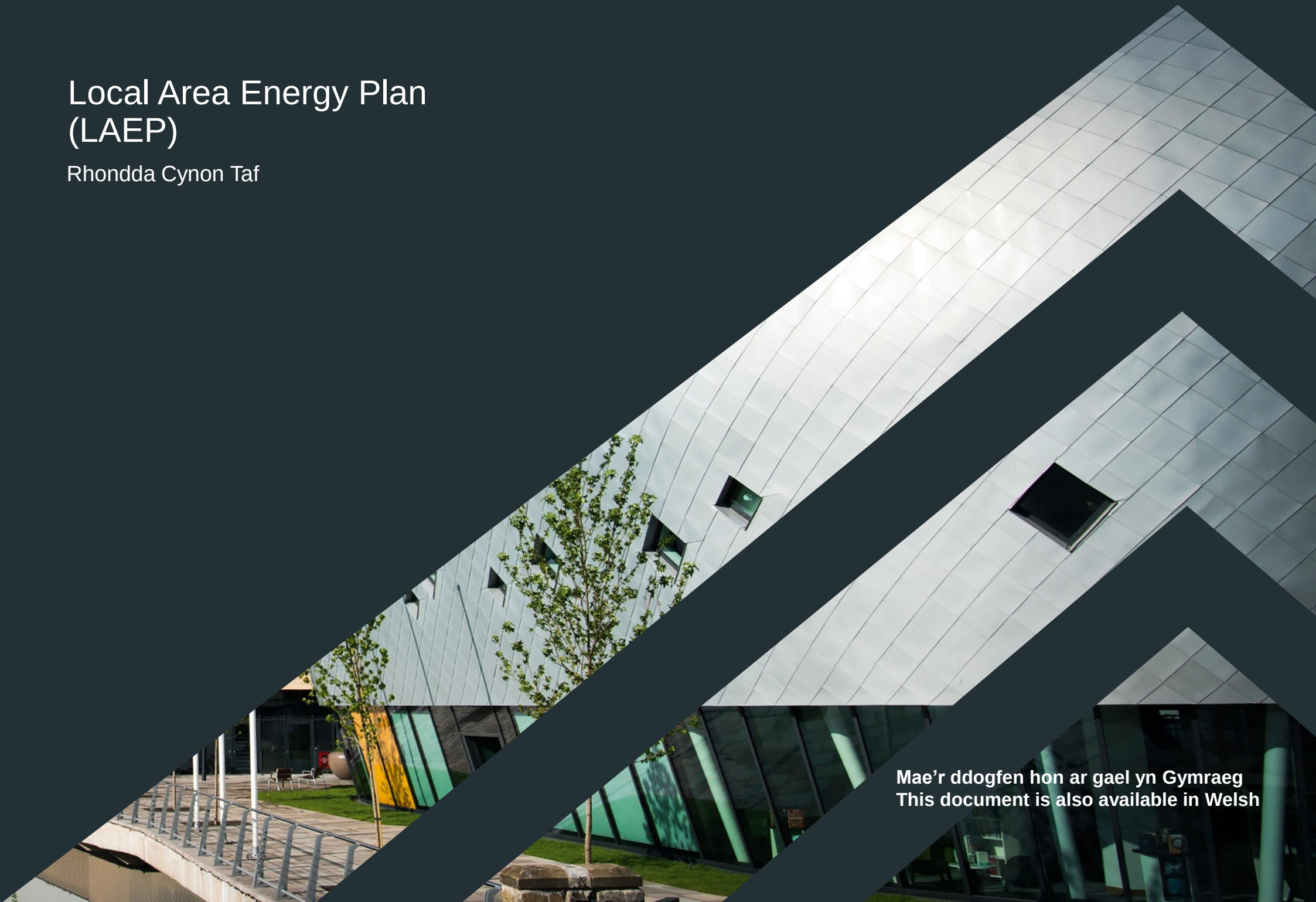
Local Area Energy Plan (LAEP)

Rhondda Cynon Taf



Mae’r ddogfen hon ar gael yn Gymraeg
This document is also available in Welsh

Abbreviations

Sponsors:

Delivery partners:

Acronym	Definition or meaning
CAPEX	Capital Expenditure
CCGT	Combined Cycle Gas Turbine
CCR	Cardiff Capital Region
DESNZ	Department for Energy Security and Net Zero
DFES	Distribution Future Energy Scenarios
ECOFLEX	Flexible Eligibility Energy Company Obligation
EPC	Energy performance certificate
ESC	Energy Systems Catapult
EV	Electric Vehicle
FES	Future Energy Scenarios
GHG	Greenhouse Gas
HGV	Heavy Goods Vehicles
LAEP	Local area energy planning or Local area energy plan
LDP	Local Development Plan
LGV	Light Goods Vehicles

Acronym	Definition or meaning
LSOA	Lower super output area, a small area classification in the UK designed to have a comparable population.
MSOA	Middle super output area, a medium-sized area classification in the UK designed to have a comparable population.
NAEI	National Atmospheric Emissions Inventory.
NGED	National Grid Electricity Distribution.
RIIO	Revenue = Incentives + Innovation + Outputs, a regulatory framework used by the UK energy regulator, Ofgem.
RLDP	Replacement Local Development Plan
SDP	Strategic Development Plan.
SLES	Smart Local Energy System.
SMR	Steam Methane Reformation.
TfW	Transport for Wales.
WWU	Wales and West Utilities.

Contents

Sponsors: *Delivery partners:*

This Local Area Energy Plan was prepared by Arup, Carbon Trust and Afallen on behalf of Rhondda Cynon Taf and co-ordinated across the region by the Cardiff Capital Region. Energy Systems Catapult is the Technical Advisor for the LAEP Programme in Wales. The Plan's development was funded by the Welsh Government.

Foreword

Sponsors:

Delivery partners:

We are pleased to introduce the Rhondda Cynon Taf Local Area Energy Plan (LAEP), an ambitious and comprehensive roadmap, tailored to meet the unique energy needs of our community, whilst aligning with our broader decarbonisation goals for the County Borough.

