

SSH Phase 2

D37 / D38: Smart Energy Plan – Bridgend County Borough Council



Department for
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& Industrial Strategy



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Abbreviations

Abbreviation	Definition
AI	Artificial Intelligence
BCBC	Bridgend County Borough Council
BEIS	Department of Business, Energy and Industrial Strategy
CHP	Combined Heat and Power
DBOM	Design, Build, Operation and Maintenance
DH	District Heating
DP	Deployment Project
EPN	EnergyPath Networks™
ESC	Energy Systems Catapult
ETI	Energy Technologies Institute
EU	European Union
HESG	Homes Energy Services Gateway
HN	Heat Network
HNDU	Heat Network Development Unit
HP	Heat Pump
InP	Innovation Project
LDP	Local Development Plan
RE	Renewable Energy
RSL	Registered Social Landlord
SA	Strategy Activity
SSH	Smart Systems and Heat programme
WG	Welsh Government
WPD	Western Power Distribution

1. Preface

This Smart Energy Plan has been produced as a deliverable of the Smart Systems and Heat Programme Phase 2.

The purpose of the plan is to describe a roadmap of projects and activities that will enable Bridgend County Borough to respond to the challenge of decarbonising heat within the wider energy system.

While this version of the plan is a deliverable of a wider programme of work it should be considered as a live document. The strategy, priorities, objectives, success criteria and project pipeline detailed within this document are driven by BCBC and set against the local context and vision. The intention is that the plan will be adopted by Bridgend County Borough Council and will be updated as further information is gathered; opportunities become available and project scopes are developed.

2. Executive Summary

Bridgend County Borough Council (BCBC) has a vision **to make Bridgend a decarbonised, digitally connected smart County Borough**. In doing so it will transition to a low carbon, decentralised energy system that works for its individuals, communities and businesses¹.

Energy Systems Catapult (ESC) has previously worked with BCBC, Welsh Government (WG) and other stakeholders to undertake Local Area Energy Planning in Bridgend¹. The Strategy has provided insight into the potential pathways for securely and affordably achieving a targeted 95% reduction in emissions (from a 1990 baseline) from Bridgend County Borough's buildings by 2050. This Smart Energy Plan, the "Plan", formally maps out the near-term delivery of the first phase of the Strategy (up to 2025). The Plan is aligned to the Welsh Government's carbon budget periods² and identifies the projects and activities to be delivered within the Plan period. Many of the projects and activities are at the early stages of development. As such the Plan should be considered as a live document and updated as further information is gathered or opportunities become available.

In achieving its vision of a decarbonised, digitally connected smart county borough, BCBC aims to:

- **decarbonise the energy sector,**
- **stimulate economic growth,**
- **provide new job opportunities, and**
- **attract new and existing businesses to trial initiatives and grow within the county borough.**

In deploying this Smart Energy Plan, BCBC will put consumers at the heart of their activities to ensure that their needs and well-being are safeguarded throughout the smart energy transition.

The Bridgend local area energy planning, Strategy and Smart Energy Plan development have been delivered under the Smart Systems and Heat programme (SSH). SSH is a collaborative project exploring how to accelerate to market innovations that decarbonise domestic heating. Whilst SSH is focused on decarbonising domestic heating BCBC are committed to decarbonising and developing localised solutions for heat, power and transport (across both domestic and non-domestic sectors). As such, BCBC would like to lead, encourage and facilitate complementary projects focused on decarbonisation of power and transport, alongside heating projects within Bridgend.

Through delivery of the projects and activities, BCBC aims to achieve the following strategic objectives:

- **to be a test bed for new energy system ideas and concepts; providing real-life case studies,**
- **to lead the decarbonisation agenda; by introducing new products and concepts to consumers,**

¹ ETI (2018) *Bridgend Local Area Energy Strategy*

² UK CCC (2018) *Reducing UK emissions - 2018 Progress Report to Parliament*. Available at: <https://www.theccc.org.uk/wp-content/uploads/2018/06/CCC-2018-Progress-Report-to-Parliament.pdf> (Accessed: 26 October 2018)

- **to attract new and existing energy and digitalisation businesses to trial ideas and grow within the county,**
- **to stimulate the local economy and develop employment opportunities through innovation and deployment of low carbon energy projects,**
- **to develop a joined-up approach to the energy transition engaging local academia, communities and businesses.**

Bridgend has already hosted the delivery of some innovative energy projects:

- **The Living Lab:** Energy Systems Catapult has installed a Home Energy Services Gateway in 30 residential properties in Bridgend to monitor energy usage within the home and conduct trials of innovative service offerings, within a real-world environment.
- **FREEDOM:** Wales and West Utilities, Western Power Distribution and PassivSystems delivered the FREEDOM (Flexible Residential Energy Efficiency Demand Optimisation and Management) project in Bridgend, which looked “...to better understand if hybrid heating systems are technically capable, affordable and attractive to customers as a way of heating homes.”³. Reports relating to the FREEDOM project are available on Western Power Distribution’s website: <https://www.westernpower.co.uk/documents>.
- **Local Area Energy Planning:** Energy Systems Catapult have used their EnergyPath Networks™ (EPN) tool to undertake whole systems Local Area Energy Planning of Bridgend County Borough. The outputs of this work have been used to inform a Local Area Energy Strategy⁴ to decarbonise emissions from buildings within the county borough by 95% (from a 1990 baseline) by 2050.

Table 1.1 summarises the near-term project/activities planned, and the proposed project locations are provided in figure 1.1.

³ Western Power Distribution (no date) *FREEDOM*. Available at: <https://www.westernpower.co.uk/projects/freedom> (Accessed 10 October 2018)

⁴ ETI (2018) *Bridgend Local Area Energy Strategy*

Table 1.1: Near-Term Project/Activity Timescales

2018	2019: <i>FIT scheme closes - UK leaves EU</i>	2020: <i>WG carbon target/budget end - Smart meters rolled-out - WG elections</i>	2021: <i>RHI planned closure - Current Arbed end date - Local elections</i>	2022 <i>UK elections - Current WG RE Support Service end date</i>	2023 <i>ERDF funding ends</i>	2024	2025: <i>WG elections (if not earlier) - WG carbon budget (2021-25)</i>
DP1 Bridgend Town Lower Carbon District Heat (DH) Network Phase 1: 1 st step to decarbonising Bridgend town.							
DP2 Bridgend Town Lower Carbon DH Network Phase 2: Build on DP1 business case and extend heat network.							
DP3 Energy Efficiency Projects: Tackle fuel poverty by installing energy efficiency measures in areas in need.							
InP1 Fully Targeted Retrofit: Understand the benefits of dynamic modelling and performance monitoring and how these can help develop more compelling retrofit offerings for consumers.							
InP2 Hybrid Heat Pumps and Full Electrification: Build on the success of the FREEDOM project and further explore the role of hybrid heat pumps in the overall decarbonisation of the Bridgend energy system.							
InP3 Caerau Mine Water Gas-to-District Heating Transition: Deliver a demonstrable example of a low carbon DH system which transitions existing residential consumers from gas heating to DH.							
InP4 Affordable Urban Heat Networks (HNs): Establish solutions for reduced HN costs & improved efficiencies.							
InP5 Electrification of Heat through Energy as a Service: Deliver energy as a service to heating consumers via different electrified heating technology packages and gain insights to assist further roll-out if successful.							
InP6: Intelligent Bridgend Energy System Design: Explore the benefits that arise from integration of heat, electricity & transport systems							
						Activity A Non-Domestic Building Data: Gather data on Bridgend's non-domestic buildings and update the Strategy.	
Activity B Low & Zero Carbon DH Energy Sources: Identify and investigate potential lower and zero carbon heat sources for DH networks to feed-in to future projects.							
Activity C Planning Policy Alignment with Decarbonisation Strategy: Ensure the new LDP accounts for the Local Area Energy Strategy.							
Activity D Establishing Bridgend as a Centre for Innovation: Effectively market Bridgend as an area to trial innovation projects and stimulate economic growth.							
Activity E Identify Power, Transport and Digitalisation Projects: Develop complementary electricity, transport and digital infrastructure projects alongside the heating projects to ensure that decarbonisation takes place in a joined-up manner.							
				Activity F Scoping Future Delivery Plans: Ensure continual learning to achieve large-scale deployment initiatives.			

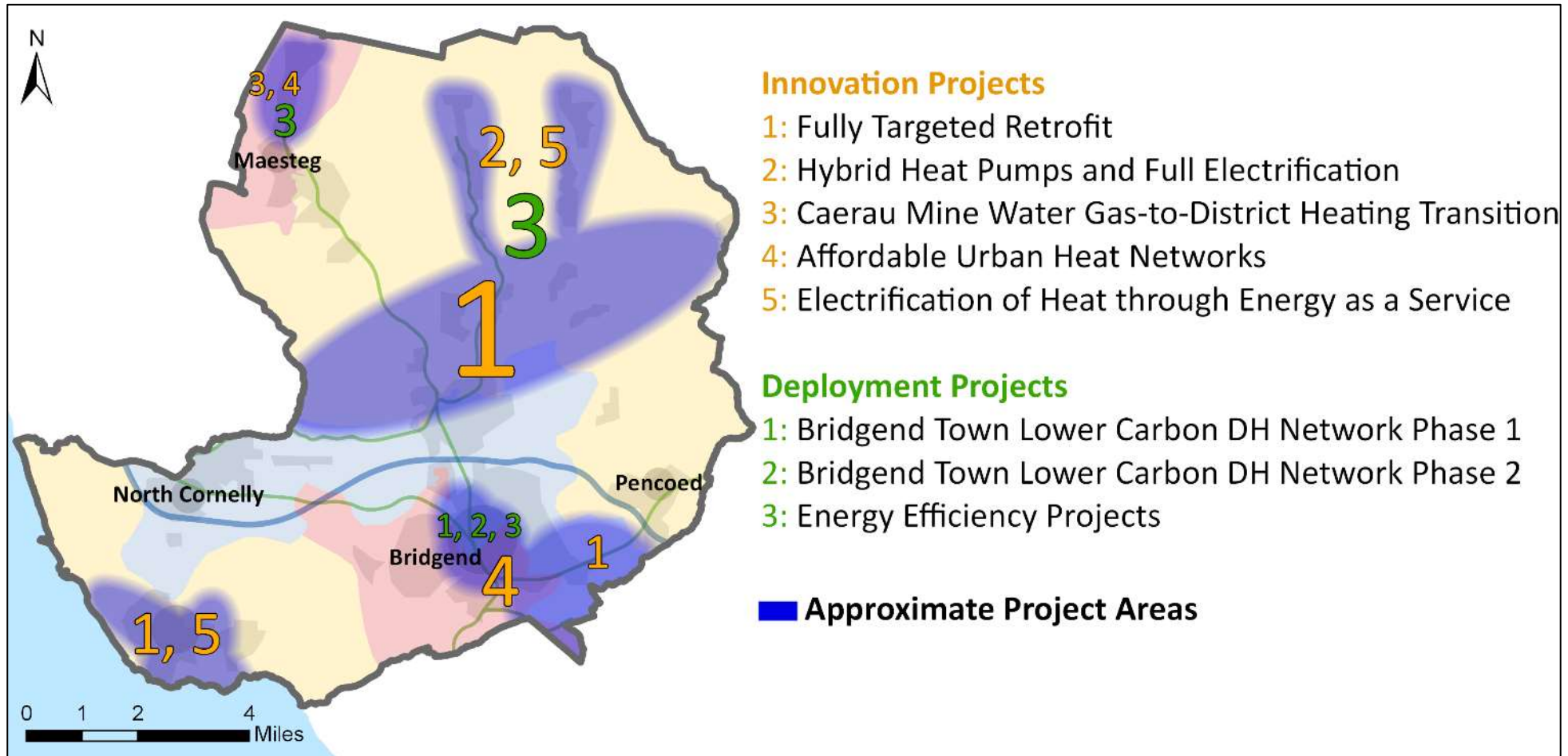


Figure 1.1. Target Project Locations

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3. Introduction

BCBC have developed this Smart Energy Plan with support from Energy Systems Catapult (ESC), Welsh Government (WG), the Energy Technologies Institute (ETI) and other stakeholders. It builds on the strategic activities identified in the Local Area Energy Strategy, “the Strategy”⁵ and the project details and recommendations provided in the Draft Smart Energy Plan⁶. It focuses on a pipeline of innovation projects that has been established through the work undertaken under the Smart Systems and Heat Phase 2 programme. The strategy, priorities, objectives, success criteria and project pipeline detailed within this document are driven by BCBC and set against the local context and vision. Learning from the innovation projects will be collected and used alongside learning from projects undertaken elsewhere to revisit and update the preferred pathways to decarbonisation for Bridgend and the UK. The projects and activities described in this document will not be driven and delivered by BCBC alone. BCBC will seek to establish the county as a “Centre for Innovation”, creating an attractive and supportive environment, in which BCBC will act as an enabler for innovators to introduce and deliver decarbonisation projects, products and concepts to local consumers.

3.1. BCBC’s Vision

BCBC has a vision **to make Bridgend a decarbonised, digitally connected smart County Borough**. In doing so it will transition from the current national, centralised energy system to a future low carbon, decentralised energy system that works for its individuals, communities and businesses⁵.

In achieving this vision, it aims to not only decarbonise the energy sector, but stimulate economic growth; providing new job opportunities to residents and attracting new and existing businesses to trial initiatives and grow within the county borough. This aim aligns with the vision outlined in BCBC’s Regeneration Strategy (2008-2021), that; *“By 2021, Bridgend County Borough will be recognised as a self-contained, productive sub-regional economy with a skilled and utilised workforce in a place where people and businesses want to be”*⁷.

3.2. UK Strategy

The UK’s Industrial Strategy⁸ aims to increase productivity and UK income generation by focusing on four grand challenges:

- Artificial Intelligence (AI) and the Data Economy
- The Future of Mobility
- Clean Growth, and
- Meeting the needs of the Ageing Society

⁵ ETI (2018) *Bridgend Local Area Energy Strategy*

⁶ Energy Systems Catapult (2017) *Developing a Smart Energy Project Plan for Bridgend County Borough Council*

⁷ BCBC (2008) *Fit for the Future Bridgend County Borough’s Regeneration Strategy*. Available at: <https://www.bridgend.gov.uk/media/1129/fit-for-the-future-bridgend-regeneration-strategy-2008-2021.pdf> (Accessed: 15 October 2018)

⁸ BEIS (2017) *Industrial Strategy*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf (Accessed: 30 July 2018)

Clean growth refers to “growing our national income while cutting greenhouse gas emissions”⁹ this will be achieved through development of and a transition to low carbon technologies and more efficient resource use, which is highlighted as “one of the greatest industrial opportunities of our time”¹⁰. As a way of advancing the clean growth challenge, the Industrial Strategy strongly endorses the idea of taking a whole-systems approach to the decarbonisation of energy¹⁰, a concept which has been central to the local area energy planning undertaken to inform Bridgend’s Local Area Energy Strategy¹¹. Since 1990 the UK economy has grown by two-thirds alongside a 42% reduction in carbon emissions⁹ – potentially showing that the two challenges can be met concurrently.

The UK government’s objectives through the Clean Growth Strategy⁹ are:

1. *“To meet our domestic commitments at the lowest possible net cost to UK taxpayers, consumers and businesses; and,*
2. *To maximise the social and economic benefits for the UK from this transition.”⁹*

These objectives mirror BCBC’s own objectives for delivery of their local decarbonisation agenda. To meet these objectives innovation is required to develop improved products, processes and services which will cause costs associated with clean technologies to reduce⁹. Whilst Climate Change is a global issue requiring global action, the Clean Growth Strategy acknowledges that “Local areas are best placed to drive emission reductions through their unique position of managing policy on land, buildings, water, waste and transport”⁹. This context reinforces the need for BCBC to have a decarbonisation strategy implemented through a series of delivery plans.

3.3. Welsh Strategy

Under the Environment (Wales) Act Welsh Ministers are required to ensure that net emissions in Wales are at least 80% lower than the baseline set in legislation¹². In 2018, Welsh Government undertook a consultation to gain views on how Wales could reduce greenhouse gas emissions by 45% between 2018 and 2030¹³. The consultation document identifies a large range of actions that could assist with meeting this target¹³. The document identifies the importance of innovation to achieve the emissions targets, and identifies the following specific opportunities:

- *“Buildings: new products and delivery models for low-carbon new-builds and retrofitting*
- *Industry: new technologies and processes, including Carbon Capture Use and Storage (CCUS)*
- *Power: new holistic solutions to reduce energy consumption at source, generate renewable energy and optimise its distribution*

⁹ BEIS (2017) *Clean Growth Strategy*. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf (Accessed 10 October 2018)

¹⁰ BEIS (2017) *Industrial Strategy*. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf (Accessed: 30 July 2018)

¹¹ ETI (2018) *Bridgend Local Area Energy Strategy*

¹² Welsh Government (2018) *Decarbonisation programme*. Available at:

<https://gov.wales/topics/environmentcountryside/climatechange/emissions/?lang=en> (Accessed: 29 October 2018)

¹³ Welsh Government (2018) *Welsh Government Consultation Document Achieving our low-carbon pathway to 2030*. Available at:

<https://beta.gov.wales/sites/default/files/consultations/2018-08/low-carbon-pathway-to-2030-consultation.pdf> (Accessed: 29 October 2018)

- *Resource management: new processes to optimise the sustainable use of resources and assist our transition to a Circular Economy*¹³

Recent target announcements from Welsh Government¹⁴ have put an emphasis on local energy generation and ownership, with:

- 70% of Welsh electricity consumption to be generated from renewable energy by 2030.
- 1 GW of Welsh renewable electricity capacity to be locally owned by 2030.
- Renewable energy projects to include an element of local ownership by 2020.

This prioritisation of local ownership, was driven by the view that it would give rise to more local benefits, including social benefits and financial benefits, e.g. through job creation¹⁴. This viewpoint echoes BCBC's view that engaging with the decarbonisation agenda can stimulate economic benefits within the local area if it is executed to do so.

3.4. The Smart Systems and Heat Programme

Heating accounts for almost one third of total UK carbon emissions. To achieve the 2050 target of an 80% reduction in carbon emissions, the UK must decarbonise the domestic heating market at the rate of 20,000 homes a week by 2025 – the current rate is less than 20,000 homes a year.

The Smart Systems and Heat (SSH) programme is designed to help innovators address this market failure and unlock the commercial opportunity of low carbon heating, by:

- Addressing the technical, regulatory, economic and social barriers that block new low carbon heat products, services and business models getting to market,
- Establishing a range of platforms, insights and modelling tools to help innovators discover new low carbon heating solutions that consumers value,
- Bringing innovators, businesses, local authorities, networks, policy-makers, regulators and consumers together to create new markets that deliver low carbon heating solutions at scale.

Smart Systems and Heat – Phase 1

The Energy Technologies Institute (ETI) launched the SSH programme and funded Phase 1, which was delivered by the Energy Systems Catapult and its partners.

The Smart Systems and Heat Phase 1 programme has developed software tools to design location-specific smart energy systems. Phase 1 undertook consumer behaviour, technology development, business modelling and supply-chain activities to support the decarbonisation of domestic heat using services that meet consumer needs. Phase 1 worked with Local Authorities to create a small number of project opportunities and roadmaps to support decarbonisation of heat specific to those communities.

Smart Systems and Heat – Phase 2

The Smart Systems and Heat Phase 2 programme aims to establish an open shared 'ecosystem' that brings together a diverse range of organisations, including: energy providers, product companies, networks, policy-makers, regulators and consumers to interact both technically and commercially across physical energy systems, market systems and information systems – to accelerate the decarbonisation of the domestic heating market. Phase 2 is funded through a grant

¹⁴ Welsh Government (2018d) *Locally Owned Renewable Energy – A Call for Evidence*. Available at: <https://gov.wales/topics/environmentcountryside/energy/renewable/local-renewable-energy-generation/call-for-evidence/?lang=en> (Accessed: 30 July 2018)

agreement with the Department for Business, Energy and Industrial Strategy (BEIS) and builds on the concepts developed in Phase 1 (funded by the ETI).

The initial focus of the Local Area Energy Strategy, developed under the Smart Systems and Heat Phase 1 programme, is on decarbonising domestic heating which is a major contributor to Bridgend County Borough's carbon emissions¹⁶. Decarbonising heat is critical to achieve a low carbon energy system and is a local and national challenge yet to be addressed. The near complete decarbonisation of domestic heating and hot water is required and there isn't a "one size fits all" solution¹⁶. Individual homes in different locations have several possible low carbon heating options which need to be considered¹⁶, and decisions need to be made at a local level. As such it is an appropriate challenge for BCBC to focus on. BCBC are, however, committed to decarbonising and developing localised solutions for power and transport as well as heat (across both domestic and non-domestic sectors). As such, whilst the projects and activities outlined within this Plan are primarily focused on decarbonising heat, BCBC would also like to lead, encourage and facilitate complementary projects that address decarbonisation of power and transport within Bridgend.

