an ideal opportunity to test the application of the ecosystems approach to a large scale environmental project that is being delivered in an urban environment in order to maximise the benefits delivered to the environment, local economy and wider community. This project will provide the exemplar scheme for other projects in Wales and the UK.

ENERGY

INTRODUCTION

The Silk Commission[3] has recommended to the UK Government that there should be devolution of planning powers to approve energy projects of up to 350 megawatts. This would give Wales greater flexibility over its generation mix and could enable it to take greater advantage of its renewables potential, as has been the case in Scotland.

EMR is important in supporting a diverse energy mix and secondary legislation to enact it should be completed in the current Westminster Parliament.

RESILIENCE

The UK has a mature and reliable electricity network[4] with sufficient generation capacity (77.9GW) to meet expected peak demand (58GW).[5] In the near-term, these margins are expected to tighten as existing generation assets are retired and ongoing political uncertainties delay investment in new generation capacity, risking the security and reliability of our supplies. Two new gas stations have opened since 2010, but market uncertainties have delayed further investment across the UK in new gas plant. Wales is also expected to benefit from investment in a new nuclear facility at Anglesey when the existing reactor is closed in 2015. Alongside the Hitachi investment at Oldbury this should provide opportunities for enhanced engineering skills and economic benefits.
Wales has good capacity to increase output from wind farms both on and off-shore, with other sources being developed e.g. tidal stream energy generation and the proposed tidal–range projects. The West Coast interconnector, which is due to be operational by 2016, will enhance power flows between Scotland, Wales and England. National Grid is also seeking to improve the interconnections with new offshore energy sources through a coordinated design approach.[6]

ENERGY EFFICIENCY

Major savings in energy consumption and carbon emissions can be achieved through better insulated buildings, the uptake of smart technologies and changes in the way that we consume energy. Reducing our energy consumption can also help cushion the impact of rising energy costs and address concerns associated with fuel poverty, while reducing carbon emissions.

Existing government-backed schemes, such as the Energy Company Obligation and Green Deal, are currently failing to promote demand management sufficiently. A more determined approach is required to attract uptake of the Green Deal by consumers and achieve the transformation of energy efficiency in the built environment.

GRADE **C**

ENERGY

RECOMMENDATIONS

Government needs a more determined approach through policies, behaviours and technologies that actively drive energy demand management. It should look to bolster the attractiveness and pace of existing schemes such as the Green Deal and smart metering

Parliament should enact the secondary legislation to implement Electricity Market Reform (EMR) by the end of this Parliament, establishing long-term investor confidence and entrenching cross-party support for electricity decarbonisation

The Office of Gas and Electricity Markets (Ofgem) should have its remit for resilience strengthened to factor in future demands on energy capacity from other infrastructure sectors and to improve resilience against interruptions caused by extreme weather events

CASE STUDY

LV NETWORK TEMPLATES (WESTERN POWER DISTRIBUTION)

The largest Low Voltage (LV) monitoring project in the UK; funded through the Ofgem Low Carbon Network Fund (LCNF).

Llywodraeth Cymru
Welsh Government

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales
Gwasanaethu Canolbarth a De Orllewin Lloegr a Chymru

This project has successfully monitored over 800 distribution transformers and 3600 voltage points on associated LV cable ends throughout South Wales, in order to gain better visibility of the LV Network and how it is affected by the introduction of new low carbon technologies.

Using the monitored data in conjunction with The Welsh Government's ARBED data, The University of Bath have been able to analyse the Electricity Network in detail with the following findings:

- 10 distinct individual templates have been created to clearly illustrate network behaviour
- Voltage analysis has shown that there is scope to reduce voltage levels in South Wales (and potentially the UK). Resulting in energy, cost and carbon savings for customers

PV installation analysis has identified approximately 20% additional headroom available for domestic Solar PV installations.

The project was completed on 31st October 2013 and WPD are now actively implementing the findings for the benefit of all their affected customers. This was considered to be an example of good practice.

3. http://commissionondevolutioninwales.independent.gov.uk/debate/energy-a-case-for-change-or-not/ **4.** In 2012/13, National Grid recorded system availability of 99.99999% **5.** Royal Academy of Engineering (2013) GB electricity capacity margin **6.** http://investors.nationalgrid.com/~/media/Files/N/National-Grid-IR/factsheets/interconnectors130214-v12.pdf

WASTE

INTRODUCTION

In 2010, the Welsh government provided a strong strategic lead with Towards Zero Waste[7], a framework setting out resource efficiency and waste management principles, outcomes and targets, explicitly promoting the closed loop recycling essential in moving to a circular economy. The aim - zero waste by 2050 - is to be achieved by ambitious (but statutory) targets of recycling or composting 58% of municipal solid waste (MSW) by 2015/16 and 70% by 2024/25. Good progress is being made: in the UK, Wales is leading the way recycling 52% of MSW compared to 42% in England[8].