This plan is a testament to the Council's ambitions to decarbonise our local energy systems and recognises the need to build a sustainable, resilient, and prosperous future for our region. With the impacts of climate change becoming increasingly evident, the need for decisive and sustainable action has never been more urgent. The declaration of a Climate Emergency by the Welsh Government in April 2019 and the subsequent 'Nature Emergency' in 2021, were pivotal moments, signalling a profound commitment to national environmental stewardship.

Locally, the Council has committed to playing its part in tackling this immense undertaking and the need to actively contribute, in addressing the wider global challenge. Our 'Think Climate RCT (2022-2025)', a strategy for tackling Climate Change adopted in June 2022, was shaped around the themes of our new Corporate Plan and set out our framework and our strategic vision for a carbon-neutral future, supported by carbon reduction targets.

The new Corporate Plan aims to deliver our Strategic Vision for an RCT, where all people, communities, and businesses can grow and live in a healthy, green, safe, vibrant, and inclusive County Borough. A place where they can achieve their full potential in all aspects of their lives and work, both now and in the future, by improving the Social, Economic, Environmental and Cultural Well-being of Rhondda Cynon Taf, through its four Well-being Objectives.

The LAEP addresses the energy challenges specific to the County Borough of Rhondda Cynon Taf, with practical and scalable solutions, encompassing a broad spectrum of initiatives, such as enhancing energy efficiency in homes and businesses, increasing the deployment of renewable energy sources, and exploring innovative technology.

As we embark on this journey to decarbonise the Rhondda Cynon Taf local energy system, we understand the importance of collaborative effort. To achieve our vision, the LAEP relies on the commitment of the Council and the active participation of our residents, businesses, and community leaders. Together, we can transform the way we produce, consume, and think about energy.

The challenges we face in our transition to a sustainable energy future are significant, as are the opportunities. However, by embracing change, fostering innovation, and working collectively, we can ensure a greener, more sustainable Rhondda Cynon Taf, both now and for future generations.

Councillor Maureen Webber,

Deputy Leader of Rhondda-Cynon-Taf, County Borough Council.

Local Area Energy Plan outline

This plan collates evidence to identify the most effective route for Rhondda Cynon Taf to reach a net zero energy system

Overview

As part of this project, three separate documents have been produced. This will ensure the content is accessible to a variety of audiences whilst also making it easier to find information relevant for the reader. These three documents are the:

1. **Local Area Energy Plan** *(this document)* contains the overarching plan, focusing on the Rhondda Cynon Taf's area-wide local energy plan and actions.
2. **Technical Report** contains the graphs, charts, maps and supporting data for the results published in the Local Area Energy Plan. It also provides more detail about the approach to modelling and scenario analysis that we took. This report is available upon request from Energy@rctcbc.gov.uk.
3. **Renewable Investment Prospectus** highlights short-term, regional and local renewable energy opportunities that have the greatest potential for delivery across the Cardiff Capital Region.

Achieving the transformation that is needed for the energy system to reach net zero will not be easy and will need a collaborative approach. In this plan, the term "we" has therefore been used to refer to the range of people and organisations in Rhondda Cynon Taf who will support the ambition we set out and take action. The Council and CCR have taken facilitating roles in developing this LAEP, but we will not deliver the ambition it sets out alone. We have developed this Plan with input from a range of stakeholders, and we hope that you will be inspired by the actions that stakeholders have committed to, to take action to transform our energy system too.

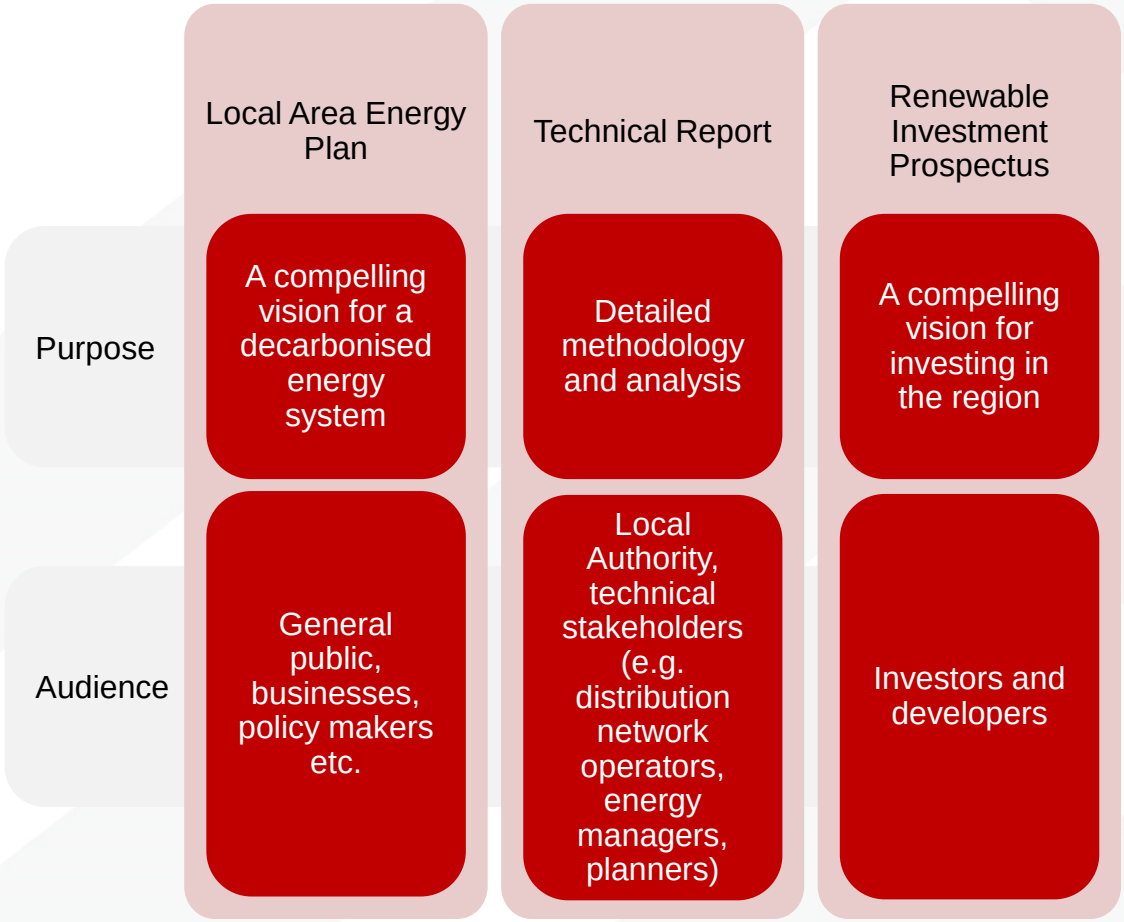


Figure 0.1: LAEP and support documents purpose and audience summary

Executive summary

Rhondda Cynon Taf has a vision to transition the local energy system to net zero

Sponsors: Llywodraeth Cymru Welsh Government; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; CARBON TRUST