3.4.1. Work Undertaken to Date

Table 2.2 summarises the major activities undertaken with BCBC to date. This document should be read alongside:

- Local Area Energy Planning Bridgend County Borough Council Evidence Base¹⁵
- Bridgend Local Area Energy Strategy¹⁶
- Bridgend Energy Transition Plan: Policy & Commercial Insights¹⁷
- Developing a Smart Energy Project Plan for Bridgend County Borough Council¹⁸

¹⁵ ETI (2018) *Local Area Energy Planning Bridgend County Borough Council Evidence Base*

¹⁶ ETI (2018) *Bridgend Local Area Energy Strategy*

¹⁷ ETI (2018) *Bridgend Energy Transition Plan: Policy & Commercial Insights*

¹⁸ Energy Systems Catapult (2017) *Developing a Smart Energy Project Plan for Bridgend County Borough Council*

Table 2.2: Smart Systems and Heat Programme Progress Timeline

Date:	2016	Jan 2016 – May 2017	December 2017	March 2018
Activity:	<p>Bridgend Scope Priorities and Constraints: set the Local Area Energy Planning project scope, stakeholder priorities/ expectations and criteria for decision making, consensus and acceptance.</p>	<p>Local Area Energy System Modelling: applied a whole system approach to investigate decarbonisation pathways in the local area, for a given set of constraints and understand cost-effective transition pathways initially focused on decarbonising heat. This identified potential scenarios including a business-as-usual, a world with green gas and a world without green gas in Bridgend.</p>	<p>Developing a Smart Energy Project Plan for BCBC¹⁹: a starting point of a process of engagement, consultation and collaboration to develop a ‘Smart Energy Project Plan’ to outline a pipeline of domestic heat decarbonisation projects.</p>	<p>Policy and Commercial Insights for Energy System Transition²⁰: describes policy, economic and commercial perspective of the Local Area Energy Strategy. Quantifies the social benefits that will arise from the Strategy. Makes policy recommendations.</p>
Date:	May 2018	May 2018	Current	2017 – 2019
Activity:	<p>Local Area Energy Planning Evidence Base²¹: Provides the technical analysis and area specific evidence, summarising the whole systems optimisation analysis and supporting information which has been used to inform future network choices in the local area.</p>	<p>Local Area Energy Strategy²²: provides a long-term framework (2020-2050) for reducing carbon emissions in Bridgend’s buildings by 95%, and identifies near-term strategic activities required to progress the Strategy.</p>	<p>Smart Energy Plan (this document): builds on the near-term delivery activities identified in the Local Area Energy Strategy and provides a near-term delivery plan (2018-2025).</p>	<p>The “Living Lab” and Home Energy Services Gateway (HESG): digital infrastructure installed in 30 homes in Bridgend (79 elsewhere) to monitor energy usage within the home and conduct trials of innovative service offerings, within a real-world environment.</p>

¹⁹ Energy Systems Catapult (2017) *Developing a Smart Energy Project Plan for Bridgend County Borough Council*

²⁰ ETI (2018) *Bridgend Energy Transition Plan: Policy & Commercial Insights*

²¹ ETI (2018) *Local Area Energy Planning Bridgend County Borough Council Evidence Base*

²² ETI (2018) *Bridgend Local Area Energy Strategy*

3.4.2. The Local Area Energy Strategy

Bridgend piloted a whole system approach to local area energy planning as part of SSH. This investigated cost-effective pathways for reducing carbon emissions from buildings by 95% by 2050 and the near-term activities and innovation opportunities needed to enable this. The assessment of many possible future local energy scenarios was used to identify areas within Bridgend considered at this stage more likely to be suitable for development of district heat, hybrid and electric-heating solutions in combination with different levels of targeted fabric retrofit, as shown in figure 2.1.

District heating emerged as the most dominant heat type selected for the more densely populated areas of Bridgend. Where no prevalent form of future network option was identified the areas in figure 2.1 are marked as Electricity/District Heat Mix, these generally follow the route of the M4 and a combination of measures are likely to be required for decarbonisation²³.

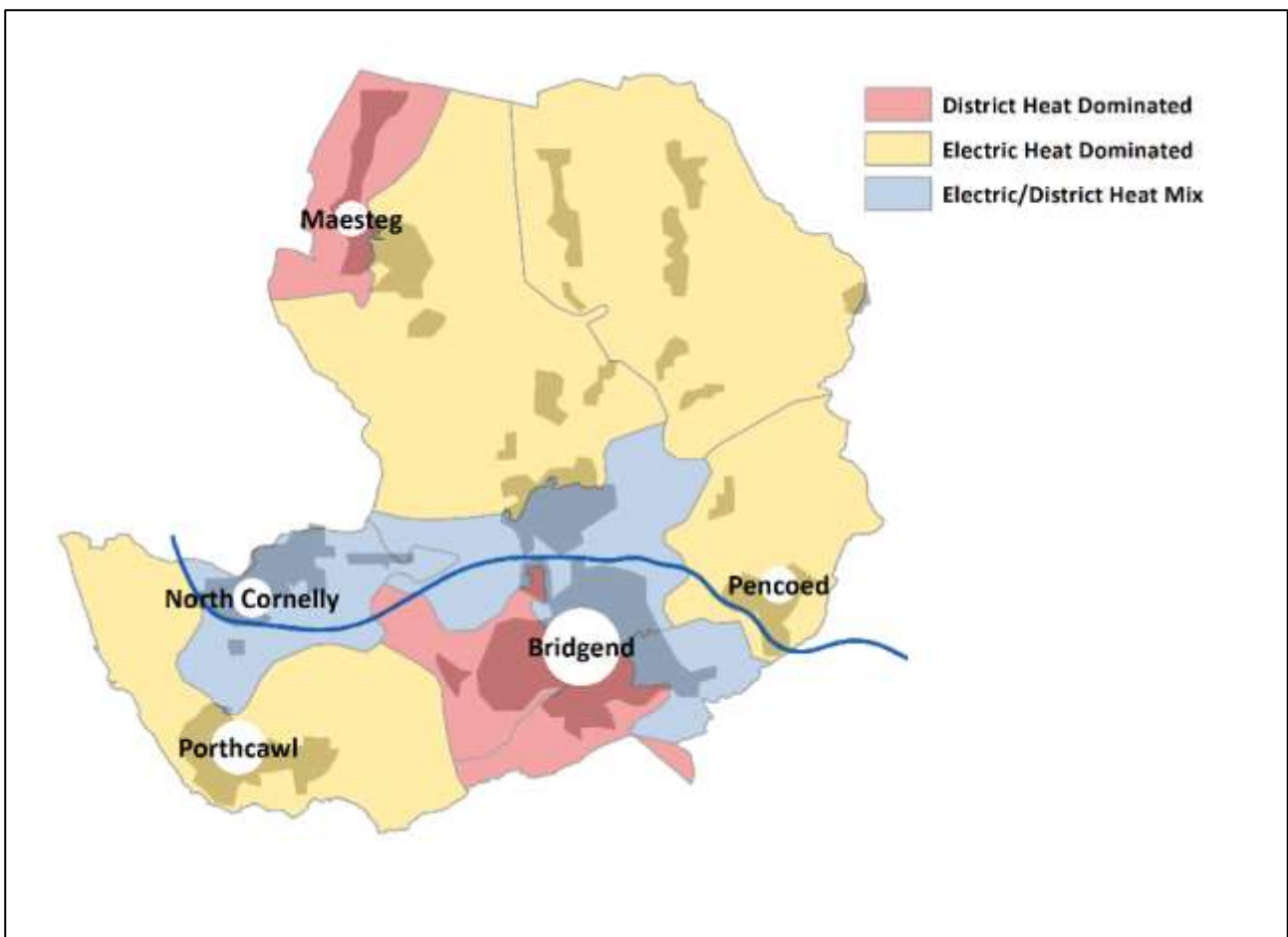


Figure 2.1: Dominant Heating Systems in 2050 by Area

(OS data © Crown copyright and database right 2018)

Whilst pre-dominant heating systems have been identified, the Strategy highlights that some uncertainties associated with these decarbonisation options remain, with innovation and market transformation required to overcome these. As such, the Strategy cautions that major decisions on energy network choices should not be made today but should be made following activities that *“...test and evaluate - through innovation, development and demonstration - if and how the*

²³ ETI (2018) *Bridgend Local Area Energy Strategy*

identified decarbonisation of heat themes can be rolled out at scale...²³. This period of testing, development and demonstration needs to take place in the near-term to ensure that sufficient evidence and insights are collected for long-term decisions to be made and overall decarbonisation targets to be achieved.

The Local Area Energy Strategy²⁴ identified five near-term delivery plan activities to enable Bridgend to start the process of testing through innovation:

- *Deployment of Better Targeted Retrofit:*
- *Developing and testing compelling customer propositions for hybrid heat pumps*
- *Overcoming barriers to moving homes from gas to district heating,*
- *Reducing costs of heat networks in urban centres and overcoming barriers to connecting existing homes to heat networks,*
- *Developing and testing compelling customer propositions for electric heating targeting potential early adopters through council services.²⁴*

3.4.3. Smart Energy Plan

This Smart Energy Plan formally maps out the near-term plan (up to 2025) for delivery of the first phase of the Bridgend Local Area Energy Strategy. As mentioned previously, the initial focus of the Strategy is on decarbonising the domestic heating sector, due to the locally distinct nature of this challenge. BCBC are committed to decarbonising and developing solutions for heat, power and transport (across both domestic and non-domestic sectors) and will actively pursue partners and project opportunities to achieve this. The Plan's primary focus is to identify opportunities for innovation projects to deliver on the Strategy's recommended activities and address the following criteria outlined in the report *Developing a Smart Energy Project Plan for Bridgend County Borough Council*²⁵:

- Develop projects that:
 - integrate and demonstrate options for decarbonisation of domestic heating or options for decarbonisation of domestic heating alongside other 'connected home' solutions,
 - address domestic heat decarbonisation and future local energy system needs and opportunities that may be relevant in other locations, providing potential for replication and scale-up,
 - experiment with new service offerings;
 - unlocking new consumer value sources and providing the evidence needed for roll-out of new market arrangements which support those offerings,
 - explore the potential impact of new consumer services on upstream parts of the value chain,
 - align to one or more of the five Future Actions that SSH aims to stimulate and support.²⁵

²⁴ ETI (2018) Bridgend Local Area Energy Strategy

²⁵ Energy Systems Catapult (2017) *Developing a Smart Energy Project Plan for Bridgend County Borough Council*

The Plan aims to establish:

- what BCBC and stakeholders intend to achieve by 2025 to progress towards their vision of a decarbonised and economically productive county borough,
- the challenges and opportunities facing the county borough, which need to be considered when developing and delivering projects,
- a road map detailing specific actions and steps required for delivery of a pipeline of individual, innovation and deployment projects,
- how actions planned in BCBC relate to Energy Systems Catapult's Smart System and Heat programme and how learning from project activities will be used to benefit the energy sector transition of the rest of the UK.

Delivery of the Plan will gather evidence, which will support:

- confident future decision-making regarding network choices and investment,
- de-risking the domestic decarbonisation delivery in Bridgend,
- overcoming barriers to decarbonisation of domestic heating,
- enabling opportunities for future decarbonisation delivery.

3.4.4. Bridgend's Strategic Objectives

BCBC's Smart Energy Plan strategic objectives are:

- to be a test bed for new energy system ideas and concepts; providing real-life case studies,
- to lead the decarbonisation agenda; by introducing new products and concepts to consumers,
- to attract new and existing energy and digitalisation businesses to trial ideas and grow within the county,
- to stimulate the local economy and develop employment opportunities through innovation and deployment of low carbon energy projects,
- to develop a joined-up approach to the energy transition engaging local academia, communities and businesses.

Success criteria, factors, key performance indicators and targets for meeting the strategic objectives within the time frame of the Smart Energy Plan (up to 2025) are provided in table 2.3. These are initial targets which will be reviewed and amended as necessary based on development of specific project plans and BCBC priorities. In order to meet the targets set, BCBC will work with stakeholders and interested parties to enable project delivery. Whilst some projects will be directly driven by BCBC, BCBC's role in other projects will be as an enabler, supporting external organisations to develop, introduce and deliver decarbonisation initiatives to local consumers.

Table 2.3: Innovation Success Criteria, Factors and Measures (up to 2025)

Success Criteria	Success Factor	Key Performance Indicator	Targets
Bridgend considered a leader in taking up new decarbonisation market offerings.	A strong relationship between BCBC and companies introducing new products/consumer offerings, so that BCBC provide development and marketing support to encourage uptake of the offerings.	Number of innovation projects delivered within Bridgend.	6 innovation projects , described in section 4 of this document, successfully developed and delivered, with learning, evidence and insights captured and disseminated to the wider energy industry to assist in future project development and successful scale-up.
Bridgend established as a location for trialling new energy concepts.	Establishing Bridgend as a Centre for Innovation and participants successfully recruited to be part of innovation trials.	Number of properties involved in innovation projects.	3000 buildings actively participating in innovation or deployment projects, with learning gained from the projects informing larger-scale decarbonisation in future plan periods.
Organisations introducing ideas and concepts within the county borough.	Networking with industry leaders to communicate the benefits of trialling products in Bridgend; an area that hosts diverse geography and demographics, with a supportive local and devolved national government.	Number of different organisations engaged with.	250 organisations , actively engaged in discussions regarding this Smart Energy Plan (to 2025) and future energy plans. Engagement activities will be planned through a dissemination plan and actively pursued through the organisation of industry engagement events.
		Number of organisations BCBC has developed and delivered projects with.	50 organisations , directly involved in delivery of projects.
		Regular Smart Energy Plan steering group meetings (see section 2.4.6 for details of steering group).	Smart Energy Plan steering group (see section 2.4.6 for details of steering group) meetings held a minimum of twice per year to ensure that local stakeholders remain integral to project development and delivery.
A stimulated local economy.	Additional income in the local area, supporting local employment markets.	Level of project funding secured.	£20M invested into Bridgend's energy system to support the energy transition.
Learning benefits for BCBC.	Strategy review and future Smart Energy Plans informed by the results of Innovation Projects	Strategy review and future project planning accounting for	Prepare and publish a second Smart Energy Plan for 2025-2030, and review, and update if necessary, the Local Area Energy

	delivered through this Smart Energy Plan.	learning from delivered projects.	Strategy considering project findings.
Wider Welsh and UK energy industry aware of learning from projects.	Successful dissemination of project results to the wider industry.	Delivery of project reports and dissemination events.	Publish publicly available insights reports for each innovation project delivered through the Plan and participate in dissemination events.

3.4.5. 2050 Decarbonisation Target

As per the Local Area Energy Strategy, BCBC are targeting **a 95% reduction (from a 1990 baseline) in emissions resulting from buildings in Bridgend County Borough by 2050**. The near-term delivery plan is focused on innovation activities which will provide learning to help support large-scale decarbonisation in the longer term. As such, a 2025 carbon abatement target is not included as part of the success criteria of this Plan. The purpose of the Plan is to create a route map for gathering evidence on how decarbonisation can be achieved. Therefore, it is considered of greater relevance to work towards a longer-term carbon reduction target (beyond the timescale covered by this Plan), which would be met by implementing the learning from the projects into a transition of business-as-usual activities.

The Local Area Energy Planning work considered different pathways for achieving the 95% reduction in emissions from buildings. Welsh Government is targeting an overall emissions reduction (from a 1990 baseline) of 80% by 2050. Targeting a greater reduction for buildings' emissions will allow for higher emissions from sectors which may be more difficult to decarbonise, e.g. agriculture. Figure 2.2 provides an illustrative carbon emissions reduction projection for achieving a 95% emissions reduction from Bridgend's buildings by 2050 (based on a 1990 baseline) generated through the future energy planning work undertaken by ESC. Numerous projection pathways are possible, but this particular illustration suggests that decarbonisation of buildings could start with decarbonisation of the national electricity mix, with in-home building emissions (largely a result of domestic heating) undergoing large-scale decarbonisation from approximately 2030 onwards. This progression pathway allows for a relatively small reduction in emissions from domestic buildings in the near term (~5% reduction in emissions between 2020 and 2030). Learning from innovation projects deployed within this time period would be integrated into large-scale deployment activities from 2030 onwards, when larger emissions reductions are projected (~80% reduction in emissions from domestic buildings between 2030 and 40).

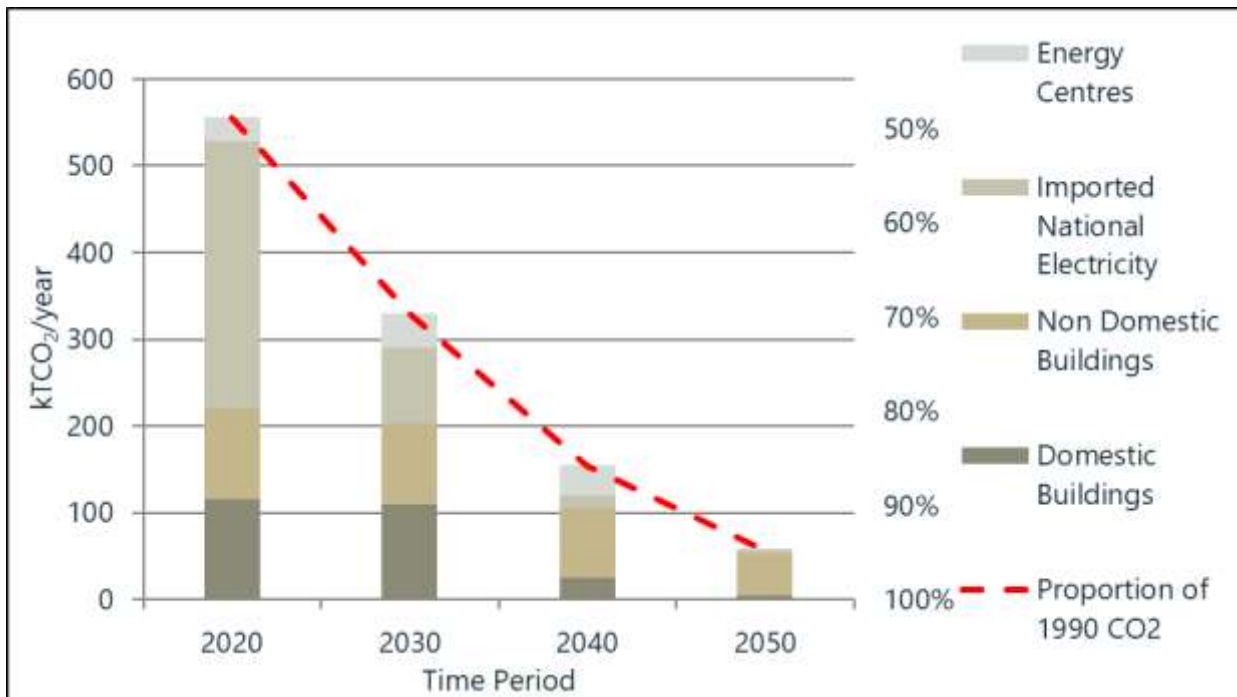


Figure 2.2: Illustrative Carbon Emissions Projection to Decarbonise Bridgend’s Buildings by 95% by 2050 (based on a 1990 baseline)

In addition to the emissions sources represented in figure 2.2, BCBC will need to deploy measures which reduce emissions from the transport sector, along a similar trajectory. Welsh Government have proposed that local authority planning departments will need to set local renewable energy deployment targets²⁶. These targets are to be based on the perceived capacity of the local area rather than the area’s needs²⁶. To inform these targets an up-to-date renewable energy assessment and energy opportunities plan will need to be established. BCBC’s Local Development Plan (LDP) is due to be updated with a new plan to be adopted in 2021²⁷. An activity identified to be undertaken within this Plan is for the BCBC Sustainable Development Team to work with the Planning Team on the updated LDP and ensure that the insights provided by the Smart Energy Plan and Local Area Energy Strategy are considered.

3.4.6. Stakeholders and Steering Group

The development and delivery of the Smart Energy Plan has a wide range of stakeholders. A Smart Energy Plan steering group has been established to provide a forum for sharing ideas, collecting feedback and ensuring that local stakeholders are aware of BCBC’s plans. The first Steering Group meeting was held on the 10th September 2018. During the meeting the Strategy and initial project ideas were presented to attendees with opportunities for discussion around both elements. Meeting attendees were fully engaged in the discussions and supportive of the project ideas.

BCBC are intending to hold an industry event to introduce the Strategy and project ideas to potential private sector project partners and provide an opportunity for potential partners to

²⁶ Welsh Government (2018) *Draft Planning Policy Wales: Edition 10*. Available at: https://beta.gov.wales/sites/default/files/consultations/2018-02/ppw-restructure-draft-ppw_en.pdf (Accessed: 10 October 2018)

²⁷ BCBC (2018) *Bridgend County Borough Council Report to Council 20 June 2018, Report of The Corporate Director – Communities, Bridgend Replacement Local Development Plan (LDP) Delivery Agreement, pp.145-149*. Available at: <http://democratic.bridgend.gov.uk/documents/g3214/Public%20reports%20pack%2020th-Jun-2018%2015.00%20Council.pdf?T=10&LLL=0> (Accessed: 13 September 2018)

introduce their services and products. Table 2.1 summarises the main project stakeholders – with the steering group members identified with an Asterix.

A range of private sector partners would need to be engaged with BCBC for successful development and delivery of projects, including:

- Energy Service Providers: providing new energy service offerings to consumers,
- Technology providers: trialling and demonstrating low carbon technologies,
- Installers: ensuring that system installation is undertaken efficiently and to a high standard,
- Digital Service Providers: providing integration of home monitoring devices, monitoring platforms and energy systems to enable insight on energy use and flows within the home and remote control of the home energy system.

