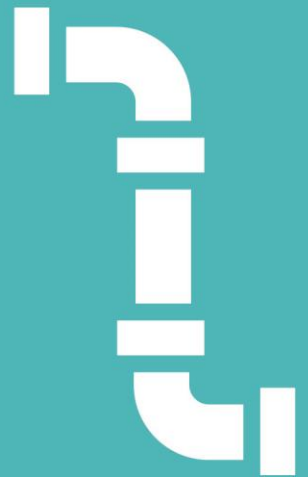




Appendix 13E: Local Area Energy Plans



Legal Notice

This paper forms part of Wales & West Utilities Limited Regulatory Business Plan. Your attention is specifically drawn to the legal notice relating to the whole of the Business Plan, set out on the inside cover of The WWU Business Plan. This is applicable in full to this paper, as though set out in full here.

1 Introduction

This appendix supports Chapter 13 of our business plan, which sets out our net zero ready vision for 2035. As Appendix 13A outlined, since 2015 we have been undertaking a programme of engagement, research and analysis to drive forward our understanding of the future of energy debate and to identify low-cost, sustainable and reliable decarbonisation solutions.

We have been at the forefront of the drive to develop Local Area Energy Plans (LAEPs) as we believe that these plans will help local communities to design and implement the decarbonisation solutions that will work best in their areas.

We have a long history of collaborating with national and local stakeholders as they consider decarbonising energy in a local way. Our proactive approach began in 2014, with projects in Bridgend in South Wales and in the County of Cornwall. Since then we have actively supported ten wide-ranging initiatives, up to and including our most recent collaboration with National Grid to speed up progress of the decarbonisation of South Wales (Zero2050).

Through this engagement we have heard the views of local stakeholders and advocates of all forms of renewable and low carbon energy. These engagements over five years have heavily informed our own vision and have been key in our decision to develop our modelling capability. This in turn has helped us find solutions and adopt whole systems thinking at an early stage. This paper sets out our journey to date in the development of LAEPs and explains our proposals for the future.

2 Initial position

Our initial engagement, starting in 2014, was directed towards two local plans, Bridgend in South Wales and the County of Cornwall.

3 Bridgend

Bridgend was one of three successful national pilot studies. Over a three-year period, we participated as part of the pilot steering group and provided significant resource and support to Bridgend Council, the Welsh Government and the Energy Systems Catapult. This pilot has led to continued engagement with many of the pilot study steering group members including the Council itself, local academia and the Energy Systems Catapult.

The initial plans for Bridgend were closely aligned to the twin track policy of the then Department of Energy and Climate Change (DECC) using heat networks to decarbonise heat in the centre of the town and air source heat pumps in the suburbs.



Our initial interest related to the future investment requirements of the gas network and the value to consumers of continuing the iron mains replacement programme. We commissioned research to understand the likelihood of this decarbonisation strategy. At the same time, DECC commissioned a report into the benefits of halting gas investment in Bridgend, the Manchester area and Newcastle.

Our research focused on the technical details of the proposed solutions (based on the government subsidies and policy of the day) and consumers' willingness or ability to pay. It revealed some surprising results:

- Heat pumps (in 2015) increased carbon emissions from heating due to the marginal carbon emissions of electricity generation (coal/gas in the heating season).
- Heat pumps did not save gas consumers any money, in fact in most cases they did not pay back the investment.
- The heat networks proposed for Bridgend reduced carbon by 30%, but increased gas demand on the local network (due to the proposed CHP units).
- 80% of consumers were unable or unwilling to pay.

The DECC¹ commissioned research concluded that:

- There is clearly a role for heat networks in a UK heat delivery market.
- There will be interaction between heat networks and gas networks.
- Little will be gained by displacing expenditure on the iron mains programme in order to fund the development of heat networks.

4 Cornwall

The County of Cornwall is blessed with renewable energy sources and we were asked to engage in a project to understand the potential to create a local energy plan, The Cornwall Energy Island.

Through a workshop approach of local stakeholders and renewable energy experts, the project concluded that the energy needs for Cornwall could be delivered via an approximate mix of 25% geothermal energy; 50% wind and 25% solar. It was proposed that the combination of renewables, plus battery storage, could provide security of supply. Our contribution was to commission an energy balancing model to test the hypothesis.

The results revealed that:

- The renewable generation proposed could satisfy annual demand for power, heat and transport.
- 500 GWh of battery storage would be required to balance supply and demand.
- The cost of batteries in 2015 would have led to excessive costs to consumers.

These results were disappointing to local stakeholders, but do not detract from the enthusiasm and ambition that many local stakeholders had. We committed to continue commissioning research that could enable local plans to be low carbon, reliable and cost effective.

5 Trends and continued engagement with local energy plans

Since these early studies, we have collaborated on, and commissioned research, to support the development of local plans, as described below:

6 Project FREEDOM – smart hybrid heating systems

A collaborative project with Western Power Distribution, this sought to develop a smart control system that would enable a small air source heat pump to be connected to a conventional gas fired or off-grid (eg oil) central heating system. The software and engineering developed has enabled a lower cost, low

¹ DECC, September 2015, Iron Mains Risk Reduction Programme Technical & Spatial Analysis.



disruption alternative to a full air source heat pump which has the added benefit of being able to use low cost or low carbon electricity when available and green gas when not.