The vision for Rhondda Cynon Taf's future local energy system is:

A sustainable energy future, focusing on reducing carbon emissions cost-effectively and building a resilient energy infrastructure. Central to this vision is community engagement and ownership, ensuring accessible and affordable energy solutions for all. Our goal is to lead in energy innovation, aligning with the Welsh Government's net zero targets, while respecting our natural heritage and enhancing community well-being. This vision represents a commitment to a sustainable, inclusive, and prosperous future for Rhondda Cynon Taf.

Rhondda Cynon Taf's **energy objectives** are collectively agreed and describe what needs to be done to create the enabling conditions needed to deliver this LAEP.

1. **To maximise reductions in carbon emissions while minimising financial costs**
2. **To provide a resilient energy system, capable of increasing local clean energy provision to meet a greater proportion of future energy demand**
3. **To provide community engagement, leadership, and ownership of our energy system**
4. **To deliver affordable solutions for all in the transition to Welsh Government's target of a net zero public sector**

Our **energy propositions** describe what needs to change between now and 2050 to decarbonise Rhondda Cynon Taf's local energy system and achieve net zero by 2050.

- Retrofit whole buildings
- Deploy renewables
- Decarbonise transport
- Foster Innovation
- Reinforce and transition energy networks

Executive summary

Energy propositions for the County Borough of Rhondda Cynon Taf in more detail

Sponsors: Llywodraeth Cymru Welsh Government; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; CARBON TRUST

1. Retrofit whole buildings

Enhance the energy efficiency of existing buildings through retrofitting measures aimed at reducing overall demand, while also transitioning away from fossil fuel-intensive heating systems.

Low-regret options:

- Retrofit
- Heat pumps

2. Deploy renewables

Increase Rhondda Cynon Taf's renewable energy output by undertaking an assessment of capacity and using the outcome of this to give clear guidance on renewables in the LDP.

Low-regret options:

- Rooftop solar PV
- Onshore wind turbines
- Ground-mounted solar PV

3. Decarbonise transport

Reduce car use in Rhondda Cynon Taf by promoting use of active travel and public transport. Facilitate the adoption of EVs by installing chargepoints across the area.

Low-regret options:

- EV chargers

4. Foster Innovation

Encourage a range of solutions to decarbonisation in Rhondda Cynon Taf by exploring opportunities for innovative technologies.

Low-regret options:

- Hydrogen pilots
- Minewater heating pilots

5. Reinforce and transition energy networks

Make upgrades to the electricity network that are required to ensure increasing electricity demand can be met. Make upgrades to the gas network that are required to ensure future hydrogen demand could be met.

Low-regret options:

- Flexibility, storage technologies

Figure 0.2: Summary of energy propositions

Executive summary

Rhondda Cynon Taf's local energy system will need to change significantly to achieve net zero by 2050

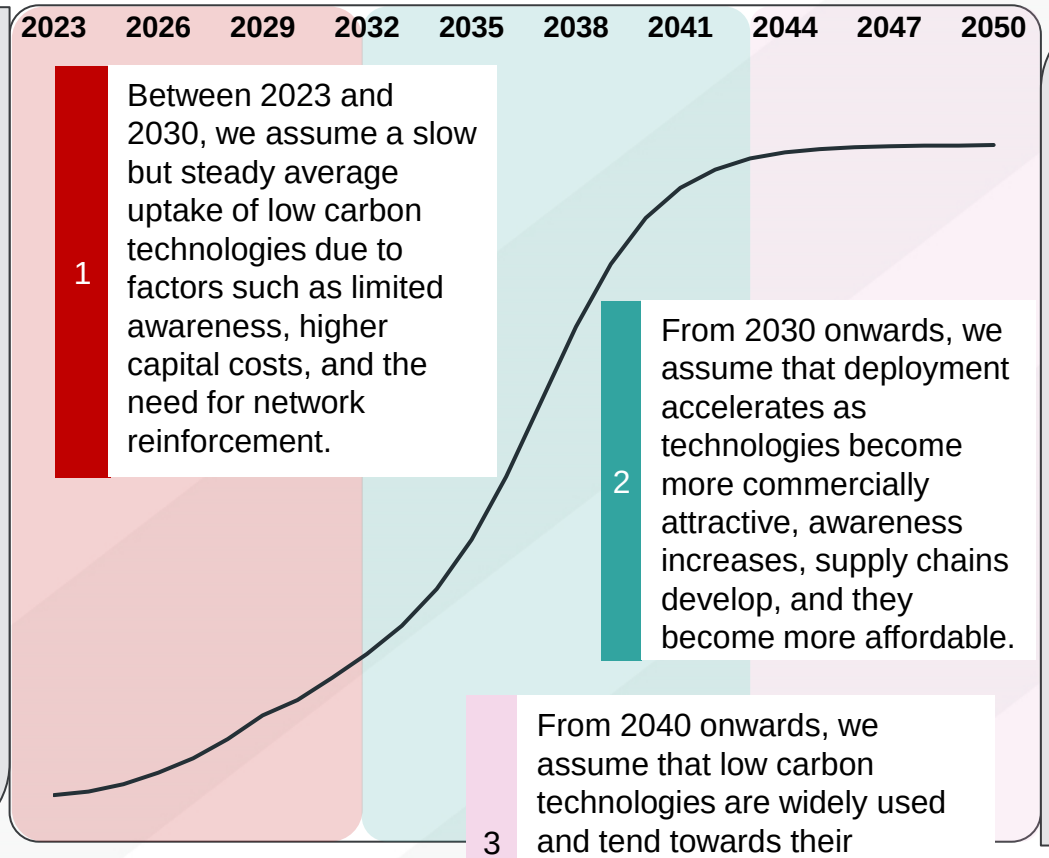
Sponsors: Llywodraeth Cymru Welsh Government; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; CARBON TRUST