Table 2.1: Smart Energy Plan Stakeholders

Group	Stakeholder	Stakeholder Interest
Public Sector	BCBC*	Primary stakeholder looking to achieve their vision for the county and the strategic objectives outlined in section 2.4.4.
	Welsh Government*	Welsh Government is interested in the development of a Smart Energy Plan and proposed pilot projects in Bridgend to see energy improvements within Bridgend itself and facilitate wider learning for the energy transition across the rest of Wales.
	Cardiff Capital Region City Deal	A 20 year-long, £1.2 billion investment programme covering ten local authorities (Bridgend, Merthyr, Torfaen, Caerphilly, Blaenau Gwent, Monmouthshire, Newport, Cardiff, Vale of Glamorgan, Rhondda Cynon Taf). Matching UK and Welsh Government funding with private sector finance to develop strategic opportunities to create and safeguard jobs and stimulate the economy; providing added value to the investment. The deal has several key themes; BCBC lead on the Energy theme.
	Cwm Taf Local Health Board*	Cwm Taf is due to become Bridgend's local health board in April 2019. The Princess of Wales and Glynrhud hospitals in Bridgend have large heat demands. Warmer homes could lead to health benefits for residents.
Utilities	Wales and West Utilities*	Local gas DNO. A key partner on the development and delivery of innovative gas heating projects.
	Western Power Distribution*	The local electricity DNO. A key partner on the development and delivery of innovative electric heating projects.
	Dwr Cymru	Local not-for-profit water supplier. Waste water has been identified as a possible district heating heat source, and the potential for utilising the sewer network for provision of fibre networks has been identified elsewhere in the UK ²⁸ .
Housing Associations	Valleys to Coast*, Wales & West Housing*, Linc Cymru*, Hafod*	Interested in providing sustainable, low-cost energy solutions for their tenants.
Not-for-Profit	Energy Systems Catapult*	The Smart Energy Plan projects and activities incorporate tools, concepts and learning that has been generated through SSH. The plan implements the first phase of the Local Area Energy Strategy and the activities are informed by ESC's Local Area Energy Planning. ESC will remain engaged in these activities in a manner appropriate to each project.
Industry	Technology & Energy Service Providers, Digital Platform Developers	Interested in providing and developing products and consumer propositions to enable company growth.
	Local Supply Chain	Potential to be involved in installation and maintenance opportunities, enabling economic growth and job provision.

²⁸ SSE (2018) *SSE Enterprise Telecoms, Three UK and Telefónica UK (O2) have agreed to support further fibre rollout in London*. Available at: <http://sse.com/newsandviews/allarticles/2018/09/sse-enterprise-telecoms,-three-uk-and-telefonica-uk-have-agreed-to-support-further-fibre-rollout-in-london/> (Accessed: 02 October 2018)

Academia	Cardiff University*	Cardiff University have contributed to the development of the Caerau Mine Water project and the Welsh Government's Smart Living Wales' Fair Futures project (with Energy Systems Catapult).
Community	Residents & Community Groups	Potential project participants and eventual consumers.

4. Local Challenges and Opportunities

Routes to decarbonisation are shaped by local context and will give rise to a wide range of local impacts. As such, it is important to understand local circumstances when developing a plan, to ensure that opportunities are exploited, and problems are not exacerbated.

4.1. Political/Legal Factors

Located within a devolved nation; Bridgend is governed by UK, Welsh and local policy.

4.1.1. Well-Being and Sustainable Development

The Well-Being of Future Generations Act (Wales) is focused on improving the social, cultural, economic and environmental well-being of Wales. It places a duty on public bodies to consider the long-term impact of decisions and work in a joined-up manner to ensure that all aspects of sustainable development are considered and delivered upon for people today and in the future²⁹. The goals of the Act are summarised in figure 3.1.



Figure 3.1: Well-Being of Future Generations Act – Well-Being Goals²⁹

In fulfilling, their legal duties with respect to the Act, BCBC need to work towards achieving these goals when developing the county's energy objectives. In this way, decarbonisation projects cannot just focus on the inherent environmental benefits that will arise from decarbonisation, but work to ensure that additional benefits are derived, for example by stimulating economic growth and leading to a more prosperous economy, delivering higher levels of comfort and better living

²⁹ Welsh Government (2015) *Well-being of Future Generations (Wales) Act 2015 The Essentials*
<https://gov.wales/docs/dsilg/publications/150623-guide-to-the-fg-act-en.pdf> (Accessed: 15 October 2018)

environments to improve the health and well-being of the county’s citizens and consulting with local communities to ensure that they are able to influence developments that happen in their local area. In addition to the Well-Being Goals the Act sets out five ways of working (see table 3.1) and 46 Well-Being Indicators to monitor progress towards the goals. The projects developed within this Plan will need to take account of the Well-Being Act and ensure that both the demonstration projects and future roll-out opportunities enable BCBC to deliver on its duties under the Act and improve the well-being of Welsh citizens. Table 3.1 summarises how the projects encompass the five ways of working.

Table 3.1: Well-Being Act Five Ways of Working

Long-term	Integration	Involvement	Collaboration	Prevention
<i>“The importance of balancing short-term needs with the needs to safeguard the ability to also meet long-term needs.”³⁰</i>	<i>“Considering how the public body’s well-being objectives may impact upon each of the well-being goals, on their objectives, or on the objectives of other public bodies.”³⁰</i>	<i>“The importance of involving people with an interest in achieving the well-being goals, and ensuring that those people reflect the diversity of the area which the body serves.”³⁰</i>	<i>“Acting in collaboration with any other person (or different parts of the body itself) that could help the body to meet its well-being objectives.”³⁰</i>	<i>“How acting to prevent problems occurring or getting worse may help public bodies meet their objectives.”³⁰</i>
BCBC’s energy projects will need to be suitable for the long-term needs of citizens, focusing on long-term, rather than short-term carbon targets, and providing long-term jobs in addition to short-term deployment opportunities.	The projects will need to consider each of the seven goals and ensure that no detrimental impact on any of the goals arises from project implementation. The steering group provides a forum for communicating the objectives and ensuring they align with others’ objectives.	BCBC will need to communicate their energy strategy and Smart Energy Plan publicly. Projects will be targeted at a cross-section of the local population; rather than one demographic.	BCBC will seek to form partnerships with different public, private and academic bodies to deliver the Smart Energy Plan and have established the Smart Energy Plan Steering Group to facilitate this.	By acting today and taking a whole system planning approach to decarbonisation, BCBC are aiming to make the most cost-effective transition in a planned, strategic manner.

³⁰ Future Generations Commissioner for Wales (2018) *Well-Being of Future Generations (Wales) Act*. Available at: <https://futuregenerations.wales/about-us/future-generations-act/> (Accessed: 30 July 2018)

4.1.2. Planning

Planning Policy Wales (Wales’ national planning policy) is currently being revised, with the consultation document indicating that the new edition may require local authorities to assess the potential for renewable energy developments in their area and set local targets³¹. BCBC’s Local Development Plan (LDP) was published in 2013, with the following vision:

“By 2021, Bridgend County Borough will be transformed to become a sustainable, safe, healthy and inclusive network of communities comprising strong, interdependent and connected settlements that can offer opportunities for an improved quality of life and environment for all people living, working, visiting and relaxing in the area.

The catalysts for this transformation will be:

- *a successful regional employment, commercial and service centre in Bridgend*
- *a vibrant waterfront and tourist destination in Porthcawl*
- *a revitalised Maesteg*
- *a realisation of the strategic potential of the Valleys Gateway; and*
- *thriving Valley communities.*³²

This vision echoes some of the objectives of the Well Being of Future Generations Act, with a clear emphasis that developments need to lead to improvements in the quality of life of those within the county borough. When developing energy projects which deliver on this vision, how the projects impact on local people, as consumers, workers and residents should be considered and taken into account when selecting target locations and demographics for the project.

4.1.3. Carbon Targets and Decarbonisation of Heat

Decarbonisation of the energy consumption within Bridgend County Borough will contribute to the legally binding national targets stipulated in the UK Climate Change Act and Environment Act (Wales); to reduce greenhouse gas emissions by 80% by 2050, against baseline levels,^{33,34} see figure 3.2.

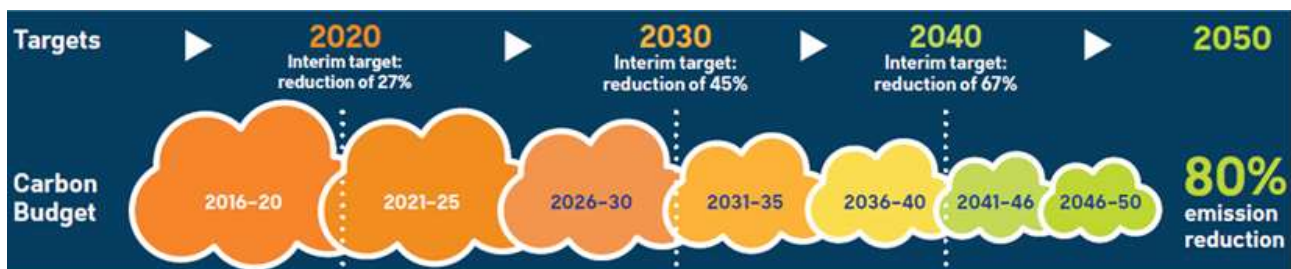


Figure 3.2: Environment Wales (Act) requires Welsh Government to set Interim Targets and Carbon Budgets to the 2050 Target – due to be announced by the end of 2018³⁵

³¹ Welsh Government (2018) *Draft Planning Policy Wales: Edition 10*. Available at:

https://beta.gov.wales/sites/default/files/consultations/2018-02/ppw-restructure-draft-ppw_en.pdf (Accessed: 10 October 2018)

³² BCBC (2013) *Local Development Plan*. Available at: <https://www.bridgend.gov.uk/media/1899/written-statement.pdf> (Accessed: 30 July 2018)

³³ Welsh Government (2016) *Environment Act (Wales)*. Available at: <http://www.legislation.gov.uk/anaw/2016/3/contents> (Accessed: 30 July 2018)

³⁴ Climate Change Act (2008) Available at: http://www.legislation.gov.uk/ukpga/2008/27/pdfs/ukpga_20080027_en.pdf (Accessed: 17 October 2018)

³⁵ Welsh Government (2018)

In its research briefing, Low Carbon Heating, the National Assembly for Wales highlighted the increased challenge faced by Wales to meet the UK energy and emission targets due to a higher proportion of emissions arising from “big emitters”, including refineries, steel works and power stations³⁶. To achieve the overall energy reduction target of 80% the UK CCC advised that emissions from buildings within Wales will need to be reduced by 85% to allow for higher emissions from other sectors (e.g. Agriculture)³⁶, see figure 3.3.

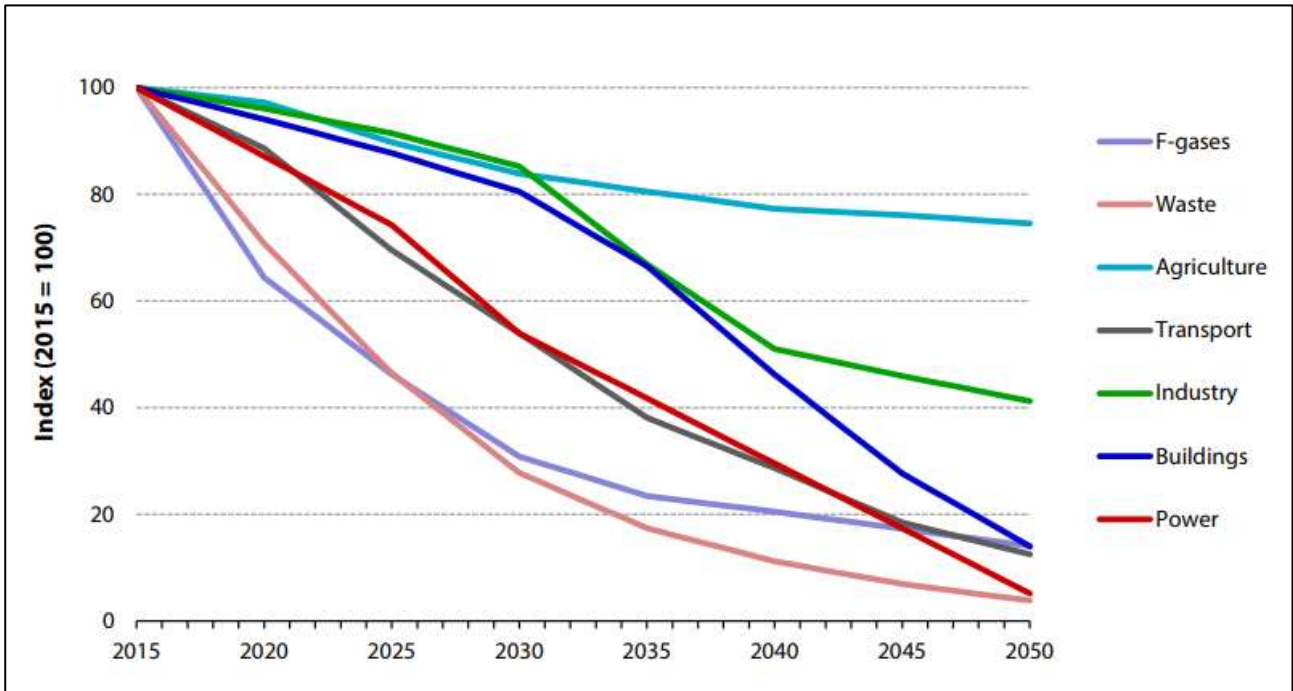


Figure 3.3: Emissions Reduction Projections advised by UK CCC for Wales³⁶

Bridgend County Borough itself, hosts a number of manufacturing facilities and businesses. Whilst the Bridgend Local Area Energy Strategy focuses initially on the decarbonisation of domestic heating, it acknowledges that the Strategy will need to evolve to include decarbonisation of the non-domestic buildings, industry and transport³⁷. In delivering this Smart Energy Plan, BCBC will engage with local stakeholders to understand their individual energy needs, and any plans that they have for future energy developments, so that these can be integrated within the wider plans which focus on the domestic sector, where appropriate.

Heating accounts for almost one third of UK carbon emissions. To meet the overall targets these emissions will need to be largely eliminated. Whilst tangible progress has been made in decarbonising the electricity sector, there has been little progress with respect to decarbonising the heating sector with just 4% of homes in the UK using low carbon heating³⁸. The UK CCC have

³⁶ National Assembly for Wales (2018) *Research Briefing: Low Carbon Heat*. Available at: <http://www.assembly.wales/research%20documents/18-042%20-%20low%20carbon%20heat/18-042-web-english.pdf> (Accessed: 30 July 2018)

³⁷ ETI (2018) *Bridgend Local Area Energy Strategy*

³⁸ ETI (2015) *Consumer Challenges for Low Carbon Heat*. Available at: <https://www.eti.co.uk/insights/smart-systems-and-heat-consumer-challenges-for-low-carbon-heat> (Accessed: 10 October 2018)

advised UK government that alongside higher standards for new buildings, low carbon heating systems and energy efficiency improvements need to be installed in existing homes^{39,40}.

A Renewable Energy Assessment undertaken to help inform the Local Development Plan for Bridgend⁴¹ identified that there was the potential to generate 38% of Bridgend's electricity demand from renewable electricity by 2020, but only 2% of Bridgend's heat demand from renewable sources by 2020⁴². The assessment states that the extent of renewable energy technology deployment is likely to be determined by the technical maturity, commercial viability and institutional and infrastructural support for the technologies considered⁴². This Plan seeks to tackle some of the barriers which have traditionally reduced the deployment of low carbon heating measures. As such, it is the purpose of this plan to increase the potential uptake within the county borough far above that forecast within the Renewable Energy Assessment⁴².

In terms of the barriers that have traditionally reduced uptake of renewable heating technologies, consumer propositions, technical factors and economic issues all need to be addressed. Whilst heating in the UK is predominantly based on fossil fuels, a consumer does not necessarily demand this should be the case. They are more concerned with the result of a comfortable home³⁹. To transition away from fossil fuels new low-carbon heating systems and energy efficiency measures need to be attractive to consumers and provide them with increased comfort or retain existing comfort levels at a reduced cost³⁹. Alternatively, higher carbon options would need to be sufficiently penalised to ensure that lower carbon options become economically attractive.

4.2. Environmental Factors

Bridgend County Borough stretches approximately 20 km from east-to-west and contains diverse natural and human geography; with valley communities in the north, coastal areas to the south and a mix of urban, rural and industrial environments⁴¹, see figure 3.4. This diverse geography provides a good representation of the geography of Wales as a whole, providing opportunity for the roll-out of lessons learned.

³⁹ UK CCC (2016) *Next steps for UK heat policy*. Available at: <https://www.theccc.org.uk/wp-content/uploads/2016/10/Next-steps-for-UK-heat-policy-Committee-on-Climate-Change-October-2016.pdf> (Accessed: 01 October 2018)

⁴⁰ UK CCC (2018) *Reducing UK emissions - 2018 Progress Report to Parliament*. Available at: <https://www.theccc.org.uk/wp-content/uploads/2018/06/CCC-2018-Progress-Report-to-Parliament.pdf> (Accessed: 26 October 2018)

⁴¹ BCBC (2013) *Local Development Plan*. Available at: <https://www.bridgend.gov.uk/media/1899/written-statement.pdf> (Accessed: 30 July 2018)

⁴² BCBC (2011) *Local Development Plan 2006-2021 Renewable Energy Assessment and Energy Opportunities Plan*. Available at: <https://www.bridgend.gov.uk/media/2055/sd115.pdf> (Accessed: 15 October 2018)

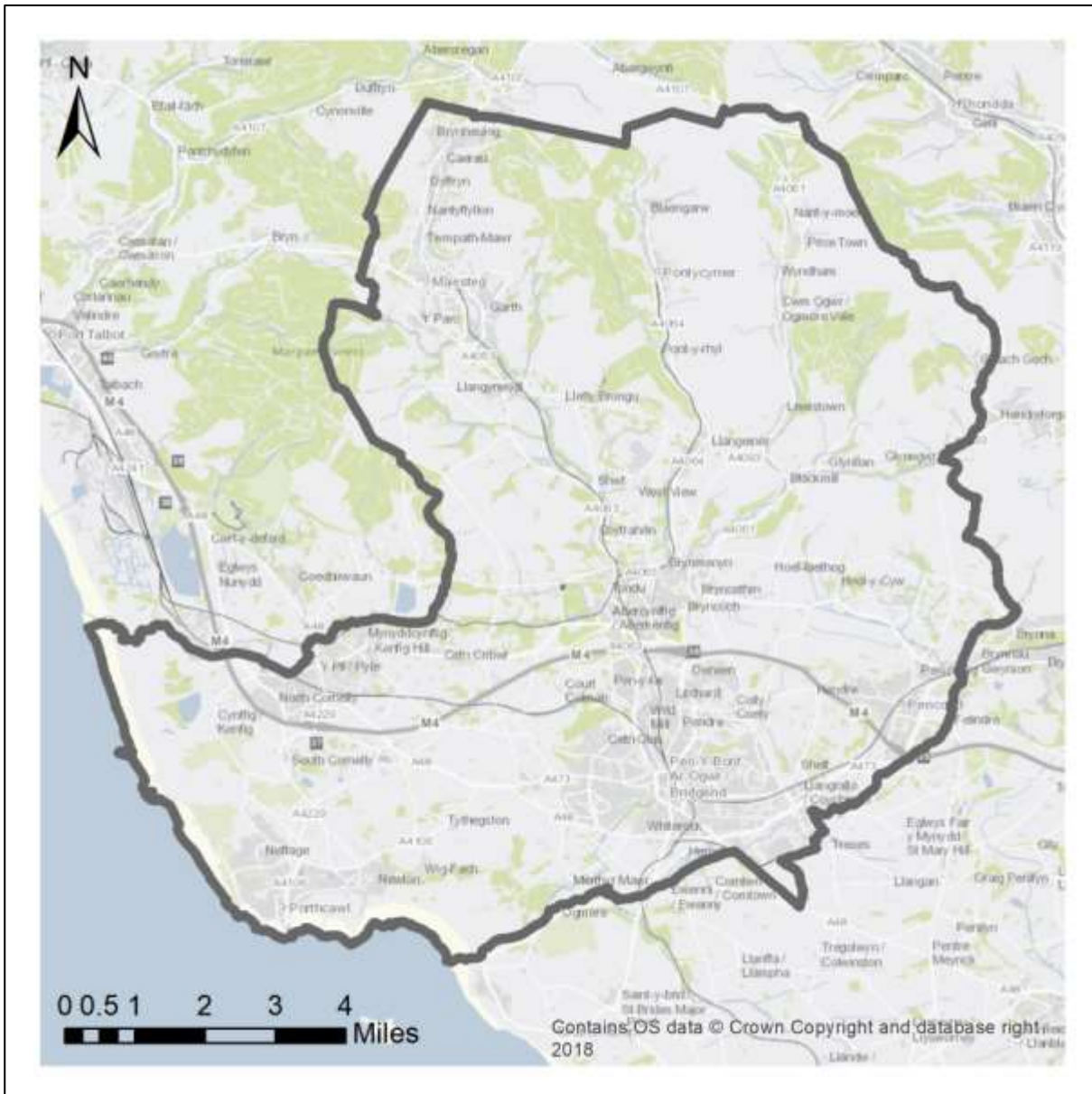


Figure 3.4: Map of Bridgend

(OS data © Crown copyright and database right 2018)

The population of Bridgend County Borough is approximately 140,000, with most residents living in the three main towns; Bridgend (33%), Maesteg in the Llynfi Valley (16%) and the seaside town of Porthcawl (12%)⁴³. It is served by major transport infrastructure, with the M4 crossing the county borough (providing a risk of poor air quality) and the mainline rail link providing easy access to Cardiff, Swansea and the south of England. Owing to its natural geography, the area has attracted renewable electricity developments, predominantly in the form of wind and solar PV (see figure 3.5).