This overcomes the weaknesses identified in the initial Bridgend study of high initial costs of installation associated with a heat pump only system, the impact of the heat pump operating when the electricity grid carbon content is high, and the investment needed in local electricity systems in order for them to provide capacity for peak heat. It also overcomes the storage issues from the Cornwall project by using the gas grid's storage capability.

7 Pathfinder and Pathfinder Plus

Pathfinder is the first whole systems energy simulator to be created by a DNO or GDN. Using balancing logic devised by the local gas systems operators, it enables non-expert users to evaluate decarbonisation scenarios quickly to understand whether they provide a secure energy system. It provides an estimate of the scenario's carbon reduction and in the latest version, Pathfinder Plus, detailed cost information to the consumer. The aim was to create a tool that could be used both by network operators to understand the impact of each scenario on investment, but also local communities to design their own energy system.

8 Future role in relation to net zero

Since the development of the research projects outlined above we have offered support to local authorities, Local Enterprise Partnerships, community energy groups and academia to provide expertise, data and the Pathfinder tool free of charge. Studies supported to date include:

- Swansea City bay energy plan led by the Institute of Welsh Affairs
- Bristol and area plan led by Zero West community group
- University of South Wales CAPSE project
- Caldicot decarbonisation plan.

These projects were independently led and were designed to create future decarbonisation visions and to test specific technology, such as tidal lagoons, solar power or heat recovery from water sources. The studies were therefore of limited value to the DNOs and stopped short of a whole energy system solution.

Our engagement with the Welsh Government has also increased as a result of this work. They have shown significant interest in the findings from the Freedom Project and the work at Bridgend. As a result, we are now part of the Minister for Housing & Local Government's 'Expert Advisory Group on the Decarbonisation of Existing Homes'. We have also supported both the Housing and Energy teams on a number of other initiatives and shared learning events, including through visits to participants of the Freedom trial.

9 What needs to happen/what we are doing

To address the gap within the projects above we proposed a project to design the network of the future on a collaborative basis with a local DNO.

In the first project of its kind, we partnered with SSEN and UKPN, along with contract partner Progressive Energy to take the most up-to-date learning on decarbonisation and apply it to the city of Swindon.

The Green City Vision project engaged local stakeholders, the local authority and other GDNs and DNOs to understand the optimum pathway to decarbonise heat, power and transport. As a first attempt, the project used Pathfinder in its most comprehensive use to date to analyse options from the perspective of domestic consumers; business consumers (including transport); electrification and the use of green gas.



It was the first LAEP to be devised and the results were fed back to a wide range of stakeholders. The local authority has also taken the details away to consider it as a starting point for its decarbonisation plans.

Swindon was chosen partly due to the nature of the city and because lessons learned from the project could easily be adapted for other similar cities in the south west of England such as Exeter, Gloucester and Taunton.

10 Next steps

It was recognised that the Pathfinder tool that was used for Swindon as part of our Green City vision project had limitations with regards to consumer costs and carbon accounting, so we commissioned the upgrade to the tool, Pathfinder Plus. This new version will be completed by the end of 2019, and its use has already been offered to a number of projects, including the next phase of Bridgend's project, the Milford Haven Kingdom, Bath University and the Centre for Sustainable Energy to plan a decarbonisation strategy for Bristol. We are also offering the free use of Pathfinder Plus to all GDNs to enable similar work to be replicated nationwide.

Pathfinder Plus has a detailed economic model within its function and, for the first time, more detailed costs to the consumer will be available. This will enhance the opportunity to engage with a wider group of stakeholders, particularly fuel poverty groups and community representatives in GD2.

To speed up the process and to enable much wider designs of energy systems, we commissioned a project known as Regional FES (Future Energy Scenarios). This is a bottom up approach to understand at sub-LDZ levels the local energy demand requirements and the local energy supply possibilities. The regions considered in this project use boundaries of local authorities and gas operating areas so that data can be provided in a way that is most meaningful to a variety of stakeholders. This, in conjunction with Pathfinder and working with our local DNOs, will provide the most comprehensive energy map ever created for our region, enabling detailed designs of the most optimal energy system.

We have recognised the value and support we can offer local authorities in developing their decarbonisation plans by providing data, modelling capability and whole systems understanding. We recognise that some of the considerations required in developing optimal whole-system decarbonisation plans are not well understood or documented. We are therefore working with a partner at present to scope out and develop guidance documentation in this area.

In GD2, we propose the development of our future of energy team under an uncertainty mechanism so that we are resourced to provide this service to make sure that consumers receive the best value from both GD2 and ED2 in a whole systems way.

11 Conclusion

We are pleased that Ofgem is pursuing consideration of LAEPs for GD2 and the model for developing LAEPs that we have been advocating in GD1.

We are seeking support from stakeholders to continue the work to date and to provide consumers with the lowest cost, least disruptive pathway to decarbonising heat, power and transport.

This work has provided vital information for our business plan, notably our net zero ready network by 2035. It has influenced our view that the pathways for decarbonisation are likely to be bespoke for different regions based on levels of demand and industry, types of housing and opportunities for renewable generation/gas.