Rhondda Cynon Taf's local energy system today

- **300** heat pumps installed
- **76,000** homes EPC D or below
- **120** EV charge points
- **13 MW** rooftop solar PV installed capacity
- **30 MW** ground-mounted solar PV installed capacity
- **120 MW** installed wind capacity

The rate of change required



What Rhondda Cynon Taf's net zero local energy system could look like in 2050

- **80,000** heat pumps installed
- **62,000** homes retrofitted
- **17,000** EV charge points
- **360 MW** rooftop solar PV installed capacity
- **1150 MW** ground-mounted solar PV installed capacity
- **210 MW** installed wind capacity

Executive summary

Achieving a net zero local energy system in 2050 aligns with the Well-being of Future Generations (Wales) Act 2015 and could lead to the following

Sponsors: Rhondda Cynon Taf; Llywodraeth Cymru Welsh Government; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; Carbon Trust

Direct impacts

Emissions reduction

50 times less GHG emissions than in 2023

Energy savings

1,000kWh less heat used per home than in 2023

Less then half the energy used for transport compared to 2023

Wider impacts

Energy security and reliability	Diversified local energy supply improves energy security	
Air quality improvements	Reduced fossil fuel combustion from transport, heat and power improves air quality	£240 million of cumulative savings by 2050
Net job creation	Emerging net zero industries attract investment and create high quality local jobs	5400 jobs created in 2050
Affordability	Highly insulated homes reduce heat demand, improve affordability and reduce fuel poverty	

National well-being goals

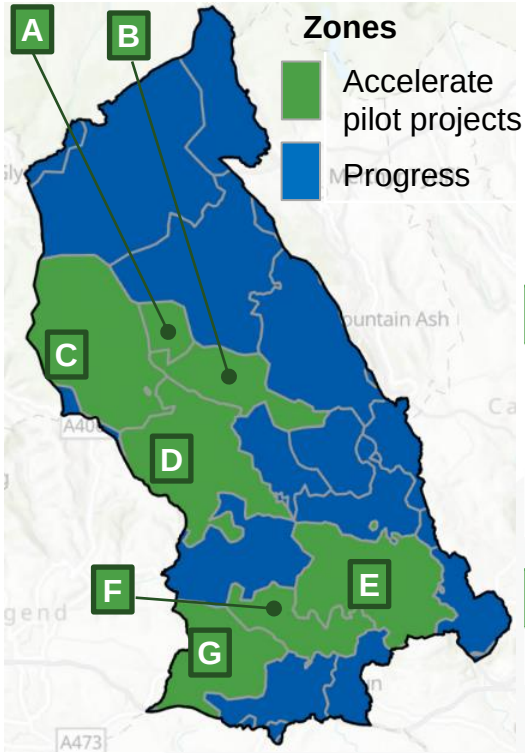
Wales' Well-being of Future Generations (Wales) Act 2015, well-being goals[M06]

Executive summary

To support transformation of the energy system, pilot projects may be useful. The plan on a page below highlights areas that could provide a useful focus for these pilots. Figure 0.3 identifies zones with particularly favourable conditions for specific energy components, making them ideal locations for pilot studies. The summary tables (shown below) detail the (i) installed capacity opportunity, (ii) required investment for each component and (iii) total investment necessary for both energy component installation and electricity network infrastructure in each zone by 2030. Ranges have been calculated by taking the minimum and maximum results from each future energy scenarios modelled (see the Technical Report for more detail). Note: intervention should be maintained in the 'Progress' zones to transition the local area to net zero.

Sponsors: Llywodraeth Cymru Welsh Government; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; CARBON TRUST



	(i)	(ii)	(iii)
A Maerdy			
	0.35 - 0.55MW (60 - 90 heat pumps)	£0.26 - 0.41m	**Zone A total £ 3 - 14m**
	0.06 - 0.07MW (16 - 18 chargers)	£0.05 - 0.06m	
B Middle Fan			
	1.3 - 2.0MW (210 - 340 heat pumps)	£0.9 - 1.5m	**Zone B total £14 - 72m**
	0.16 - 0.21MW (40-50 chargers)	£0.13 - 0.17m	
C Ynysfeio			
	2,500 - 2,800 homes	£10 - 140k	**Zone C total £29 - 158m**
D Tonypandy			
	4,500 - 5,500 homes	£20 - 270m	**Zone D total £56 - 300m**
E Upper boat primary			
	17MW	£18m	**Zone E total £78 - 286m**
	78MW	£34m	
	16MW (2050)	£18m (2050)	
F Talbot Green Primary			
	12MW	£13m	**Zone F total £37 - 120m**
G Pencoed Primary			
	4MW	£4.7m	**Zone G total £ 24 - 98m**
	6MW (2050)	£7m (2050)	

Figure 0.3: Rhondda Cynon Taf's spatial representation of opportunities, including 2030 ambition and investment (million £). Zone boundaries are defined by primary substation service areas

Suggested energy components to pilot in each zone

	Heat pumps		Ground-mounted PV		Rooftop PV
	EV charger		Onshore wind		Insulation measures

Executive summary

To deliver the LAEP, we have developed a series of actions and next steps that we'll need to take

Sponsors: Llywodraeth Cymru Welsh Government; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; CARBON TRUST

Action routemap

Although the exact form of the decarbonised energy system in 2050 is uncertain, there are actions we can take now with relative certainty that will help us maintain the ability to meet our 2050 Net Zero ambition and capitalise on the opportunities that this transition will bring.

Our action routemap takes each energy proposition and outlines critical, enabling actions that we will take collectively alongside our stakeholders in the coming decade, with a particular focus on what we can achieve in the next 5-7 years.