⁴³ BCBC (2014) *Bridgend County Borough Profile – 2014*. Available at: <https://business.bridgend.gov.uk/media/1008/bridgend-county-borough-profile-january-2014.pdf> (Accessed: 19 October 2018)

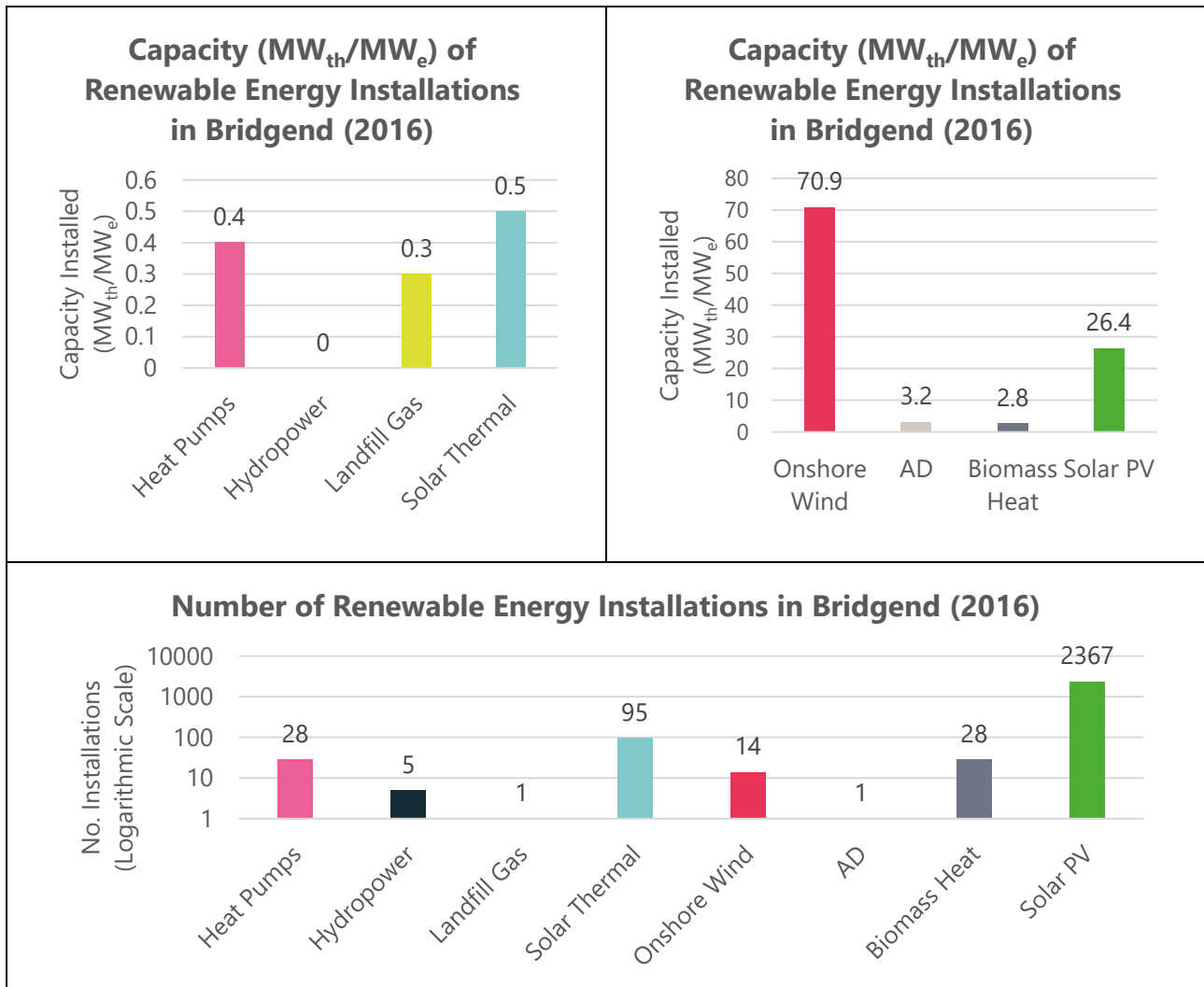


Figure 3.5: Renewable Energy Developments in Bridgend (2016)⁴⁴

⁴⁴ Welsh Government (2016) *Energy Generation in Wales*. Available at: <https://gov.wales/docs/desh/publications/171207-energy-generation-in-wales-en.pdf> (Accessed: 17 September 2018)

4.3. Social Factors

4.3.1. Health

Cold homes have been found to have a significant negative impact on health^{45,46}. Whilst the causes are unknown, the 2014 life expectancy in Bridgend was below the 2016 Welsh and UK national averages (Welsh male: 78.4 years, Welsh female: 82.4 years, UK male: 79.2 years, UK female: 82.9 years), with Bridgend having one of the lowest life expectancies of the Welsh Local Authorities (see figure 3.6)^{47,48}. Within the *Bridgend Energy Transition Plan: Policy & Commercial Insights* it is estimated that £5M of health benefits associated with provision of warmer homes will arise from deployment of the Local Area Energy Strategy up to 2050⁴⁹.

⁴⁵ Age UK (2012) *The cost of cold*. Available at: https://www.ageuk.org.uk/Documents/EN-GB/Campaigns/The_cost_of_cold_2012.pdf?dtrk=true (Accessed: 31 July 2018)

⁴⁶ Marmot Review Team (2011) *The Health Impacts of Cold Homes and Fuel Poverty*. Available at: https://friendsoftheearth.uk/sites/default/files/downloads/cold_homes_health.pdf (Accessed: 15 October 2018)

⁴⁷ Office for National Statistics (2017) *National life tables, UK: 2014-2016*. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/bulletins/nationallifetablesunitedkingdom/2014to2016#life-expectancy-at-birth> (Accessed: 30 July 2018)

⁴⁸ Welsh Government (2014) *Local Area Summary Statistics Bridgend*. Available at: <https://gov.wales/docs/statistics/2014/141218-local-area-summary-bridgend-en.pdf> (Accessed: 30 July 2018)

⁴⁹ ETI (2018) *Bridgend Energy Transition Plan: Policy & Commercial Insights*

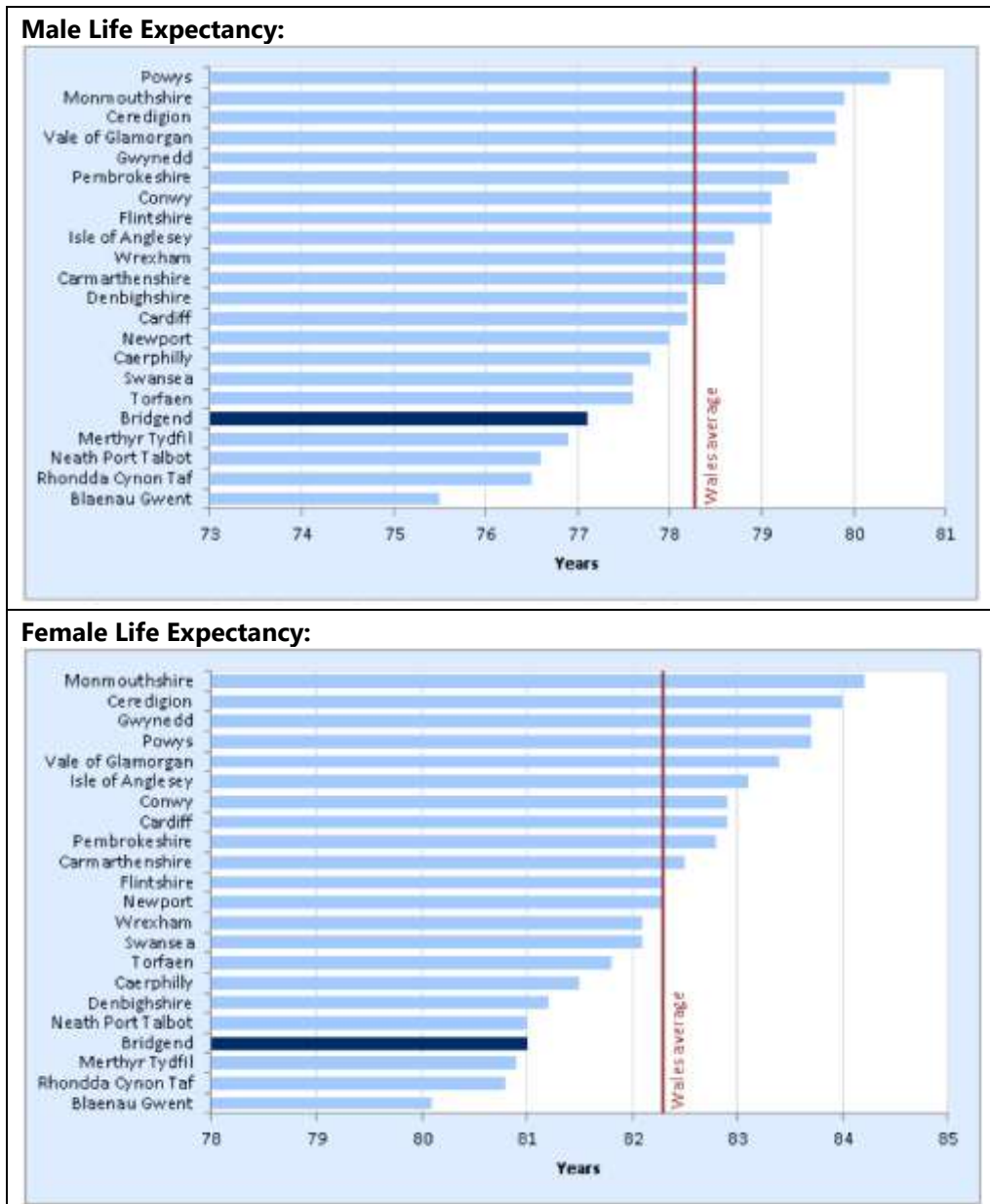


Figure 3.6: Life Expectancy in Wales, 2014⁵⁰

4.3.2. Deprivation

Many communities within the county borough (especially within the valley areas) are among the most deprived in Wales, with the area's employment opportunities located outside the areas of higher deprivation⁵¹. The South Wales Valley communities have unique challenges arising from the end of coal-mining in the region and the economy, standard of life and levels of skills and education lag behind the rest of Wales⁵². The valleys area in Bridgend coincides with incidence of fuel poverty, with additional smaller areas of fuel poverty located further south in the county

⁵⁰ Welsh Government (2014) *Local Area Summary Statistics Bridgend*. Available at: <https://gov.wales/docs/statistics/2014/141218-local-area-summary-bridgend-en.pdf> (Accessed: 30 July 2018)

⁵¹ BCBC (2013) *Local Development Plan*. Available at: <https://www.bridgend.gov.uk/media/1899/written-statement.pdf> (Accessed: 30 July 2018)

⁵² Welsh Government (2017) *Our Valleys, Our Future*. Available at: <https://gov.wales/docs/dsjlg/publications/comm/170720-our-valleys-our-future-env2.pdf> (Accessed: 30 July 2018)

Borough, see figure 3.7. The greatest areas of fuel poverty are concentrated in the valleys communities of Nant-y-Moel, Pontycymmer, Caerau and Blaengarw⁵³.

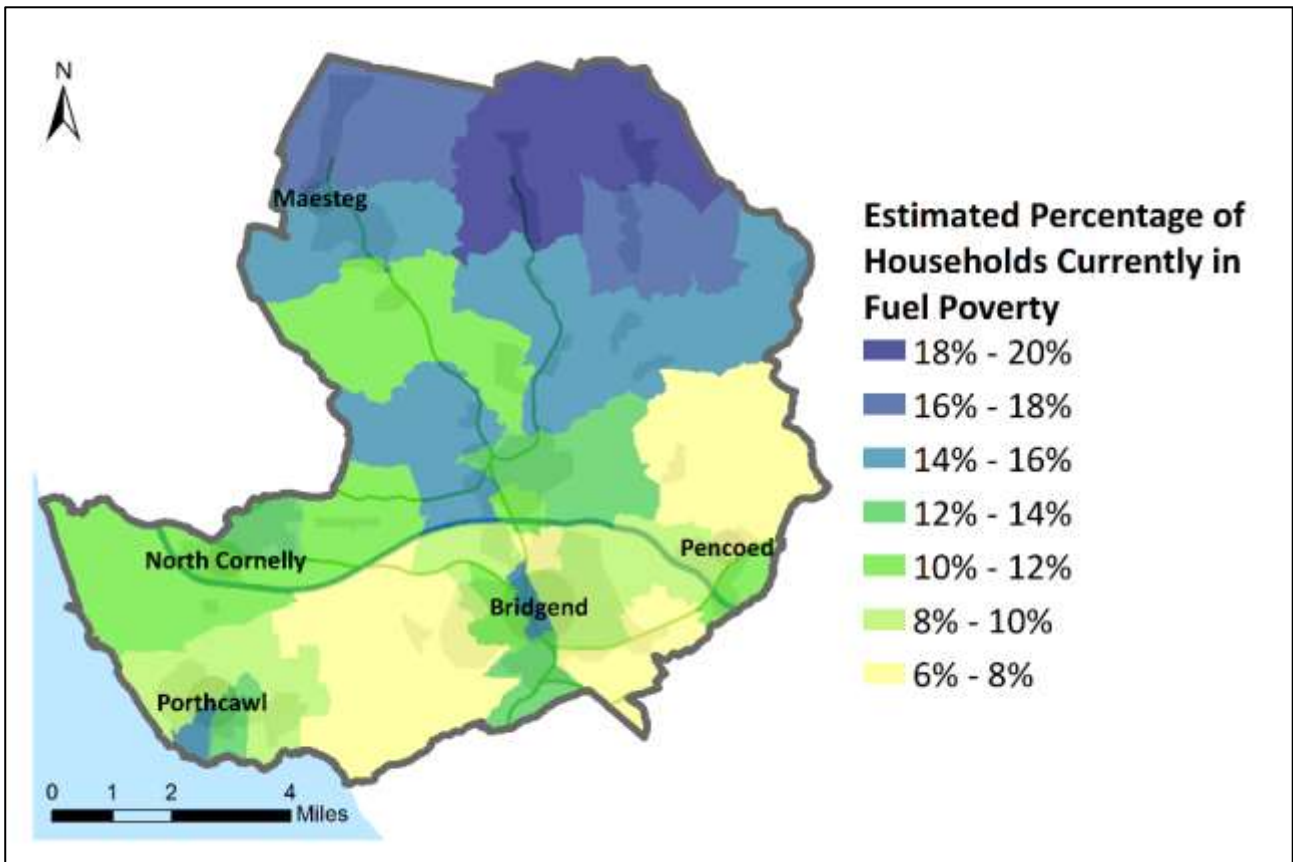


Figure 3.7: Map of Fuel Poverty

(OS data © Crown copyright and database right 2018)

The prevalence of deprivation within valley communities is not unique to Bridgend, but common across the whole of the ex-industrial communities of South Wales Valleys⁵⁴. To help remedy this situation, the Welsh Government launched the Valleys Task Force in 2017, who are working with local communities to develop activities, which aim to provide:

- high quality jobs and the skills to fulfil them,
- improved public services,
- the opportunity to make the most of the Valleys' unique environment, culture and heritage so they can be enjoyed more widely by local people and visitors alike.⁵⁴

4.3.3. House Ownership

The majority of homes in the county borough are owner occupied (76%) with 10% privately rented and 14% social housing⁵³. The greatest proportion of Bridgend's housing stock was built between 1965-1979, with approximately 21% built pre-1914 and over 20% built between World War 1 and 2⁵³.

⁵³ ETI (2018) *Bridgend Local Area Energy Strategy*

⁵⁴ Welsh Government (2017) *Our Valleys, Our Future*. Available at: <https://gov.wales/docs/dsjlg/publications/comm/170720-our-valleys-our-future-env2.pdf> (Accessed: 30 July 2018)

4.3.4. Community Energy Engagement

Community energy activity in Bridgend has increased in recent years due to the efforts of BCBC, local people and Welsh Government and EU funded programmes.

“Reach”, Bridgend’s European funded Rural Development Programme, has made great efforts over the past two years to:

- offer residents home energy advice and provide a sign-posting service to national resources,
- encourage and support residents to collaborate and develop community energy projects,
- provide tailored, expert support to a flag-ship community energy project.⁵⁵

Local sustainability charity, Sustainable Wales, held a series of events in 2017 to encourage the local community to come together and start developing energy projects. As a result of these events an unincorporated sub-group of Sustainable Wales, Porthcawl Community Energy has been set up.

BCBC will engage with the Reach programme during project development, to secure their support for participation with wider consumer engagement and recruitment and to help inform the development process of proposals.

The Energy Company Obligation and Welsh Government’s Arbed programmes have resulted in approximately 400 homes in Bridgend receiving energy efficiency measures installed since 2009.

BCBC has undertaken an extensive programme of community engagement in Caerau, focused on a mine water district heating scheme that is under development (explained further in section 4). This engagement has included public exhibitions, articles in newsletters, attendance at community meetings and events, social media activity, school workshops and involvement in detailed house assessments. Through this extensive engagement, project champions from the local community have naturally emerged and are intended to form part of an ongoing, wider Caerau Community Advisory Group. Associated with this engagement, Cardiff University has led qualitative, longitudinal interview studies with 25 Caerau residents, monitoring and understanding experiences and views of the energy system and how this changes as propositions are tested within the village, e.g. targeted retrofits. Learning from the results of this work should be considered when progressing the future project activity. SPECIFIC⁵⁶ and Cardiff Metropolitan University undertook detailed whole house assessments as part of Caerau Mine Water Project Feasibility Study, working with 10 Caerau householders to gain a sound understanding of the energy efficiency of the housing stock within Caerau as well as the compatibility of the current heating systems to utilise heat pump technology and demand management techniques.

4.4. Technical Factors

4.4.1. Gas Network Coverage

The gas network within Bridgend, operated by Wales and West Utilities is extensive, with 97% of the ~62,000 domestic properties within the county borough served by the network⁵⁷. This is far

⁵⁵ BCBC (2018) *Bridgend County Energy Challenge*. Available at: <https://www.bridgendenergy.co.uk/> (Accessed: 30 July 2018)

⁵⁶ SPECIFIC Innovation and Knowledge Centre is an academic and industrial consortium led by Swansea University, with strategic partners Akzo Nobel, NSG Pilkington, Tata Steel and Cardiff University. It is funded by the Engineering and Physical Sciences Research Council, Innovate UK and the European Regional Development Fund, through the Welsh Government.

⁵⁷ ETI (2018) *Bridgend Local Area Energy Strategy*

higher than the 2016 national average of 83% in Wales and 86% in Great Britain⁵⁸. Figures 3.8 and 3.9 show the distribution of off-gas properties within the county borough.