In a move the Welsh government said would save it £158 million over a decade, Natural Resources Wales (NRW) was created in 2013 by merging three agencies. These included Environment Agency Wales, which had responsibilities around waste regulation[9]. Under the upcoming Environment Bill, NRW would be granted more powers – specifically over extending segregation and collection, and enforcing bans on materials such as wood and textiles from landfill and energy from waste (EfW)[10].

CONDITION AND CAPACITY

Despite, Wales' progressive waste policies, it still has a high landfill rate - 41% compared to 34% in England[11]. It is estimated the remaining landfill sites have a maximum of 10 years life[12] and. as the Zero Waste regulations mean new landfill sites are very unlikely, Wales will need to increase its EfW capacity.

At present, little Welsh waste is processed through EfW - only 5% in 2012/13 compared to 22% in England[13]. At present, there are no large-scale EfW facilities in Wales however two are planned.

Virador's Trident Park EfW plant, located at Splott, Cardiff is part of Prosiect Gwyrdd a sub-regional partnership comprising Cardiff Council and neighbouring authorities. The plans are for a combined heat and power incinerator, capable of processing 350,000 tpa of waste. It would have an electricity generation capacity of 30 MW and provide heat for up to 50,000 homes via district heating[14]. However, the proposals have not been without opposition – it first received planning consent in 2010 but in March this year was subject to a (failed) judicial review.

GRADE **B**

WASTE

RECOMMENDATIONS

A move from waste to resource management and a circular economy should be at the centre of government policy across the UK

The Welsh government must continue its strong clear strategic leadership, and be supported by Natural Resources Wales working with other bodies, to maintain ongoing improvements in the waste sector

The Welsh government should focus on creating a policy, regulatory and commercial environment that encourages private investment in infrastructure. At the centre of this should be improved waste data in the commercial and industrial (C&I) sector

The second proposal, the North Wales Residual Waste Treatment Project, is a five local authority partnership that intends to submit a planning application for an EfW plant near Connah's Quay this year. While plans are yet to be finalised, it is expected the facility would process up to 200,000 tpa[15].

RESILIENCE

If both proposed EfW facilities operate at capacity, they will account for around a third of the MSW currently produced in Wales and, as such, should adequately counterbalance the planned closure of landfill sites.

Both plants will be operated commercially on 25 year contracts, which would take their period of operation beyond 2025, the target date for recycling/composting 70% of MSW.

Whether increased recycling and EfW would result in over-capacity, is unclear due to the current paucity of data around C&I waste. While the Welsh government should be commended for commissioning its first C&I review since 2007[16] (carried out in 2012 but, to date, not published), as it is based on voluntary survey of sites, it is likely to be less accurate and up-to-date than the annual reporting of MSW.

CASE STUDY

CB ENVIRONMENTAL, ABERYSTWYTH

The scheme enables waste management companies to demonstrate to potential customers that they comply with PAS : 402 2013. This publicly available BSI specification requires the company to produce an 8 section annual report which includes, inter alia, recovery rates for material streams. Under the Green Compass scheme this report is independently inspected each year by a UKAS Accredited inspection body, with the purpose of giving customers greater confidence in the recovery rates of their waste. CB Environmental of Aberystwyth is typical of the 38 waste management companies that have been successfully inspected to date.

7. Welsh Assembly Government (2010) 'Towards Zero Waste' **8.** StatsWales (2014) 'Local authority municipal waste management, 2012-13' and Defra (2013) 'Management of Local Authority Collected Waste 2000/01 to 2012/13' **9.** BBC Wales (2011) 'One environment body will save £158m - Welsh government' **10.** WAG (2014) 'Environment Bill – White Paper' **11.** Natural Resources Wales (2012) 'Wales Waste Information 2012' **12.** Ibid **13.** Statistics for Wales (2014) 'Local authority municipal waste management report for Wales, 2012-13' and Defra (2013) 'Management of Local Authority Collected Waste 2000/01 to 2012/13'

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KEY TO WALES GRADES

A	FIT FOR THE FUTURE
B	ADEQUATE FOR NOW
C	REQUIRES ATTENTION
D	AT RISK
E	UNFIT FOR PURPOSE

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14. Virador (2013) 'Cardiff EfW' and BBC (2014) 'Cardiff incinerator could heat 20,000 homes via pipeline'
15. BBC (2014) 'Public's views sought on Deeside waste incinerator' and NWRWTP (2013) 'North Wales Residual Waste Treatment Project'
16. NRW (2013) 'Response to the Waste Prevention Programme Consultation'