The sequencing of activities in the routemap is highly dependent on the political, regulatory and strategic context it has been created in. Therefore, we expect it to evolve over time and be regularly updated to make sure it stays relevant. Rhondda Cynon Taf's routemap can be found in Chapter 4: Action planning.

Next steps

Progressing energy propositions: For each prioritised proposition, we will undertake a series of development activities to progress towards delivery (such as feasibility studies, detailed technical and commercial development, business case, commercialisation and procurement).

Governance: Where possible, we will integrate oversight of LAEP delivery with existing governance structures. We will endeavour to appoint a delivery programme manager, to lead the delivery of the actions in this plan.

Monitoring: We will work with regional and national partners to develop a monitoring framework which builds on existing processes and helps us understand the progress Rhondda Cynon Taf is making towards its committed actions and ambitions set out in this plan.

Engagement & collaboration:
Many stakeholders with an interest and influence over the local energy system have come together to help shape this LAEP, and it is important that this collaboration continues as we deliver this plan. The development of this LAEP has brought those with interest and influence together.

Rhondda Cynon Taf

Chapter 1: Introduction

1. Introduction

What is Local Area Energy Planning (LAEP)?

Sponsors: Delivery partners:

Overview

Definition of a LAEP

A LAEP sets out the changes required to transition an area's energy system to net zero carbon emissions against a specified time. By exploring a range of technologies and scenarios through whole energy system modelling and analysis, the most cost-effective preferred pathway to net zero can be identified[M01]. The process follows standardised guidance defined by Energy Systems Catapult (ESC).

Being data-driven and evidence-based, a LAEP uses a whole energy system approach that is led by local government and developed collaboratively with defined stakeholders. It sets out to identify the most effective route for the local area to meet its local Net Zero target, as well as contributing towards meeting the national net zero target[M01].

A LAEP results in an indicative costed spatial plan that identifies the change needed to the local energy system and built environment, detailing what changes are required, where, when and by whom. The level of detail in a LAEP is equivalent to an outline design or masterplan and is intended to identify core areas that require focus over the next 25 years.
It proposes future sector-specific action plans that set out how each part of the area will be designed and built. Additional detailed design work will be required for identified specific actions, projects and programmes to progress to implementation[a].

Vision of a LAEP

A LAEP defines a long-term vision for an area but should be updated approximately every 3–5 years (or when significant technological, policy or local changes occur) to ensure the long-term vision remains relevant.

[a]For example, a LAEP may identify a zone that is best suited to a district heat network by assessing the types of buildings in the zone, their characteristics, and density; however, to deliver the district heat network it would require a full feasibility assessment by an appropriately qualified installation or design company, along with assessment of commercial viability and delivery mechanisms.

1. Introduction

What is Local Area Energy Planning (LAEP)?

Sponsors:

Delivery partners:

Overview

Scope of a LAEP

The UK government's 2021 Net Zero Strategy estimates that **82% of the UK's emissions are "within the scope of influence of local authorities."**[M02]

The scope of a LAEP covers the current and projected future energy consumption and associated greenhouse gas (GHG) emissions, primarily focusing on an area's built environment (all categories of domestic, non-domestic, and industrial buildings), energy used for road transport (excl. energy used in rail, aviation, and shipping), local renewable generation and the energy networks needed to support this consumption.

Elements included in a LAEP are:

- Electricity, heat and gas networks
- The future potential for hydrogen
- The built environment (industrial, residential, and commercial), its fabric and systems,
- Flexibility (in terms of shifting when demand is placed on the grid), and the storage and generation of energy,
- Providing energy to decarbonised transport (i.e., the electricity required for electric vehicle charging infrastructure).

It identifies near-term actions and projects, providing stakeholders with a basis for taking forward activity and prioritising investments and action. Site-specific data is used where available, with remaining areas covered by nationally available dataset.

Benefits of a LAEP

A LAEP provides a long-term plan to deliver net zero. A benefit of LAEP is the 'whole systems approach', aligned to the Wellbeing of Future Generations Act[M06] "way of working" on integration. This provides consideration to the most cost-effective solutions to future energy system at the right time for example, deploying different heat decarbonisation technologies to avoid a high-cost upgrade of the electricity network. By working closely with local stakeholders, incorporating their data, knowledge and plans, a LAEP is built on a common evidence base. The outputs can then be used reliably by stakeholders from Rhondda Cynon Taf planners to network operators to community groups, knowing they are working towards a common goal built on strong foundations.

1. Introduction

The energy transition across Wales

Overview

The Welsh Government's "Net Zero Wales" plan[M03] establishes an increased level of ambition on decarbonisation, with a legally binding target to reach net zero emissions by 2050. It is the first national government to fund the roll out of LAEP to all its local authorities. The programme is being coordinated through a regional approach, where LAEPs are being developed for local authorities in Mid Wales, South West Wales, North Wales and the Cardiff Capital Region. The rationale for taking this approach was because there are efficiencies on data collection and management, as well as reinforcing the links between the regional and local plans to maximise opportunities across LA areas and between regions.

To contribute to the Welsh Government's commitment of producing a "National Energy Plan" in 2024, upon completion of the LAEP programme Energy Systems Catapult[M04] will aggregate the LAEPs into a national view. To support this task, they are working with the Welsh Government to create and import standardised LAEP outputs for aggregation into the DataMapWales platform[M05]. The Catapult is also providing technical advisory support to the Welsh Government throughout the programme.

The LAEPs will also form the basis of the 'National Energy Plan' Welsh Government has committed to produce in 2024.