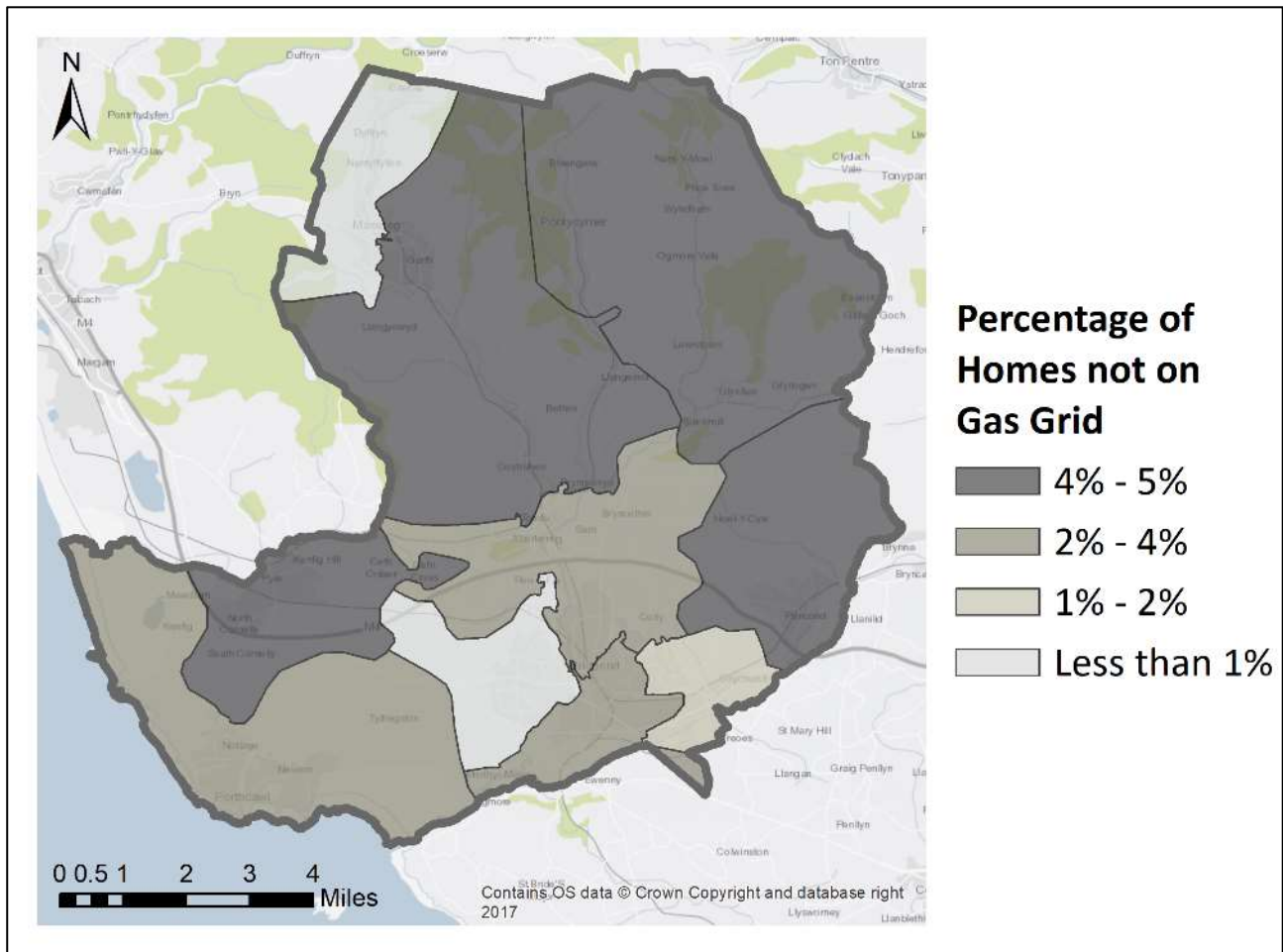


Figure 3.8: Percentage of Off-gas Homes in Different Areas of Bridgend

(OS data © Crown copyright and database right 2018)

⁵⁸ BEIS (2018) *LSOA estimates of households not connected to the gas network*. Available at:

<https://www.gov.uk/government/statistics/lsOA-estimates-of-households-not-connected-to-the-gas-network> (Accessed: 30 July 2018)

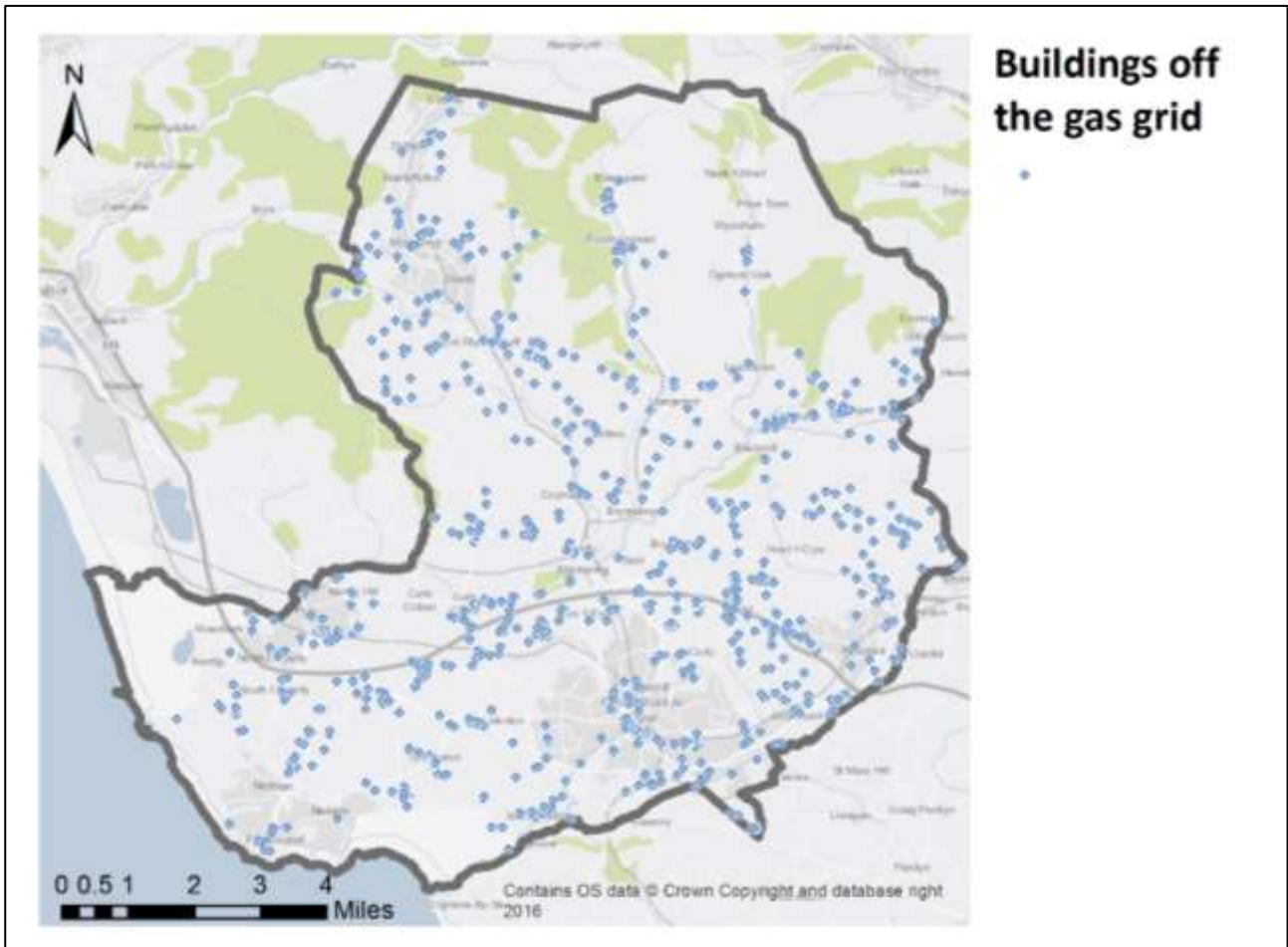


Figure 3.9: Location of Off-gas Homes in Bridgend

(OS data © Crown copyright and database right 2018)

4.4.2. Electricity Network Constraints

The electricity distribution network in Bridgend is operated by Western Power Distribution (WPD). As per much of South Wales, the distribution network is constrained with respect to generation connections⁵⁹. This increases the likelihood of export restrictions or expensive additional generation connections, due to network reinforcement requirements. Increases in electrical loads through electrification of heating and transport may cause constraints and reinforcement requirements with respect to demand connections. The Local Area Energy Planning work undertaken by Energy Systems Catapult has accounted for the costs and requirements to upgrade the electricity network to meet the forecast demand increases.

4.4.3. Digitalisation

⁵⁹ Western Power Distribution (no date) *Distributed Generation EHV Constraint Maps*. Available at: <https://www.westernpower.co.uk/Connections/Request-network-location-plans/Distributed-generation-EHV-constraint-maps.aspx> (Accessed: 30 July 2018)

The UK Government's Industrial Strategy highlights the productivity benefits that artificial intelligence (AI) and data analytic technologies can provide⁶⁰. It identifies the energy sector as one of the six priority business sectors to be targeted for rapid AI adoption to enable more efficient use of energy and resources and provide more integrated energy provision across heat, power and transport⁶¹. The internet of things and a need for new consumer business models will help to drive the installation and use of digital infrastructure within the energy industry.

The Smart Systems and Heat Phase 1 and 2 programmes developed software tools to design a smart energy experimental platform (the Home Energy Services Gateway or HESG). A number of consumer behaviour, technology development, business modelling and supply-chain activities were also undertaken to understand how energy can be delivered as a service, by providing consumers with the experience they desire (i.e. a comfortable home) rather than a product that they do not necessarily understand (a unit of energy)⁶². The platform was deployed in approximately 100 properties in the UK, including 30 within Bridgend, to monitor and understand energy usage within individual homes and how this data can be used to help develop propositions which will improve consumer service whilst lowering carbon emissions. The gateway now provides a "living lab" of connected homes, which can be used by innovators to test new concepts and products.

BCBC recognise that digitalisation does not only offer opportunities for the energy sector and have ambitions for the infrastructure developed for their heating projects to be built upon to provide wider benefits to their residents. Digital Master Planning undertaken for BCBC has set out key areas that would benefit from digitalisation within the county borough and the major steps required for development. Sectors to be targeted include buildings, health and social care and transportation. BCBC will aim to increase digitalisation of the county borough alongside each of the innovation and deployment projects deployed.

4.5. Economic Factors

4.5.1. Employment

The economy of Bridgend is more reliant on the manufacturing sector than Wales as a whole, with Ford, Sony and Rockwool production facilities located within the county borough^{63,64}.

Understanding of the energy needs of this sector may identify opportunities for developing wider local energy generation and use infrastructure centred on large energy loads, to provide investment certainty.

⁶⁰ BEIS (2017) *Industrial Strategy*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf (Accessed: 30 July 2018)

⁶¹ BEIS (2017) *Industrial Strategy*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf (Accessed: 30 July 2018)

⁶² ETI (2018) *Local Area Energy Planning Bridgend County Borough Council Evidence Base*

⁶³ BCBC (2010) *Employment Land Review*. Available at: <https://www.bridgend.gov.uk/media/1163/employment-land-review.pdf> (Accessed: 30 July 2018)

⁶⁴ BCBC (2013) *Local Development Plan*. Available at: <https://www.bridgend.gov.uk/media/1899/written-statement.pdf> (Accessed: 30 July 2018)

Current employment rates in Wales are 74%, slightly lower than the UK rate of 75.7%⁶⁵. In 2013 the employment rate in Bridgend was 72.1% and the gross disposable income per household in 2012 was lower than the Welsh average, see figure 3.10⁶⁶.

⁶⁵ Office of the Secretary of State for Wales (2018) *Welsh employment rates at record high*. Available at: <https://www.gov.uk/government/news/welsh-employment-rates-at-record-high> (Accessed: 10 October 2018)

⁶⁶ Welsh Government (2014) *Local Area Summary Statistics Bridgend*. Available at: <https://gov.wales/docs/statistics/2014/141218-local-area-summary-bridgend-en.pdf> (Accessed: 30 July 2018)

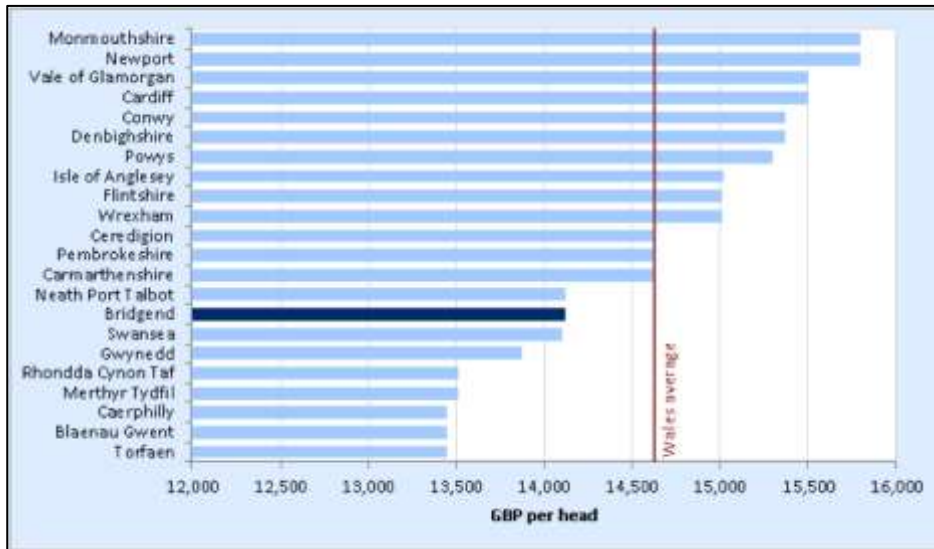


Figure 3.10: Gross Disposable Income per Head, 2012⁶⁷

The UK Industrial Strategy identifies the transition to a cleaner economy as “one of the greatest industrial opportunities of our time”⁶⁸. Innovate UK’s schemes return an average of £7.30 Gross Value Added to the economy for every £1 invested⁶⁹. The Welsh Government Warm Homes Arbed EU scheme achieved a Welsh Local Multiplier of £2, meaning that for £1 spent on the contract £2 was reinvested in the Welsh Economy⁷⁰. More than 430,000 UK jobs in low carbon businesses and their supply chains have already been created and “the UK low carbon economy could grow by an estimated 11 per cent per year between 2015 and 2030 – four times faster than the rest of the economy”⁷¹. By implementing this plan with a local focus and securing investment into a series of projects in the local area, Bridgend and its citizens are more likely to directly benefit from this projected growth.

4.5.2. Energy Support Programmes

Welsh Government Smart Living Programme

The Welsh Government’s Smart Living Programme provides support to develop innovative energy solutions that are place-based and needs-led⁷². The programme is working with twelve projects to test energy innovations, with the learning used to enable future roll-out of the energy transition across Wales.

⁶⁷ Welsh Government (2014) *Local Area Summary Statistics Bridgend*. Available at: <https://gov.wales/docs/statistics/2014/141218-local-area-summary-bridgend-en.pdf> (Accessed: 30 July 2018)

⁶⁸ BEIS (2017) *Industrial Strategy*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf (Accessed: 30 July 2018)

⁶⁹ Innovate UK (2017) *Innovate UK: 10 years shaping the future*. Available at: <https://www.gov.uk/government/publications/innovate-uk-10-years-shaping-the-future> (Accessed: 19 November 2018)

⁷⁰ Ricardo Energy and Environment (2017a) *Evaluation report - ARBED 2 European Regional Development Fund (ERDF) programme 2012-2015*. Available at: <https://gov.wales/docs/desh/publications/171106-welsh-government-warm-homes-arbed-eu-project-final-report-en.pdf> (Accessed: 10 October 2018)

⁷¹ BEIS (2017) *Clean Growth Strategy*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf (Accessed 10 October 2018)

⁷² Welsh Government (2016) *Smart Living Internet of Life*. Available at: <https://gov.wales/docs/det/publications/161019-smart-living-en.pdf> (Accessed 10 October 2018)

Two of the twelve projects are located in Bridgend⁷³:

- **Bridgend Smart Systems and Heat:** The Welsh Government Smart Living Programme are providing additional support to the activities of the Smart Systems and Heat programme to ensure that the benefits of the programme are maximised⁷³.
- **Smart Living Wales' Fair Futures Project:** The Welsh Government is working with Cardiff University and Energy Systems Catapult to understand how issues of vulnerability can be addressed in a future low carbon energy system⁷⁴.

Welsh Government Energy Support Service

The current Welsh Government Energy Support Service, launched in 2018, is a four-year programme which brings together two previous support services; Green Growth Wales and the Local Energy Service to provide a single point of service for support for public sector and others to develop renewable energy and energy efficiency projects⁷⁵. The Service provides both technical and funding support to renewable energy projects in Wales⁷⁶.

Welsh Government Warm Homes Programme

The Welsh Government Warm Homes Programme includes the Arbed and Nest schemes, and funds energy efficiency improvements for low income households and those living in deprived communities⁷⁷. Whilst Nest is concerned with individuals, the Arbed Scheme works with Local Authorities to deliver area-wide energy efficiency deployment⁷⁷. Grant funding is provided for the measures, and the focus of both programmes is remediation of fuel poverty, rather than focusing on decarbonisation or regeneration. The third phase of Arbed was launched in June 2018 and will run for at least three years. The programme is managed by a newly formed company, Arbed am Byth, which is a joint venture between the Energy Saving Trust and Everwarm.

EU Rural Development Programme

The EU-funded Rural Development Programme is a 7-year programme of support for those living and working in rural areas. It provides funding for projects which align with the European Rural Development Priorities:

- *fostering knowledge transfer and innovation in agriculture, forestry, and rural areas*
- *enhancing farm viability and competitiveness of all types of agriculture in all regions and promoting innovative farm technologies and the sustainable management of forests*
- *promoting food chain organisation, including processing and marketing of agricultural products, animal welfare and risk management in agriculture*
- *restoring, preserving and enhancing ecosystems related to agriculture and forestry*
- *promoting resource efficiency and supporting the shift towards a low carbon and climate resilient economy in agriculture, food and forestry sectors*

⁷³ Welsh Government (2018) *Welsh Government Smart Living Initiative*. Available at: <https://www.cse.org.uk/downloads/reports-and-publications/policy/renewables/welsh-govt-smart-living-initiative-english-version-july-2018.pdf> (Accessed: 15 October 2018)

⁷⁴ Energy Systems Catapult (2018) *Fair Futures*. Available at: <https://es.catapult.org.uk/projects/fair-futures/> (Accessed: 15 October 2018)

⁷⁵ Welsh Government (2018) *Written Statement - Launch of the Welsh Government Energy Service*. Available at: <https://gov.wales/about/cabinet/cabinetstatements/2018/launchofwges/?lang=en> (Accessed: 15 October 2018)

⁷⁶ Welsh Government (no date) *Welsh Government Energy Service*. Available at: <http://localenergy.gov.wales/en/> (Accessed: 15 October 2018)

⁷⁷ Welsh Government (2017) *Warm Homes Programme*. Available at: <https://gov.wales/topics/environmentcountryside/energy/efficiency/warm-homes/?lang=en> (Accessed: 30 July 2018)

- *promoting social inclusion, poverty reduction and economic development in rural areas.*⁷⁸

Within Bridgend the Rural Development Programme is working with the Centre for Sustainable Energy to develop community energy projects and raise awareness of energy efficiency in the home⁷⁹.

⁷⁸ Welsh Government (2018) *Welsh Government Rural Communities – Rural Development Programme 2014-2020*. Available at: <https://gov.wales/topics/environmentcountryside/farmingandcountryside/cap/ruraldevelopment/wales-rural-development-programme-2014-2020/?lang=en> (Accessed 10 October 2018)

⁷⁹ BCBC (2018) *Bridgend County Energy Challenge*. Available at: <https://www.bridgendenergy.co.uk/> (Accessed: 30 July 2018)

5. Near-term Project Delivery Plan (up to 2025)

This section describes:

- the three deployment projects (DP) within the project pipeline,
- the key priority innovation projects (InPs), which have been developed based on the five near-term Strategy Activities (SA) identified within the Strategy⁸⁰,
- additional complementary activities to be pursued alongside specific projects.

Following a description of the projects, a timeline is provided to set the project delivery alongside one another in the near-term (up to 2025). As the projects are developed and discussed with funders and partners a priority hierarchy will be established, and the delivery timescales may need to be updated. Learning from each of the projects will be used to develop more projects and enable further roll-out of decarbonisation technologies and as additional project opportunities are identified these will be pursued alongside the projects described here.

In the near-term BCBC will also continue to take forward the other, non-project specific activities identified and recommended in the Bridgend Local Area Energy Strategy:

- collect detailed and robust data for the non-domestic buildings in Bridgend to allow the Local Area Energy Strategy to be updated to encompass non-domestic building planning,
- identify suitable sources of low and zero carbon heat to decarbonise the heat supplied to heat networks where gas is initially used,
- evaluate planning policy to ensure that it is supportive of the decarbonisation strategy.⁸⁰

One of BCBC's key aims of the energy transition is to use it to stimulate economic growth and job creation within the county borough. Through the SSH activities BCBC has sought to establish Bridgend County Borough as a Centre for Innovation, focused around the energy transition and digital transformation. As a Centre for Innovation, Bridgend will be viewed by potential energy innovators as an ideal area to develop ideas, test products and market offerings, and invest in skills, jobs and infrastructure. A series of activities will be required to ensure that Bridgend is widely recognised as a Centre for Innovation and the opportunity for additional project development (outside of those identified), economic growth and job creation are maximised.

The two most progressed projects under development by BCBC are:

- Deployment Project 1: Bridgend Town Lower Carbon District Heat Network:
 - All the feasibility work associated with this project has been undertaken and the Outline Business Case is complete.
 - Funding and support for the project development was secured from Welsh Government, HNDU and internal BCBC resource.
 - Capital funding applications are being pursued and the project is likely to start construction late 2019 or in 2020.
- Innovation Project 3: Caerau Mine Water Gas-to-District Heat Network:
 - A detailed feasibility study for this project has been undertaken and the project is progressing to the commercial business modelling stage.
 - Significant community engagement has been undertaken in the local area, including public exhibitions, articles in newsletters, attendance at community meetings and events, social media activity, school workshops and detailed house assessments.

⁸⁰ ETI (2018) *Bridgend Local Area Energy Strategy*

- A grant offer of approximately £6.5M has been made by ERDF, and discussions are underway with other funders to secure, in principle, the remaining match funding required for the project delivery. The business plan submitted to the Welsh European Funding Office provides more details regarding the scheme, albeit the project has developed substantially since the drafting of this document. Project development has been supported by funding secured from HNDU, BCBC and Welsh Government.

In addition to the projects being pursued by BCBC, Wales and West Utilities, Western Power Distribution and PassivSystems have delivered the FREEDOM (Flexible Residential Energy Efficiency Demand Optimisation and Management) project in Bridgend. The FREEDOM project's research objectives are *"...to better understand if hybrid heating systems are technically capable, affordable and attractive to customers as a way of heating homes."*⁸¹. The final report for the FREEDOM project was published in October 2018 and *"The project successfully demonstrated that hybrid heating systems were able to maintain consumer comfort across a broad range of housing types, ages and sizes, with consumers from a range of socio-economic groups ... without making any changes to the existing wet heating system that was being used for the gas boiler and with no thermal improvements to the property"*⁸².

As mentioned in section 3.4.3 the Home Energy Services Gateway, a smart energy experimental platform, has been deployed in 30 properties within Bridgend, to monitor and understand energy usage within individual homes and how this data can be used to support propositions which will improve consumer service whilst lowering carbon emissions. The gateway now provides a "living lab" of connected homes, which can be used by innovators to test new concepts and products.

Bridgend are also the focus of a project within ESC's Fair Futures Programme, which looks to better understand the opportunities for reducing energy vulnerability faced by consumers as the energy system transforms through decarbonisation and digitalisation. This particular project was commissioned by Welsh Government and is delivered by Cardiff University and Energy Systems Catapult. The project aims to explore how consumer needs and vulnerabilities experienced by households in Bridgend could inform the design of consumer-centred innovation in a future low carbon energy system.

⁸¹ Western Power Distribution (no date) *FREEDOM*. Available at: <https://www.westernpower.co.uk/projects/freedom> (Accessed 10 October 2018)

⁸² Freedom Project (2018) *Freedom Project Final Report* Available at: <https://www.westernpower.co.uk/downloads/12221> (Accessed 15 October 2018)

5.1. Deployment Projects – Project Summaries

5.1.1. Deployment Project 1: Bridgend Town Lower Carbon District Heat Network

District heating offers an efficient method of providing energy to a local area. The Local Area Energy Planning undertaken by Energy Systems Catapult identified district heating as the dominant heating method to achieve cost-effective decarbonisation of heating in Bridgend town⁸³. Detailed feasibility and initial design work has been undertaken to determine the most appropriate configuration of an initial district heating scheme within the town and an Outline Business Case has been prepared and signed off by BCBC Cabinet for its development. The project is currently undergoing final project design, prior to completing the funding package and undertaking procurement for the Design, Build, Operation and Maintenance (DBOM) contract.

The initial district heat network will be based on a gas CHP plant, but will look to transition to a lower carbon heat source in due course. The project will provide an initial heat network, which could be extended in the future, to enable further decarbonisation. The project will provide energy to public, residential and commercial buildings in Bridgend town centre in a more efficient manner, progressing BCBC’s decarbonisation agenda. It also provides the opportunity for digitalisation to be integrated into the scheme and a heat as a service offering to be introduced.

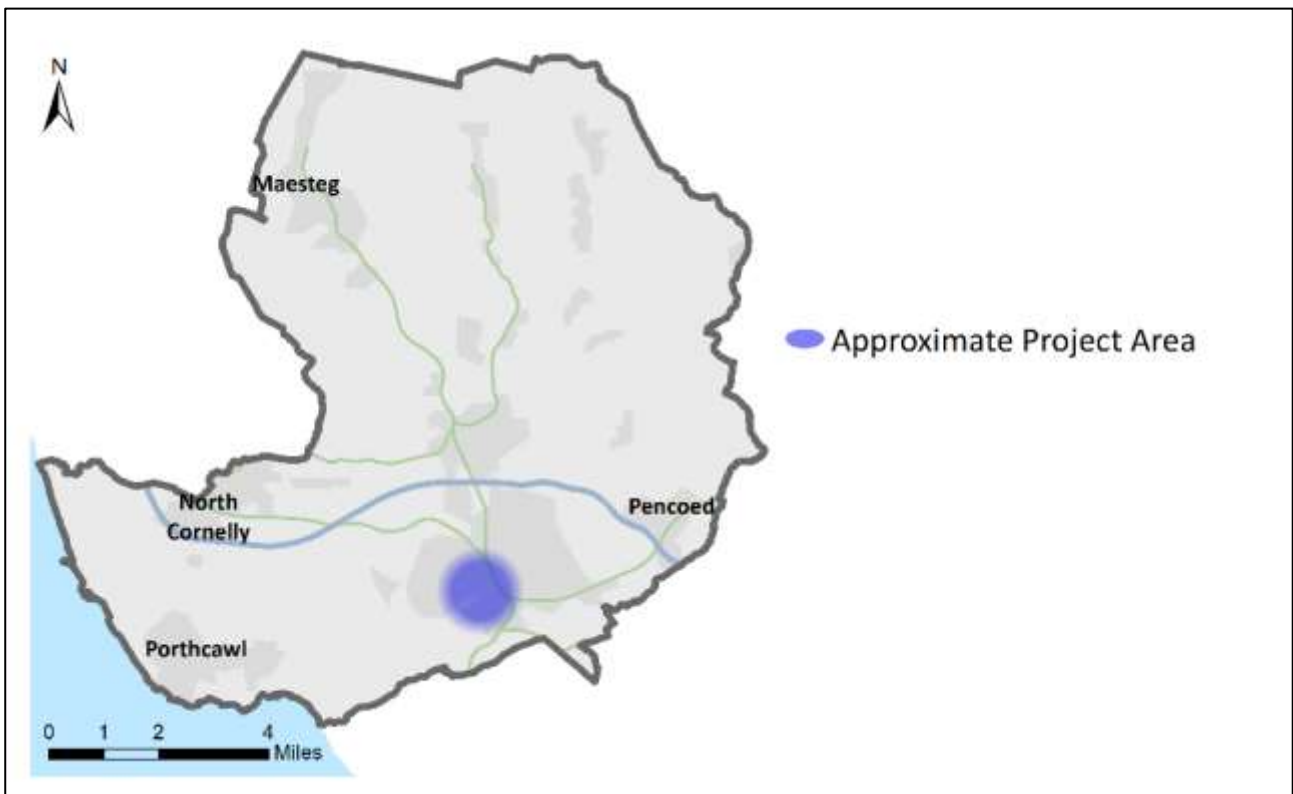


Figure 4.1: Initial Project Target Area

(OS data © Crown copyright and database right 2018)

⁸³ ETI (2018) *Bridgend Local Area Energy Strategy*

5.1.2. Deployment Project 2: Bridgend Town Lower Carbon District Heat Network Phase 2

Deployment Project 1: Bridgend Town provides the first step in the decarbonisation of Bridgend town. This initial heat network can be added to and extended by developing additional networks to transition the whole area to a district heating energy system by 2050, as outlined in the Strategy. Alternative heat network locations and configurations were considered within the feasibility work undertaken for Deployment Project 1. This will be revisited to identify an appropriate location for the next phase of the Bridgend Town Heat Network, with necessary partners identified and secured. The potential to extend the network to existing residential areas will be informed from the consumer insights gained through Innovation Project 4. The additional heat network will build on the business case established for the initial Bridgend Town Heat Network and further progress BCBC’s decarbonisation agenda for Bridgend town.

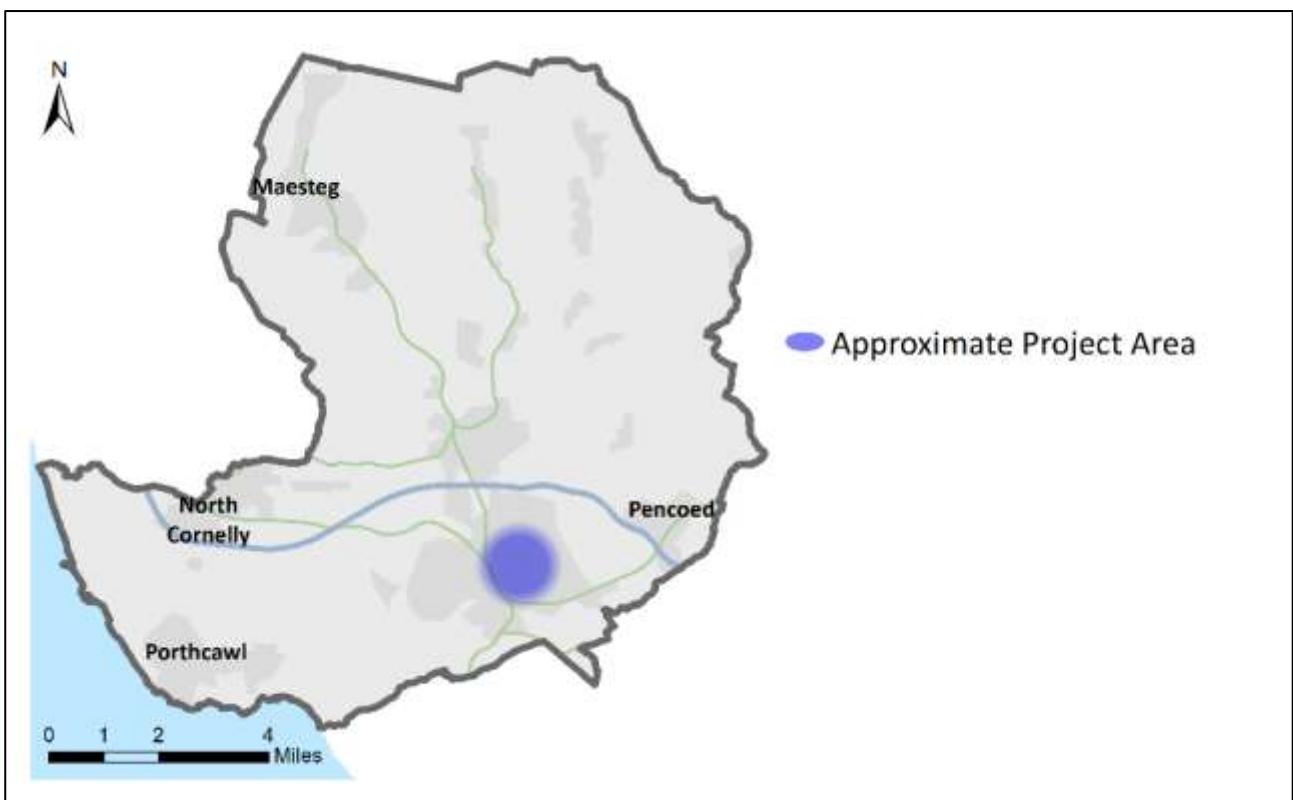


Figure 4.2: Likely Project Target Area

(OS data © Crown copyright and database right 2018)

5.1.3. Deployment Project 3: Energy Efficiency Projects

The Welsh Government’s Area Based Initiative under the Warm Homes Scheme; Arbed, is being delivered by Arbed am Byth. “The aim of the scheme is to help eradicate fuel poverty by identifying and installing where appropriate energy efficiency measures in properties in areas of severe fuel poverty across Wales”⁸⁴. Arbed am Byth are working with the Welsh Local Authorities via the Carbon Trust to identify a pipeline of projects. Once the projects are identified, the scheme will be publicised in the areas targeted, and households interested will have their buildings surveyed. Suitable measures will be identified and installed and following installation the properties will be resurveyed to ensure that the measures are installed correctly.

BCBC will work with Arbed am Byth to develop a pipeline of projects, which will look to target areas experiencing fuel poverty with energy efficiency measures. The Local Area Energy Strategy has identified areas which would most benefit from retrofit, and areas which are affected by high levels of fuel poverty⁸⁵. These two elements do not necessarily interact. The Arbed programme criteria is to target areas in severe fuel poverty, as such these areas will be prioritised but consideration of where there is most scope for retrofit deployment and measures that are most cost effective will be considered to maximise the benefit of the scheme’s deployment.

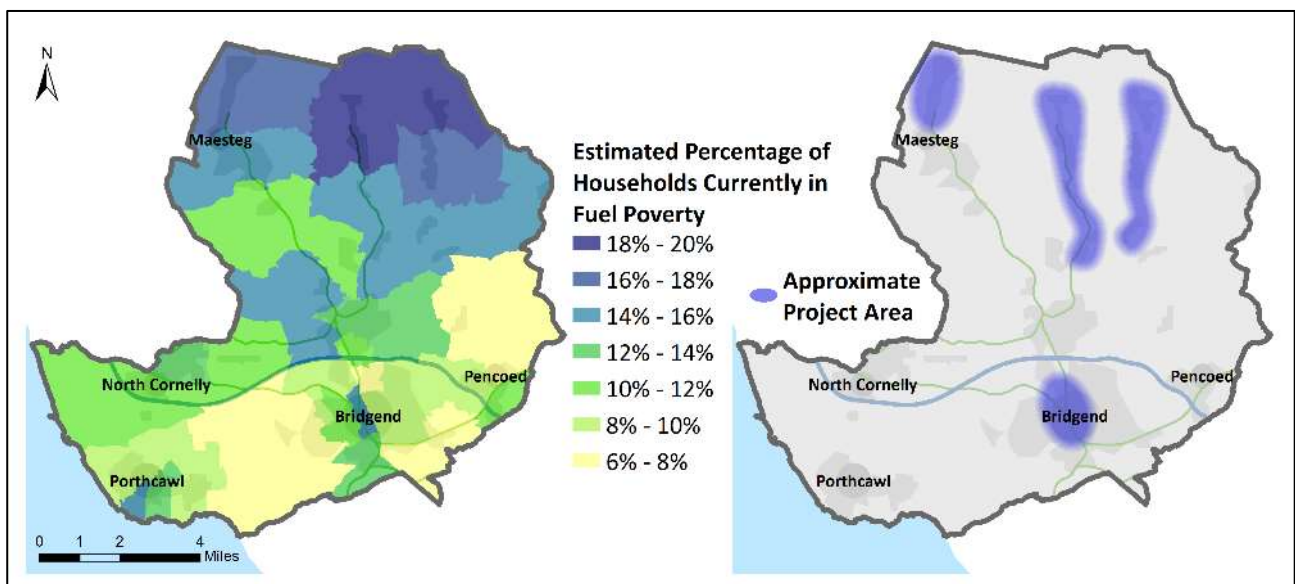


Figure 4.3: Percentage of Households currently in Fuel Poverty and Areas Likely to be targeted by the Project

(OS data © Crown copyright and database right 2018)

⁸⁴ Arbed am Byth (2018) *Helping to Warm Homes across Wales*. Available at: <http://www.arbedambyth.wales/index.html> (Accessed: 15 October 2018)

⁸⁵ ETI (2018) *Bridgend Local Area Energy Strategy*

5.2. Innovation Projects

This section describes BCBC’s evolving innovation developments. The projects are at different stages of development, and BCBC are looking to engage with public and private partners to further shape, develop and ultimately deliver the projects. These projects will provide learning opportunities for all participants and will help inform further progression of the decarbonisation agenda within Bridgend. Section 4.2.7 summarises how the projects relate to SSH, the Local Area Energy Strategy, local context and the overall UK energy transition.

5.2.1. Innovation Project 1: Fully Targeted Retrofit

Improving building energy efficiency is a key opportunity for reducing carbon emissions⁸⁶. Whilst deep retrofit of UK housing stock is technically feasible the cost would be similar to rebuilding the entire stock⁸⁷. Targeting an appropriate mix of measures on specific housing and occupants provides more cost-effective decarbonisation⁸⁷. This project looks to test this assertion by:

- Targeting areas that have been identified through the local area energy planning as having the greatest proportion of properties that would benefit from additional insulation (see figure 4.4), and
- Using dynamic modelling to fully understand energy flows within the dominant building types and identify the most cost-effective energy efficiency measures for a given budget and heating system.

The impact of installed measures on the properties will be monitored and analysed to consider development of new consumer offerings and business models, building on the following objectives of **Strategy Activity 1**:

- *Identify new business models that can self-finance wide scale deployment; this could involve providing integrated solutions incorporating other measures alongside retrofit. Reducing dependency on public grants.*
- *Focus on: developing and delivering new retrofit service offers and business models that also improve quality of homes/comfort; defining target areas and consumer segments; and adopting a means of performance contracting to ensure outcomes rather than measures are achieved.*⁸⁶

⁸⁶ ETI (2018) *Bridgend Local Area Energy Strategy*

⁸⁷ ETI (2016) *Housing Retrofits – A new start*. Available at: <https://www.eti.co.uk/insights/housing-retrofits-a-new-start> (Accessed: 4 September 2018)

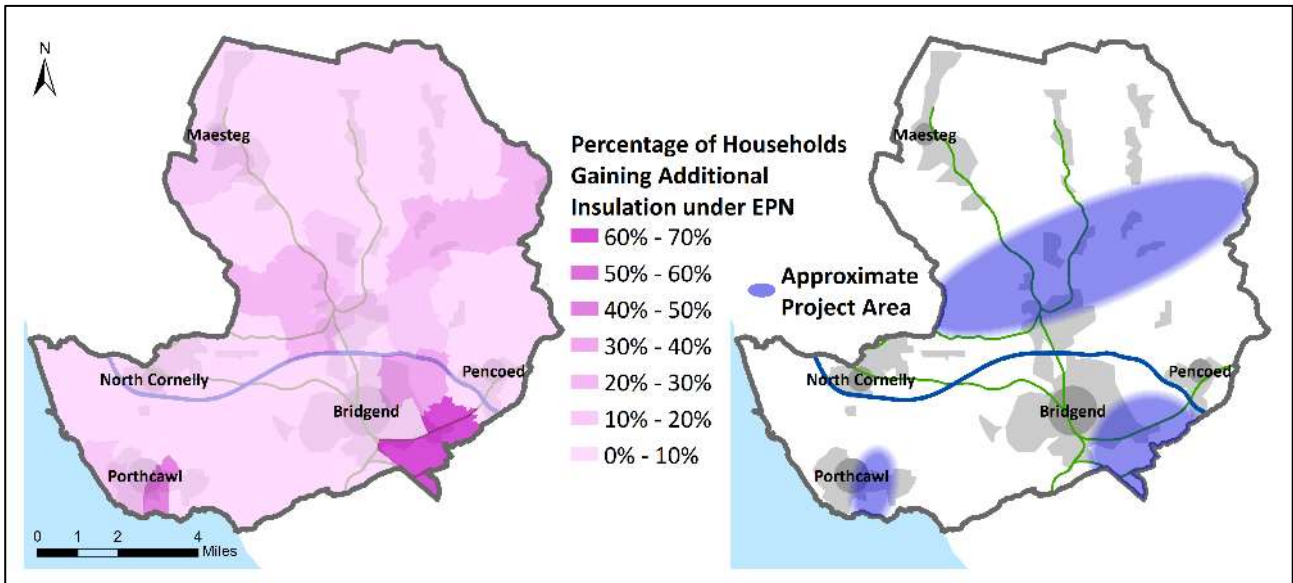


Figure 4.4: Proportion of Households identified as benefiting from Additional Insulation and Project Target Areas⁸⁸

(OS data © Crown copyright and database right 2018)

⁸⁸ ETI (2018) *Bridgend Local Area Energy Strategy*

5.2.2. Innovation Project 2: Hybrid Heat Pumps and Full Electrification

As mentioned above, Bridgend hosted the FREEDOM (Flexible Residential Energy Efficiency Demand Optimisation and Management) project, which looked “...to better understand if hybrid heating systems are technically capable, affordable and attractive to customers as a way of heating homes.”⁸⁹. “The project successfully demonstrated that hybrid heating systems were able to maintain consumer comfort across a broad range of housing types, ages and sizes, with consumers from a range of socio-economic groups ... without making any changes to the existing wet heating system that was being used for the gas boiler and with no thermal improvements to the property”⁹⁰.

BCBC would like the success of the FREEDOM project to be built upon within Bridgend and the role of hybrid heat pumps in the overall decarbonisation of the Bridgend energy system as opposed to full electrification to be further explored.

Project areas that are currently being considered with respect to this include:

- The suitability of hybrid heating systems within a non-domestic environment, with an assessment of BCBC’s own estate considering this,
- The potential for hybrid heating systems to be utilised as a transition technology within areas in which local area energy planning identified full electrification to be the most cost-effective heating system for 2050,
- The optimum housing fabric conditions and market environment to minimise carbon emissions when utilising a fully smart hybrid heating system.

The local area energy planning results identified the greatest average number of hybrid heat pumps in the Ogmore and Garw valleys, with fully electrified heating systems also identified nearby⁹¹. As such, it is intended that these areas will be targeted initially for further domestic hybrid heat pump deployment.