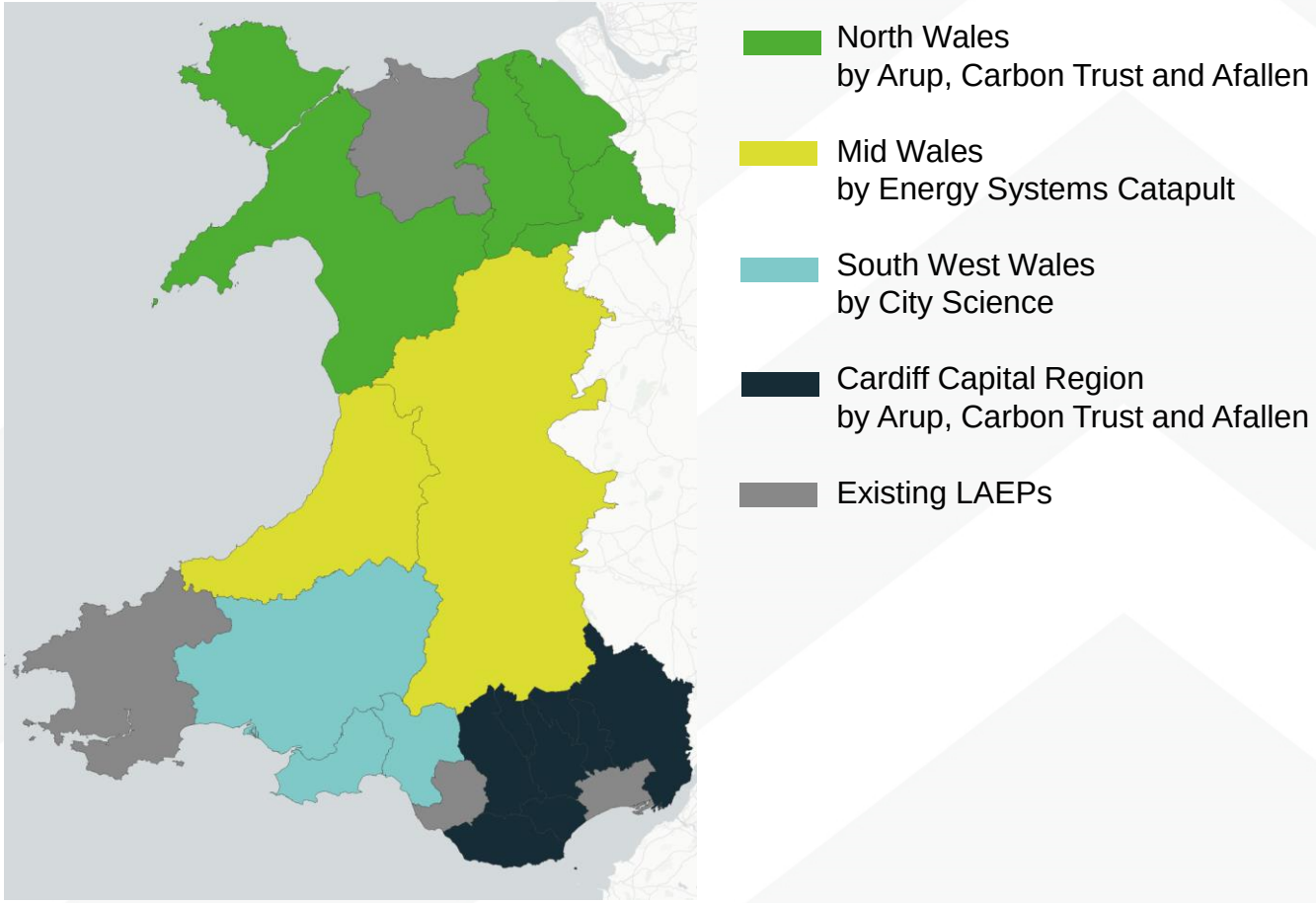


Figure 1.1: LAEP landscape across Wales

1. Introduction

Boundary and scope

Parts of the energy system analysed in a LAEP

A LAEP considers energy use, supply and generation within the Rhondda Cynon Taf boundary.

There are three core parts to the local energy system:

- **Infrastructure** – The physical assets associated with the energy system such as electricity substations.
- **Supply** – Generation (renewable and non-renewable), storage and distribution of energy to local consumers for use in homes, businesses, industry and transport.
- **Demand** – The use of energy driven by human activity (e.g. petrol/diesel used in vehicles, gas burned for heat in homes) required for the energy system to operate.

The whole energy system across all sectors is considered in the planning process to ensure that the interactions and dependencies between generation and use of different energy sources are fully considered. This identifies where different systems can work together to improve the overall resilience and flexibility of the energy system.