This project will focus on the following objectives of **Strategy Activity 2**:

- *Understand value of hybrids – is it transition technology or a long term 2050 solution.*
- *Develop and test compelling customer propositions that are attractive to customers so they buy-in to the transition.*
- *Build on the FREEDOM Project.*
- *Consider benefits of hybrid v electrification, potentially alongside fabric improvement.*
- *Provide further evidence on potential role of hybrid solutions before making energy network decisions.*⁹¹

⁸⁹ Western Power Distribution (no date) *FREEDOM*. Available at: <https://www.westernpower.co.uk/projects/freedom> (Accessed 10 October 2018)

⁹⁰ Freedom Project (2018) *Freedom Project Final Report* Available at: <https://www.westernpower.co.uk/downloads/12221> (Accessed 15 October 2018)

⁹¹ ETI (2018) *Bridgend Local Area Energy Strategy*

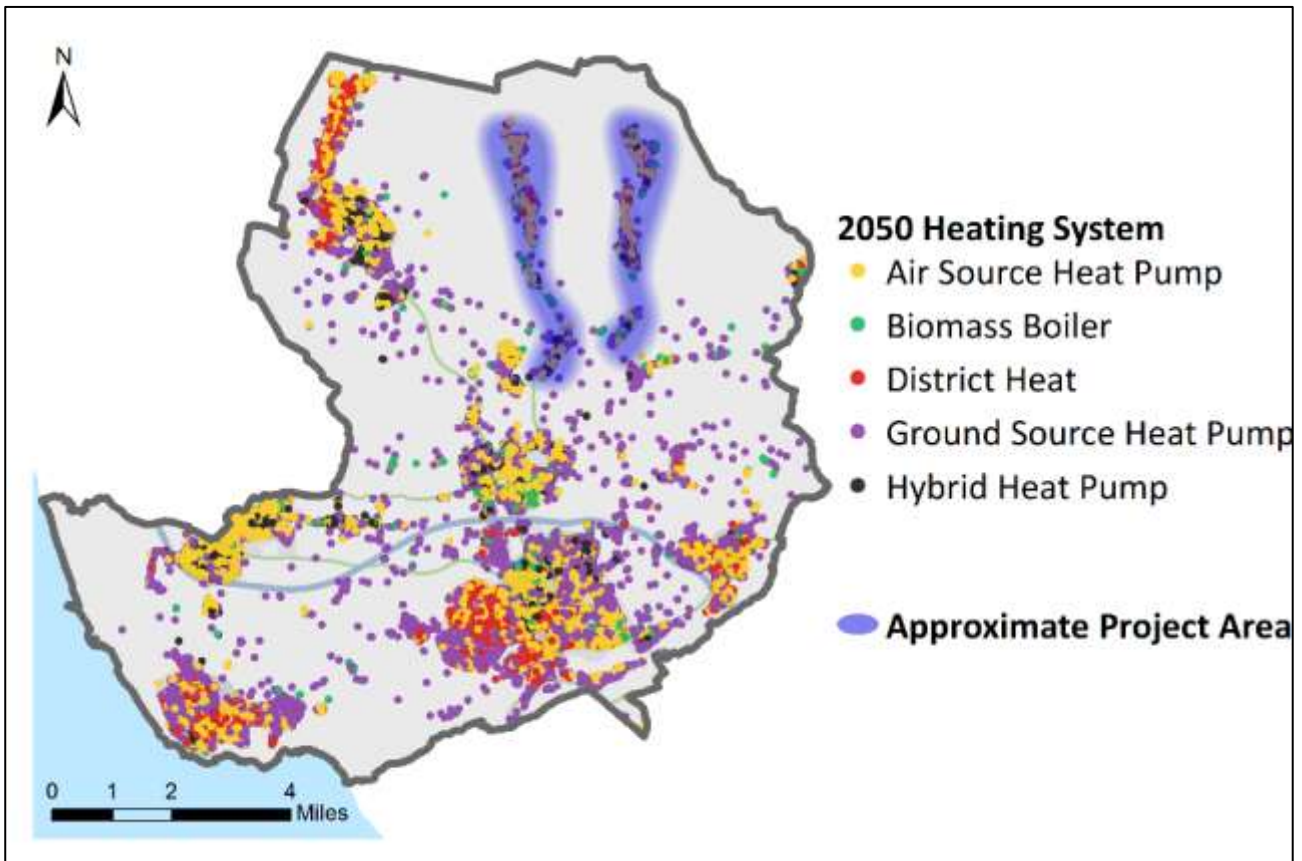


Figure 4.5: Heating Systems Identified from the Local Area Energy Planning under the Green Gas Scenario and Project Target Areas

(OS data © Crown copyright and database right 2018)

5.2.3. Innovation Project 3: Caerau Mine Water Gas-to-District Heating Transition

The Upper Llynfi Valley has been identified as a potential area for district heating (DH). Feasibility work has been undertaken and an Outline Business Case prepared for a scheme that utilises the water resources held within the historic mine workings beneath the village to provide a low carbon heating system. Water within the old mine-workings is flowing at a raised temperature, measured at 20°C. The scheme will pump the mine water to an Energy Centre at the surface and use a heat exchanger to extract the heat from the water and transfer it to a clean water supply which would be transported through a district heating network to residents' properties. Heat pump technology will increase the water temperature, so it is suitable for the residents' heating systems.

The majority of Caerau residents are connected to the gas network and use individual gas boilers to provide their heating requirements. Whilst DH offers an efficient method of providing energy to a local area the market for heat networks in the UK is immature and extending DH schemes to residential areas is difficult⁹². The Caerau mine water project provides an opportunity to gain technical and consumer insights relating to the delivery of heating via a low carbon district heat network to existing low-rise properties.

The project will encompass all objectives associated with **Strategy Activity 3**:

- *Understand insights from Caerau Heat Network scheme to identify barriers and opportunities to extend the scheme [...]*
- *Provide key learning to inform other potential residential retrofit schemes to similar groups of housing.*
- *Focus on understanding aspects such as:*
 - *Successful consumer engagement methods. Considering aspects such as the social demographic.*
 - *Commercial considerations. Key actual cost and economic data can be assessed to understand the financial implications of retrofitting heat networks to existing low rise residential areas.*
 - *Consumer's experience – what are the key aspects to focus on to encourage further uptake?⁹³*

⁹² AECOM (2017) *Reducing the capital cost of district heat network infrastructure*. Available at: <https://d2umxnkyjne36n.cloudfront.net/teaserImages/Reducing-the-capital-cost-of-district-heat-network-infrastructure.pdf?mtime=20171103092304> (Accessed 10 October 2018)

⁹³ ETI (2018) *Bridgend Local Area Energy Strategy*

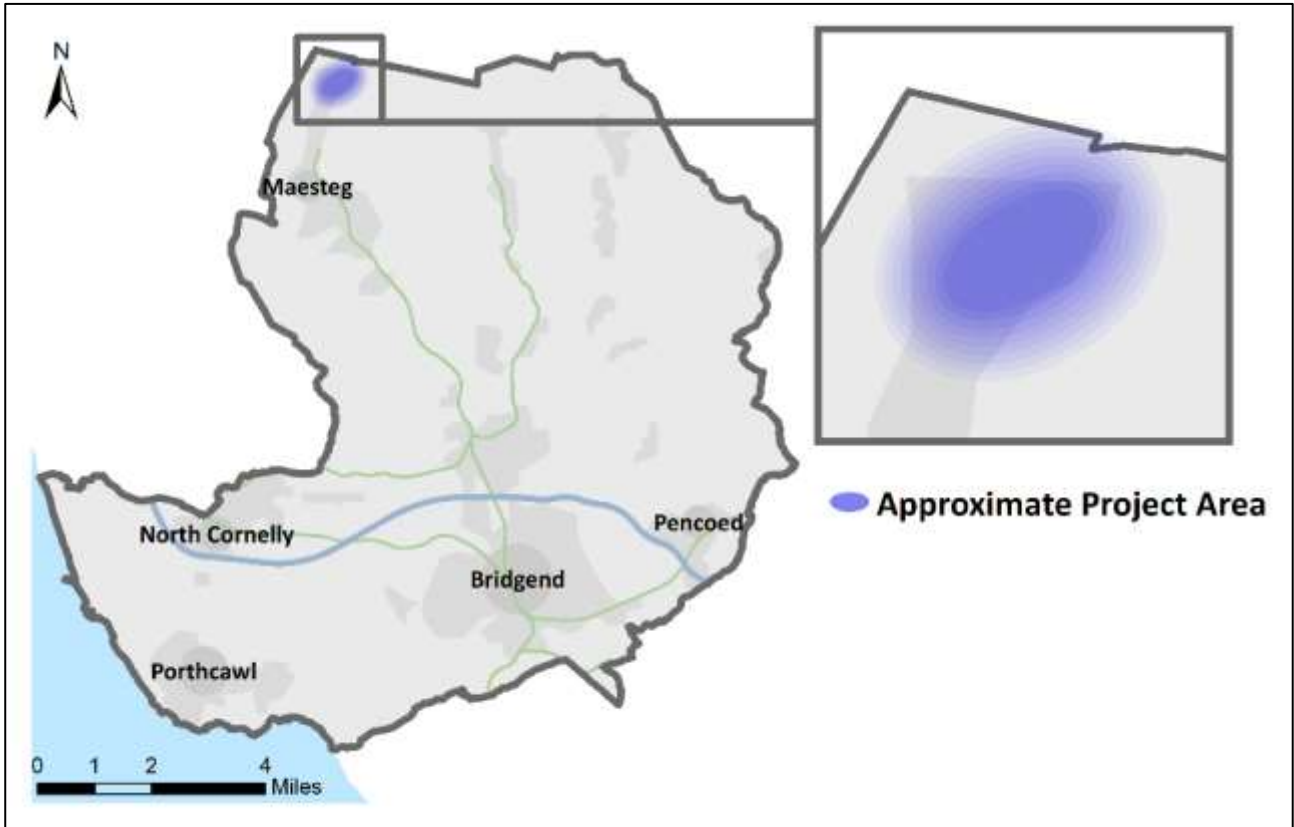


Figure 4.6: Project Target Area

(OS data © Crown copyright and database right 2018)

5.2.4. Innovation Project 4: Affordable Urban Heat Networks

“Modern and accessible infrastructure...is essential to our future growth and prosperity”⁹⁴, however productivity growth in the construction sector has been slower than other sectors of the economy, which has an impact on infrastructure performance⁹⁵. Whilst DH offers an efficient method of providing energy to a local area, the capital cost of DH networks is a major barrier to their development. ETI has identified the potential for 30-40% reduction in the capital cost of networks through the delivery of eight route maps⁹⁶. This work was theoretical in nature, identifying high cost areas that have the largest potential for cost reductions. It identified specific gaps in the market where innovation efforts should be focussed to provide maximum benefit and value for money. This project looks to work with industry partners and build on the work undertaken for the ETI⁹⁶ and investigate additional innovation potential through the role of digitalisation to reduce the costs associated with urban heat networks and increase their overall cost efficiencies.

The project would develop innovative construction methods, products and delivery mechanisms, which reduce costs and increase efficiencies and test these in a real-world district heat network, to demonstrate the value provided and learn lessons for further development.

The project would focus on the following objectives of **Strategy Activity 4**:

- *Assess options of reducing cost of heat networks; focusing on proposed Bridgend Town Centre scheme. Utilising resources such as ETI Heat Infrastructure Development project: Reducing the capital cost of district heat network⁹⁶.*
- *Provide insights relevant to other potential comparable urban centre schemes.*
- *Consider aspects relevant to extending from urban centres to existing residential areas.*
- *Focus on overcoming barriers to connecting existing homes to heat networks.⁹⁷*

⁹⁴ BEIS (2017) *Industrial Strategy*. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf (Accessed: 30 July 2018)

⁹⁵ Infrastructure and Projects Authority (2018) *Transforming Infrastructure Performance*. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664920/transforming_infrastructure_performance_web.pdf (Accessed: 15 November 2018)

⁹⁶ AECOM (2017) *Reducing the capital cost of district heat network infrastructure*. Available at:

<https://d2umxnkyjne36n.cloudfront.net/teaserImages/Reducing-the-capital-cost-of-district-heat-network-infrastructure.pdf?mtime=20171103092304> (Accessed 10 October 2018)

⁹⁷ ETI (2018) *Bridgend Local Area Energy Strategy*

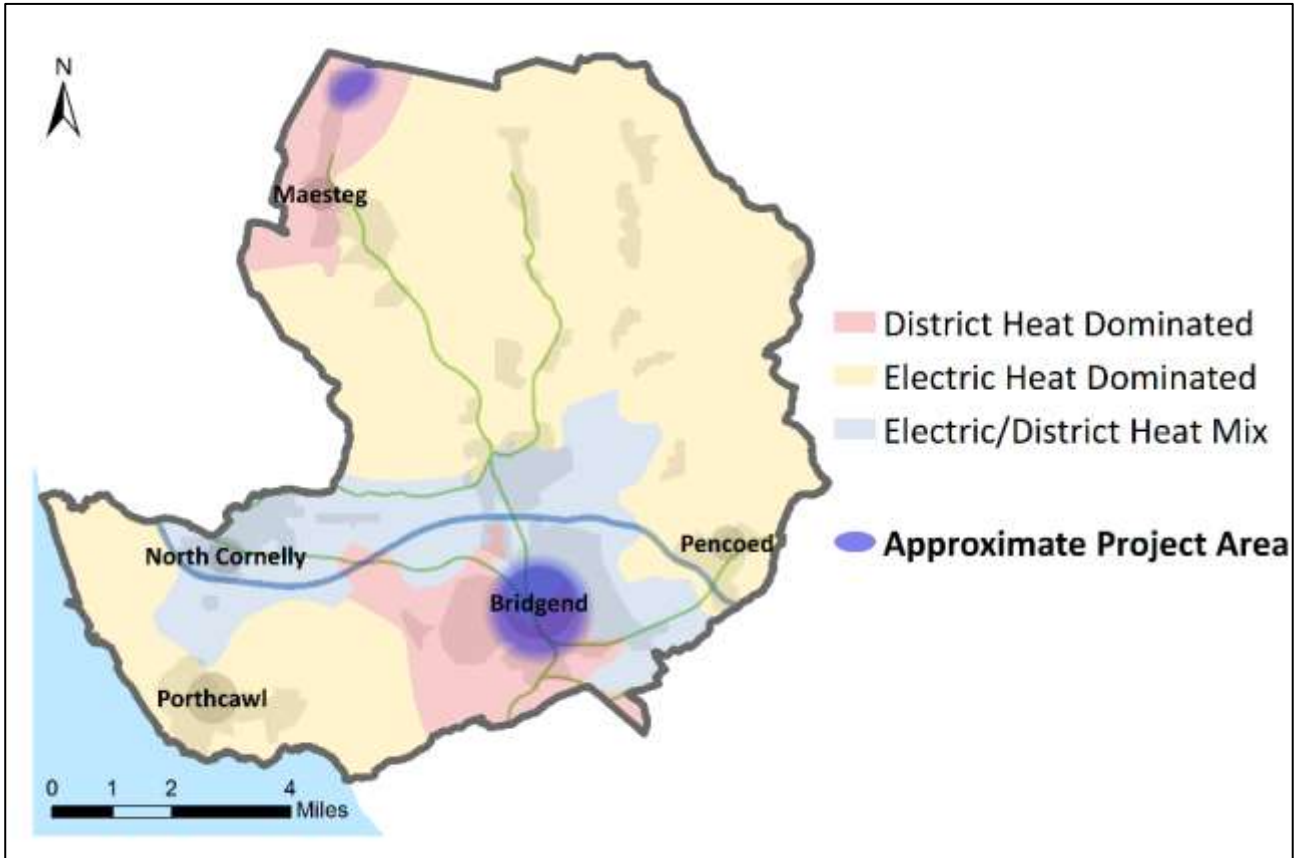


Figure 4.7: Dominant Heating Systems in 2050 by Area and Potential Project Target Areas

(OS data © Crown copyright and database right 2018)

5.2.5. Innovation Project 5: Electrification of Heat through Energy as a Service

Electrified heating has been identified as the predominant cost-effective decarbonised heating system for much of Bridgend's valley and coastal areas⁹⁸. Decarbonisation of domestic heating requires a significant change to the current energy retail sector, selling energy as a service is a potential solution that has been identified which this project will test⁹⁹. A market that sells energy as a service would see consumers buying the experience they want; a comfortable home when they require it, rather than buying the individual components that provide that experience (e.g. boilers, radiators, gas, electricity, insulation, etc.). This project would look to introduce electrified heating solutions, utilising different energy service propositions to recruit participants. Technical insights in to providing the service promised and consumer insights regarding satisfaction levels with respect to the service provided will help to develop further propositions and determine if this is a viable way of transitioning consumers to an electrified heating solution.

BCBC are interested in testing a range of different electric heating technology packages, to understand the practicalities of different options and the home-environments in which they are most suited.

The project will target areas identified within the Local Area Energy Strategy⁹⁸ for predominantly electrified heating, but will look to include a range of housing types, demographics and geographical locations to understand how:

- different home environments affect the technical operation of delivering heat as a service via electrified solutions,
- different consumers respond to the energy as a service concept.

In addition to testing different technology packages this project will look to test different approaches to recruiting consumers, including through:

- the domestic heating supply chain,
- council services,
- partnerships with Registered Social Landlords.

The project will focus on the following objectives of **Strategy Activity 5**:

- *Develop and test compelling customer propositions that are attractive to customers so they buy-in to the transition.*
- *Develop new forms of service provision as different approaches will be needed for different areas and consumer segments.*
- *Establish partners and test approaches through council services such as social care.*
- *Consider targeting perceived early adopters in coastal areas.*⁹⁸

⁹⁸ ETI (2018) *Bridgend Local Area Energy Strategy*

⁹⁹ ETI (2018) *How can people get the heat they want at home without the carbon?* Available at: <https://www.eti.co.uk/insights/how-can-people-get-the-heat-they-want-without-the-carbon> (Accessed: 15 October 2018)

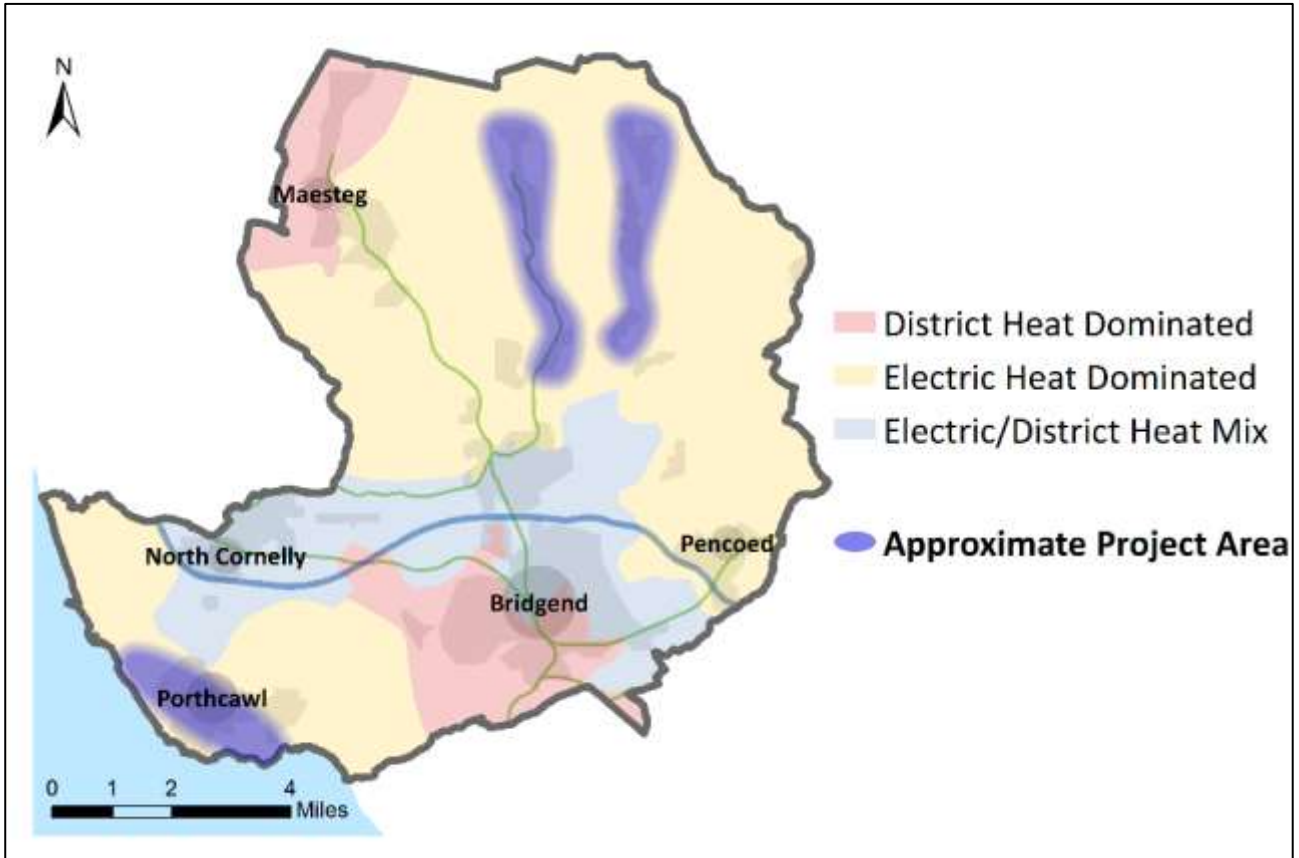


Figure 4.8: Dominant Heating Systems in 2050 by Area and Potential Project Target Areas

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5.2.6. Innovation Project 6: Intelligent Bridgend Energy Systems Design

The Industrial Strategy promotes a “whole systems approach” to decarbonisation and clean growth and looks to “...position the UK as a leader in clean and efficient power, transport and heat through an integrated approach to decarbonising these increasingly connected systems.”¹⁰⁰. BCBC are supportive of this approach and would like to maximise the benefits that the heat projects under development within the county borough and the operational electricity projects in and around Bridgend County Borough can offer by integrating energy generation/use for transport, power and heat.

BCBC views digitalisation as essential to achieving this aim and will look to improve digital infrastructure alongside the energy projects developed to ensure that projects are future-proofed for further development and to enable additional service offerings to be introduced in the future which will provide further benefits to Bridgend’s citizens; from smarter more efficient energy provision to mobility services and more responsive health care needs. As such, BCBC are interested in working with partners who not only work in the energy space but operate in the digitalisation industry to achieve the vision of becoming a *decarbonised, digitally connected smart County Borough*.

This specific project will develop a design and concept proposal for how to use digitalisation capabilities to integrate the three energy vectors (transport, heat and electricity) at a local level to:

- improve cost and resource efficiencies,
- enhance consumer experience,
- start to explore the potential benefits of a fully digitalised energy system.

¹⁰⁰ BEIS (2017) *Industrial Strategy*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf (Accessed: 30 July 2018)

5.2.7. Innovation Project Relationship with SSH and the Local Context

Table 4.1 summarises how the individual projects take forward the concepts developed within SSH, the Bridgend Local Area Energy Strategy¹⁰¹ and how the project activities relate to both local context and the UK energy transition as a whole.

Table 4.1: Innovation Project Relationship with SSH, UK Energy Transition, Local Context and Local Area Energy Strategy

Innovation Project	Elements that Interact with SSH	Potential learning/outcomes for the UK energy transition	Relationship with Local Context	Interaction with Bridgend Local Area Energy Strategy
Innovation Project 1: Fully Targeted Retrofit	<p>Tests whether full understanding of building fabric and energy flows can enable more cost effective retrofit measures to be identified.</p> <p>Project tackles: Economic barriers to low carbon heating.</p>	<p>Potential to:</p> <ul style="list-style-type: none"> • Make public funded energy efficiency programmes more cost effective. • Lead to the development of attractive retrofit consumer offerings for able to pay market. <p>By targeting a variety of areas in Bridgend County Borough the project will cover the diverse geography, housing types and demographics present in Bridgend, providing insights relevant to Wales as a whole.</p>	<p>Installation of retrofit measures doesn't just provide the potential for energy and cost savings, but can also provide:</p> <ul style="list-style-type: none"> • Health benefits • Building improvements • Area regeneration. <p>Therefore, the project feeds into BCBC's aspiration of delivering "<i>...an improved quality of life and environment for all people...in the area.</i>"¹⁰².</p> <p>Aims to provide insight for public programmes targeted at relieving fuel poverty (due to high fuel poverty prevalence in the valleys) and consumer models targeted at the able-to-pay market (due to presence of more affluent areas, which would benefit from retrofit).</p>	<p>Aims to provide the evidence/insight required to begin delivery of some of the objectives associated with Strategy Activity 1, specifically:</p> <ul style="list-style-type: none"> • Building on data regarding housing retrofit • Identifying new, self-financing business models • Identifying consumer segments.¹⁰¹

¹⁰¹ ETI (2018) *Bridgend Local Area Energy Strategy*

¹⁰² BCBC (2013) *Local Development Plan*. Available at: <https://www.bridgend.gov.uk/media/1899/written-statement.pdf> (Accessed: 30 July 2018)

Innovation Project 2: Hybrid Heat Pumps and Full Electrification	<p>Further understanding of the role of hybrid heat pumps as opposed to fully electrified heat pump systems, and whether hybrid heating systems are a useful transition technology.</p> <p>Project tackles: Social barriers to low carbon heating.</p>	<p>Will provide insight which will help inform the transition to hybrid or fully electrified heating systems in other areas.</p>	<p>97% of properties in Bridgend are connected to the gas network, so it is important to identify suitable methods of transitioning from gas to electric heating systems.</p>	<p>Project will achieve the following Strategy Activity 2 objectives:</p> <ul style="list-style-type: none"> • Providing further evidence on role of hybrids and their value as a transition or long-term technology. • Developing and testing attractive consumer propositions. • Considering the benefits of hybrid systems versus full electrification.¹⁰³
Innovation Project 3: Caerau Mine Water Gas-to-District Heating Transition	<p>Will provide real consumer insight relating to the transition from gas-to-district heating in existing properties.</p> <p>Project tackles: Social and technical barriers to low carbon heating.</p>	<p>Will provide understanding of the potential for mine water to provide an energy source for district heating schemes, relevant to the whole South Wales coalfield and other coalfields across the UK. Consumer insights may help to develop future consumer propositions for new heat networks or heat network extensions.</p>	<p>Two areas of Bridgend County Borough have been identified for wide-scale district heating within the Strategy¹⁰¹. These areas are served by the gas network, therefore methods for encouraging transfer to district heating are required. The project will identify and start to break down the barriers to low carbon heating, which resulted in the low forecast of low carbon heat generation potential from the Local Development Plan Renewable Energy Assessment¹⁰⁴. Local ownership of the scheme contributes to Welsh Government’s aspiration for locally owned local energy generation and</p>	<p>The two areas identified for DH in the Strategy are predominantly served by the gas network. Understanding how to encourage consumers in these areas to transition to DH will be imperative to implementing the Strategy. It will specifically fulfil Strategy Activity 3 objectives to:</p> <ul style="list-style-type: none"> • Identify barriers and opportunities to extend planned DH schemes, and • Provide learning for other potential residential retrofit schemes to similar housing groups.¹⁰³

¹⁰³ ETI (2018) *Bridgend Local Area Energy Strategy*

¹⁰⁴ BCBC (2011) *Local Development Plan 2006-2021 Renewable Energy Assessment and Energy Opportunities Plan*. Available at: <https://www.bridgend.gov.uk/media/2055/sd115.pdf> (Accessed: 15 October 2018)

			helps to achieve the Well-Being of Future Generations goal of a Resilient Wales.	
Innovation Project 4: Affordable Heat Network	<p>Tests and furthers work undertaken for the ETI¹⁰⁵ regarding lowering the cost of district heat networks.</p> <p>Project tackles: Economic barriers to low carbon heating.</p>	<p>Findings may provide replicable solutions for lowering district heat network costs elsewhere. There are six district heating projects under development in Wales which would benefit from the project findings, as well as other projects across the UK¹⁰⁶.</p>	<p>Whilst district heating is identified as the most cost effective domestic heating carbon reduction measure in two areas of Bridgend¹⁰⁷, the high capital cost provides an obstacle to deployment.</p> <p>This project will generate insight for project extensions due to be developed over the long-term towards 2050. As such it delivers on the Well Being of Future Generations Act's Long-Term way of working.</p>	<p>Findings will help to achieve the following objective within Strategy Activity 4:</p> <ul style="list-style-type: none"> • <i>“Assess options of reducing cost of heat networks; focusing on proposed Bridgend Town Centre scheme. Utilising resources such as ETI Heat Infrastructure Development project: Reducing the capital cost of district heat networks.”¹⁰⁷</i>

¹⁰⁵ AECOM (2017) *Reducing the capital cost of district heat network infrastructure*. Available at: <https://d2umxnkyjne36n.cloudfront.net/teaserImages/Reducing-the-capital-cost-of-district-heat-network-infrastructure.pdf?mtime=20171103092304> (Accessed 10 October 2018)

¹⁰⁶ HNDU (2018) *Local Authorities Supported by HNDU*. Available at: <https://www.gov.uk/guidance/heat-networks-delivery-unit#local-authorities-supported-by-hndu> (Accessed: 10 October 2018)

¹⁰⁷ ETI (2018) *Bridgend Local Area Energy Strategy*

Innovation Project 5: Electrification of Heat through Energy as a Service	<p>Test and gather consumer insights on the Energy as a Service concept.</p> <p>Project tackles: Economic, social and technical barriers to low carbon heating.</p>	<p>May provide a model for an Energy as a Service consumer proposition which can be used to roll-out other heat/energy services and technology solutions in addition to that tested in the project.</p>	<p>The Strategy identified electric heating as the predominant cost-effective heating decarbonisation solution for much of Bridgend, however the gas network serves 97% of domestic properties. As such, compelling consumer propositions to encourage residents to switch from gas to electric heating will need to be established.</p>	<p>This project delivers on the following Strategy 5 objectives:</p> <ul style="list-style-type: none"> • <i>“Develop and test compelling customer propositions that are attractive to customers so they buy-in to the transition.</i> • <i>Develop new forms of service provision as different approaches will be needed for different areas and consumer segments.”¹⁰⁷</i>
Innovation Project 6: Multi-Vector Integration	<p>Aims to fully integrate a “whole-systems” approach into projects that are in development or are operational.</p> <p>Project tackles: Economic and social barriers to low carbon heating and other energy vectors.</p>	<p>Provides a test case for a BEIS’ aim to <i>“...position the UK as a leader in clean and efficient power, transport and heat through an integrated approach to decarbonising these increasingly connected systems”¹⁰⁸</i></p>	<p>Integrates local energy generation and uses, to provide a more integrated approach to energy delivery and distribution within the local area.</p>	<p>Builds on the Strategy’s aspiration <i>“to evolve to consider carbon emissions from other sectors such as transportation”¹⁰⁹.</i></p>

¹⁰⁸ BEIS (2017) *Industrial Strategy*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf (Accessed: 30 July 2018)

¹⁰⁹ ETI (2018) *Bridgend Local Area Energy Strategy*

5.3. Other Near Term Deliver Non-Project Specific Activities

The other non-project specific activities are summarised in table 4.2.

Table 4.2 Additional Non-Project Specific Activities to be undertaken in the Near-Term (up to 2025)

Activity	Activity Details
Additional Activity A: Non-Domestic Building Data	The Strategy has focused initially on decarbonisation of BCBC’s domestic buildings. Bridgend also hosts over 5000 non-domestic buildings, which will need to be decarbonised to meet Wales’ carbon targets. To evolve the Strategy to include measures for tackling decarbonisation of the non-domestic buildings, BCBC will collect detailed and robust data for these buildings so that they can be assessed, and appropriate decarbonisation approaches can be identified and implemented.
Additional Activity B: Low and Zero Carbon DH Energy Sources	BCBC are looking to transition two areas of Bridgend to district heating. Whilst there are plans to fuel some DH areas with gas CHP plants initially, BCBC will look to transition these to lower/zero carbon heat sources in due course. This activity will identify and investigate different potential low carbon heat sources, through feasibility studies and stakeholder engagement. Findings from this activity are expected to lead to the development of future projects which may be undertaken under this plan or future plans beyond 2025.
Additional Activity C: Planning Policy Alignment with Decarbonisation Strategy	BCBC are currently starting to prepare a new Local Development Plan (LDP), which will set out the priorities and objectives of the Corporate Plan in terms of land use ¹¹⁰ . BCBC need to undertake a variety of steps to develop and adopt the new LDP, including reviewing the current LDP, compiling an Evidence Base, and drafting and receiving feedback on pre-deposit and deposit versions of the plan ¹¹⁰ . The new LDP is currently scheduled for adoption Summer/Autumn 2021 ¹¹⁰ . The BCBC Sustainable Development Team will feed into this process to ensure that any potential barriers to the Local Area Energy Strategy are reduced and opportunities are maximised. Additionally, the BCBC Sustainable Development Team should work with the BCBC Planning Team when establishing a local renewable energy target to ensure that the insights provided by the Smart Energy Plan and Local Area Energy Strategy are taken into account.
Activity D: Establishing Bridgend as a Centre for Innovation	A variety of activities will be undertaken to ensure that Bridgend is viewed by the wider industry as a Centre for Innovation and an ideal area to trial innovation projects and encourage economic growth and job creation. Activities will include engagement (through a variety of media) with industry stakeholders about BCBC’s near-term and long-term activities and objectives, to encourage: <ul style="list-style-type: none"> • companies to partner with BCBC on innovation projects (both those outlined in this plan and additional project ideas that the external parties may wish to pursue themselves), • supply-chain companies to invest in skills that would be useful for ongoing projects and the overall energy transition in Bridgend, • companies to invest in Bridgend as an area that will be at the forefront of the changing energy market.
Activity E: Identify Power, Transport and	BCBC are committed to decarbonising and developing localised solutions heat, power and transport (across both domestic and non-domestic sectors). BCBC are aware that these three sectors impact each other, and that complementary business models and technical solutions may be able to be developed to increase the benefits and impact of

¹¹⁰ BCBC (2018) *Bridgend County Borough Council Report to Council 20 June 2018, Report of The Corporate Director – Communities, Bridgend Replacement Local Development Plan (LDP) Delivery Agreement, pp.145-149*. Available at: <http://democratic.bridgend.gov.uk/documents/g3214/Public%20reports%20pack%2020th-Jun-2018%2015.00%20Council.pdf?T=10&LLL=0> (Accessed: 13 September 2018)

<p>Digitalisation Projects</p>	<p>any single vector energy solution proposed. BCBC will integrate decarbonisation of power and transport and digitalisation where possible into the heating projects proposed and pursue project ideas with external partners to accelerate progression in these additional areas. Potential project areas include electrification of transport, local electricity market development associated with peer-to-peer trading and direct/indirect Power Purchase Agreements and development of mixed technology generation and storage assets.</p>
<p>Activity F: Scoping Future Delivery Plans</p>	<p>The Bridgend Local Area Energy Strategy suggested that there would need to be a series of relatively short-term (5 year) delivery plans that would detail activities undertaken and evidence collected before major area-based decisions could be made with certainty¹¹¹. As such, during the delivery of the Smart Energy Plan time will need to be dedicated to planning activities and projects that will be undertaken during the next phase of the Strategy delivery and re-evaluating decarbonisation pathways based on insight from innovation projects. This will ensure a process of continual learning to gather evidence and insights that will enable confident decision-making regarding energy systems investments and future large-scale deployment of decarbonisation initiatives.</p>

5.4. Near-Term Decarbonisation Road Map

Table 4.3 provides the anticipated timescales for each of the project activities. The Smart Energy Plan is a live document and many of the projects and activities are currently at the early stages of development, as such the steps and timescales are likely to require updating as further information is acquired. Additionally, as further opportunities are identified, the pipeline will be added to.

Figure 4.9 provides a map which illustrates the anticipated targeted areas for the projects alongside the dominant 2050 decarbonisation heating technologies identified via local area energy planning. As per the timescales, this may be subject to change during project/activity development.

¹¹¹ ETI (2018) *Bridgend Local Area Energy Strategy*

Table 4.3: Near-Term Project/Activity Timescales

2018	2019: <i>FIT scheme closes - UK leaves EU</i>	2020: <i>WG carbon target/budget end - Smart meters rolled-out - WG elections</i>	2021: <i>RHI planned closure - Current Arbed end date - Local elections</i>	2022 <i>UK elections - Current WG RE Support Service end date</i>	2023 <i>ERDF funding ends</i>	2024	2025: <i>WG elections (if not earlier) - WG carbon budget (2021-25)</i>
DP1 Bridgend Town Lower Carbon District Heat (DH) Network Phase 1: 1 st step to decarbonising Bridgend town.							
DP2 Bridgend Town Lower Carbon DH Network Phase 2: Build on DP1 business case and extend heat network.							
DP3 Energy Efficiency Projects: Tackle fuel poverty by installing energy efficiency measures in areas in need.							
InP1 Fully Targeted Retrofit: Understand the benefits of dynamic modelling and performance monitoring and how these can help develop more compelling retrofit offerings for consumers.							
InP2 Hybrid Heat Pumps and Full Electrification: Build on the success of the FREEDOM project and further explore the role of hybrid heat pumps in the overall decarbonisation of the Bridgend energy system.							
InP3 Caerau Mine Water Gas-to-District Heating Transition: Deliver a demonstrable example of a low carbon DH system which transitions existing residential consumers from gas heating to DH.							
InP4 Affordable Urban Heat Networks (HNs): Establish solutions for reduced HN costs & improved efficiencies.							
InP5 Electrification of Heat through Energy as a Service: Deliver energy as a service to heating consumers via different electrified heating technology packages and gain insights to assist further roll-out if successful.							
InP6: Intelligent Bridgend Energy System Design: Explore the benefits that arise from integration of heat, electricity & transport systems							
						Activity A Non-Domestic Building Data: Gather data on Bridgend’s non-domestic buildings and update the Strategy.	
Activity B Low & Zero Carbon DH Energy Sources: Identify and investigate potential lower and zero carbon heat sources for DH networks to feed-in to future projects.							
Activity C Planning Policy Alignment with Decarbonisation Strategy: Ensure the new LDP accounts for the Strategy.							
Activity D Establishing Bridgend as a Centre for Innovation: Effectively market Bridgend as an area to trial innovation projects and stimulate economic growth.							
Activity E Identify Power, Transport and Digitalisation Projects: Develop complementary electricity, transport and digital infrastructure projects alongside the heating projects to ensure that decarbonisation takes place in a joined-up manner.							
						Activity F Scoping Future Delivery Plans: Ensure continual learning to achieve large-scale deployment initiatives.	

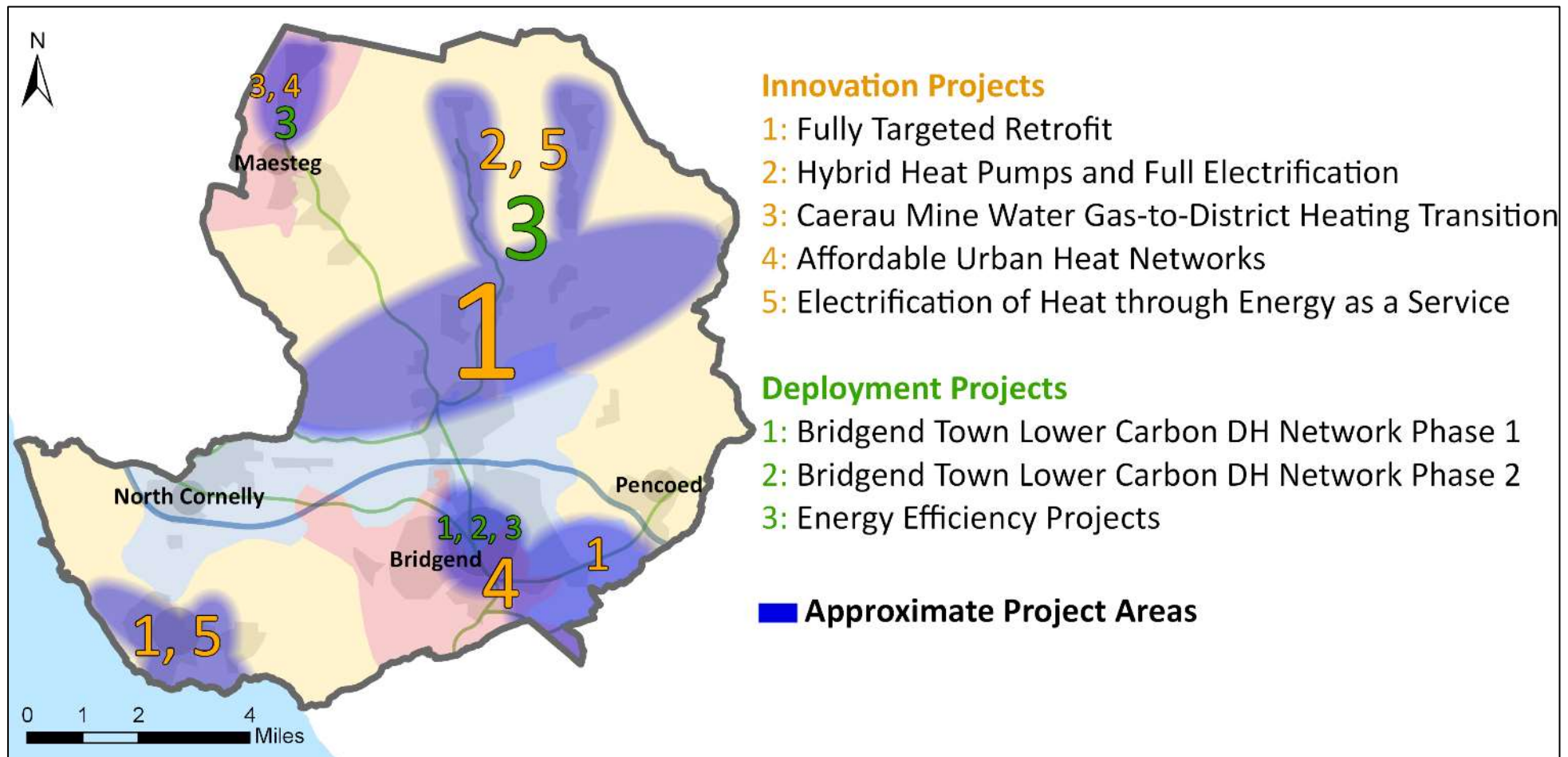


Figure 4.9: Target Project Locations

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6. Conclusions

BCBC have developed this Smart Energy Plan with support from Energy Systems Catapult, Welsh Government, ETI and other stakeholders. The strategy, priorities, objectives, success criteria and project pipeline detailed within this Plan are driven by BCBC and set against the local context and vision. Implementation of the Plan will progress BCBC towards an aspiration of a decarbonised, digitally connected and economically productive county borough. It provides a project pipeline of three deployment projects, six innovation projects and six additional activities, which aim to support the decarbonisation of the local energy system. The Plan looks to exploit the opportunities provided by the UK Clean Growth and Industrial strategies and the aspirations of Welsh Government to increase locally-owned renewable energy generation within Wales. The projects are set within the local context of an area with mixed geography, a range of housing types and its own economic and social challenges, within a devolved nation with its own set of targets, legal commitments and support mechanisms.

A series of strategic objectives and success criteria have been established with suggested targets (see section 2.4), which can be used to focus activities and against which the success of the Plan can be evaluated.

The project pipeline within the Smart Energy Plan is primarily focused on activities related to the decarbonisation of domestic heating, due to its relationship with local decision-making. BCBC are committed to decarbonising and developing localised solutions for heat, power and transport (across both domestic and non-domestic sectors) and will look to exploit opportunities for addressing these energy vectors in delivery of the Plan. Additionally, BCBC will pursue opportunities for progressing the digitalisation agenda within Bridgend, recognising that this provides opportunities for delivering additional benefits to consumers, beyond the energy transition.

The innovation projects identified provide learning which will help to further decarbonise the local energy system and provide interested parties with relevant information for the decarbonisation of the UK. Presentation of development and delivery timescales associated with the innovation projects alongside deployment projects and other planned activities, assists in communicating the scope of work required by BCBC's Sustainable Development Team and the level of investment and support required to enable delivery of the suite of work identified. The target areas for the projects have been determined following Local Area Energy Planning undertaken by Energy Systems Catapult and the ETI and analysis used to inform the Local Area Energy Strategy. The target areas are spread across the county borough, with maps provided in section 4 identifying the target locations.

By developing Bridgend as a Centre for Innovation, BCBC hopes to attract companies and investment to the area, which could help to provide jobs and training opportunities for local people. By engaging with local industry stakeholders, BCBC aims to ensure that they will be well-positioned to benefit from the activities underway.

The Smart Energy Plan is a live document, subject to change and updates as further information becomes available and opportunities arise. Delivery of the projects identified according to the timescale provided, is dependent on securing the necessary funding at the necessary time. If this is not achieved, the timescales provided in the road map may need to be revised. It is advised that the projects are developed as far as possible to ensure that they are ready to be launched as soon

as suitable funding is identified and secured. It is anticipated that BCBC will formally adopt the Smart Energy Plan and assume responsibility for its continued development throughout the near-term delivery period (until 2025).

Energy Systems Catapult supports innovators in unleashing opportunities from the transition to a clean, intelligent energy system.

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