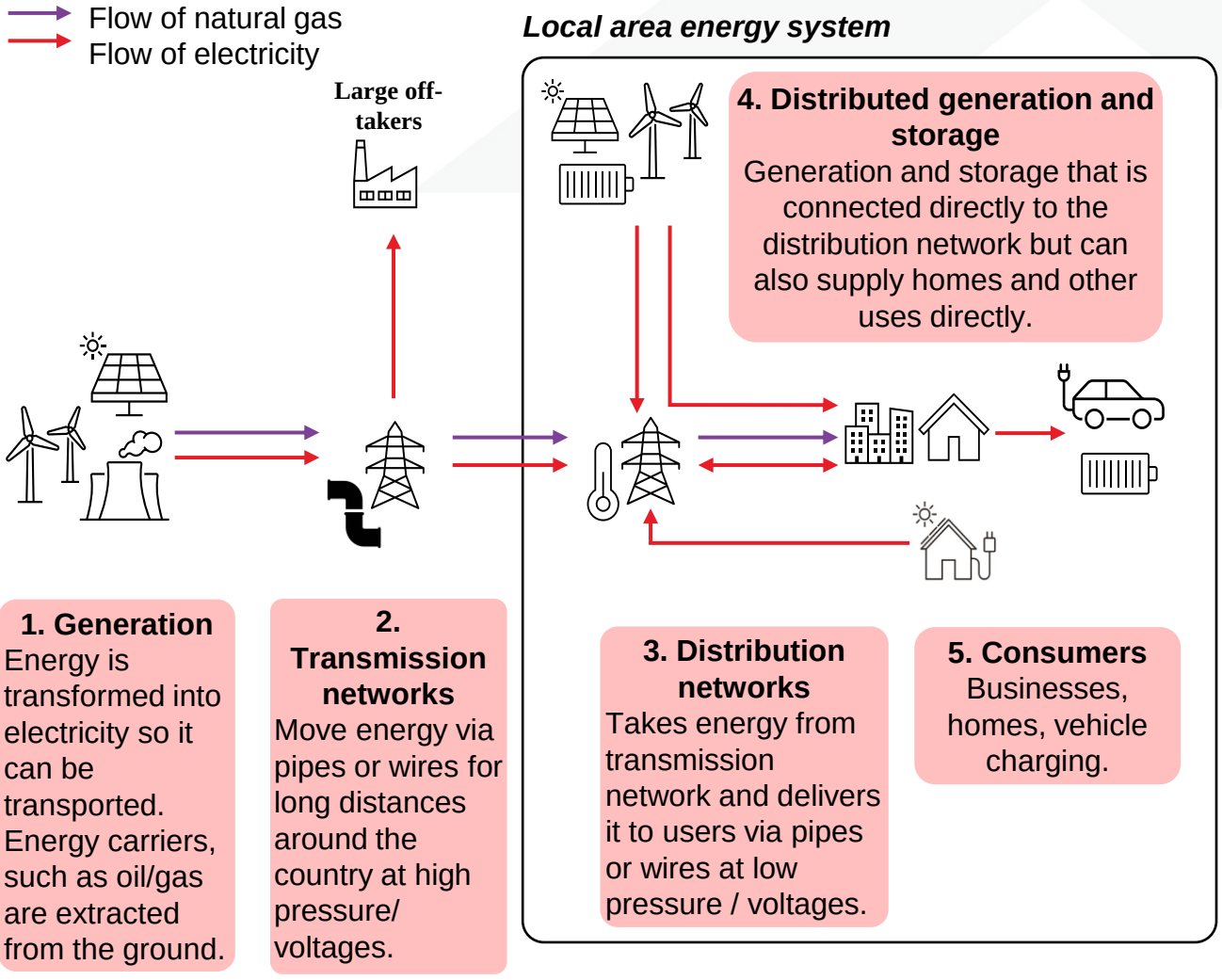


Figure 1.2: Schematic of electricity and gas transmission and distribution network and the system boundary for LAEP

1. Introduction

Boundary and scope

Definitions

Scope for the Welsh LAEPs

The diagram to the right indicate the parts of the local energy system which are in-scope for the LAEPs across Wales. This scope is defined by ESC's LAEP Guidance[M01].

Geographic boundary

We used the geographic boundary for Rhondda Cynon Taf to set the boundary for the LAEP, which meant that any energy generating assets, energy use and infrastructure in that boundary were considered for inclusion in the LAEP.

Exclusions from the LAEP

LAEP does not consider aspects of the energy system which are expected to be overseen by central government, or any non-energy sources of greenhouse gas (GHG) emissions occurring within the Local Authority's governing boundary (for example, emissions from industrial processes, agricultural land use and livestock are excluded. Energy used for shipping, aviation and rail are excluded on the basis that they are not local uses of energy. Large electricity generators connected to the transmission network (such as large wind farms and hydrogen SMR) are considered national assets and excluded from the modelling. However these, for example Pen Y Cymoedd wind farm, are likely to play an important role in Rhondda Cynon Taf's decarbonisation journey.

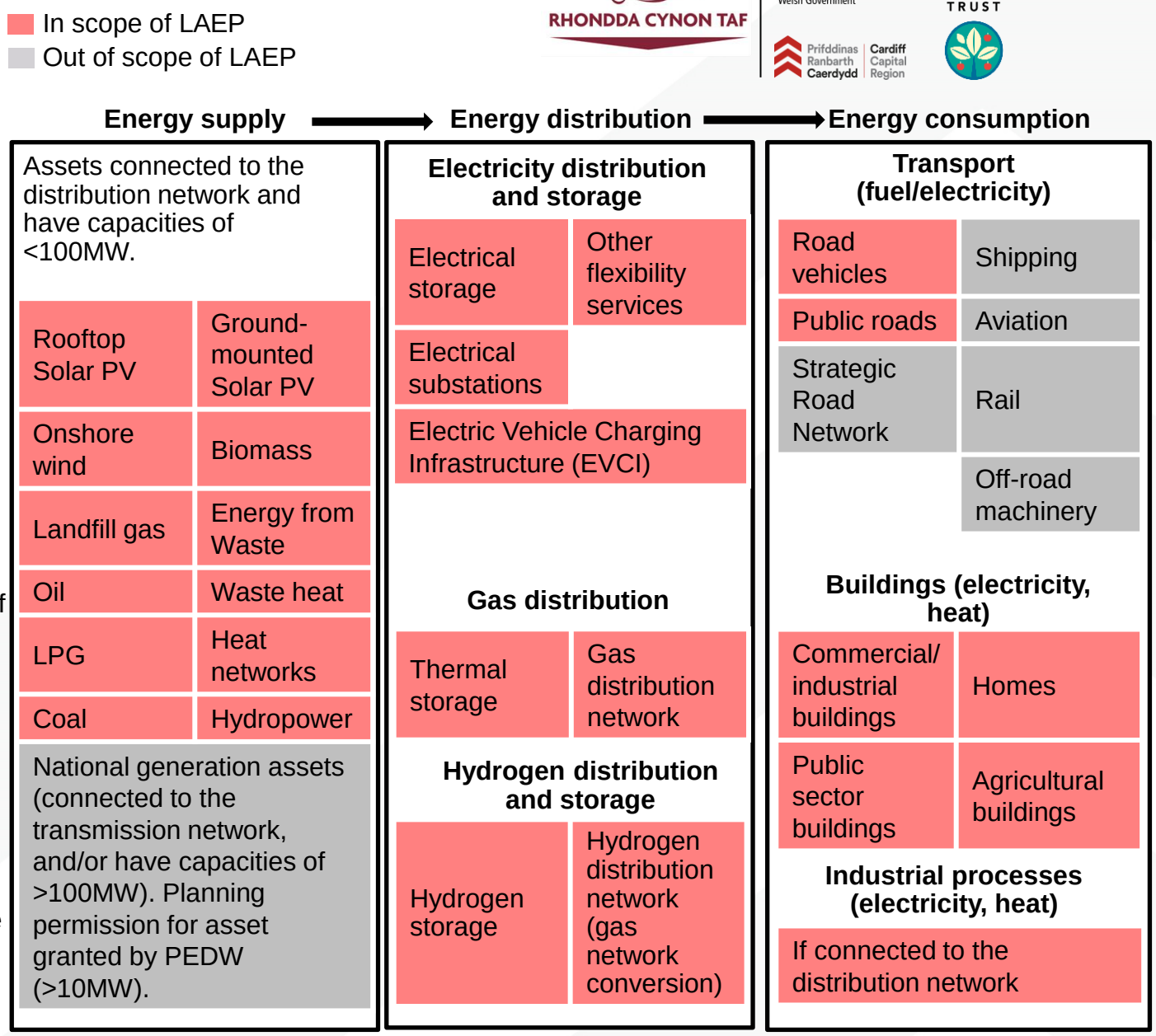


Figure 1.3: Schematic of the local system scope for LAEP

1. Introduction

Our vision for Rhondda Cynon Taf's future local energy system

Future energy system vision, objectives and principles

Sponsors: *Delivery partners:*

We have produced the following vision statement that underpins our ambition for the future net zero energy system by 2050 in Rhondda Cynon Taf:

Accompanying this statement, we have developed specific energy system objectives for our LAEP. The proposed actions outlined in Section 4 of this plan are designed to implement changes that will facilitate Rhondda Cynon Taf in attaining these objectives:

Rhondda Cynon Taf's vision

A sustainable energy future, focusing on reducing carbon emissions cost-effectively and building a resilient energy infrastructure. Central to this vision is community engagement and ownership, ensuring accessible and affordable energy solutions for all. Our goal is to lead in energy innovation, aligning with the Welsh Government's net zero targets, while respecting our natural heritage and enhancing community well-being. This vision represents a commitment to a sustainable, inclusive, and prosperous future for Rhondda Cynon Taf.

Energy objectives

1. **To maximise reductions in carbon emissions while minimising financial costs**
2. **To provide a resilient energy system, capable of increasing local clean energy provision to meet a greater proportion of future energy demand**
3. **To provide community engagement, leadership, and ownership of our energy system**
4. **To deliver affordable solutions for all in the transition to Welsh Government's target of a net zero public sector**

1. Introduction

LAEP contents

This LAEP presents a vision for a net zero local energy system by 2050 for the whole Rhondda Cynon Taf area, with a route map to get there, including a set of recommended actions for the Rhondda Cynon Taf, whilst recognising the role of other key actors in government, the energy sector and across the community.

Plan structure

This plan is structured into four main topic areas:

1. The current energy system - description of Rhondda Cynon Taf's existing energy system and relevant policies and objectives.
2. The future energy system - presentation of future scenarios for a net zero local energy system by 2050, including risks and "low regrets" measures, which are very likely to be part of the future energy system regardless of uncertainty around certain aspects of the future.
3. Action planning - a route map and action plan for us to use to drive the local energy system transition in Rhondda Cynon Taf, including what needs to happen and what we will do.
4. Next steps – outlines immediate next steps and what is needed to create an enabling environment for the delivery of this plan, and a net zero local energy system.

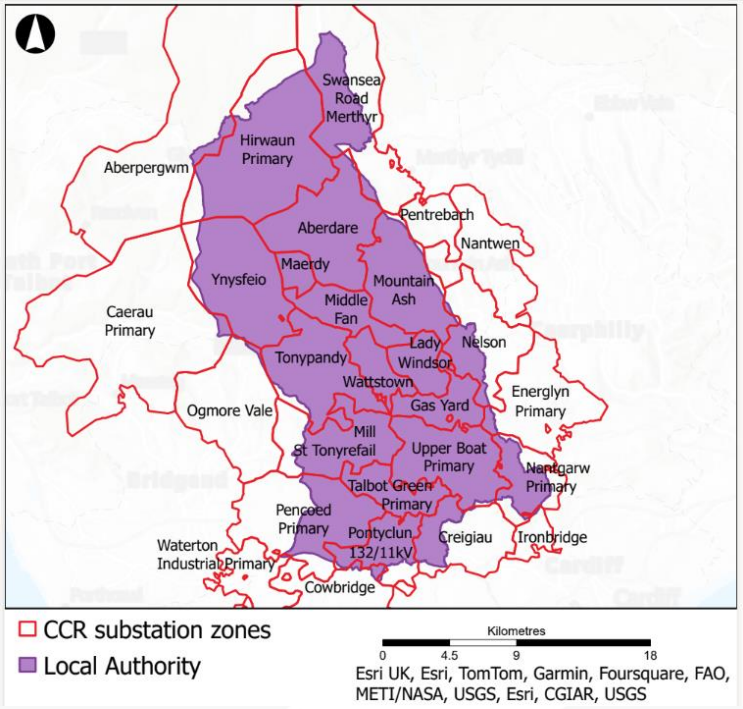


Figure 1.4: Geographic boundary of the LAEP

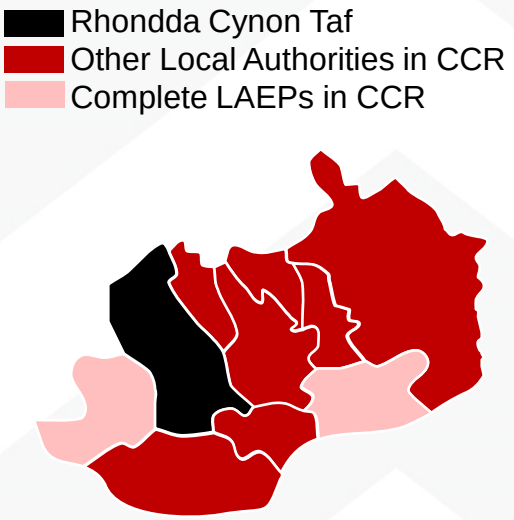


Figure 1.5: Cardiff Capital Region

Figure 1.4 shows the boundaries of Rhondda Cynon Taf (purple) and each of the primary substation service areas (red). Where primary substation service areas intersected one or more Local Authority boundaries, they were divided into smaller modelling zones at that boundary. We most often present the analysis, results, and maps herein in terms of these smaller modelling zones, which may also be called "substation zones" or simply "zones."

Rhondda Cynon Taf

Chapter 2: The current energy system

2. The current energy system

Analysis - local context

Sponsors:

Delivery partners:

Rhondda Cynon Taf covers an area of the South Wales Valleys stretching from the Brecon Beacons in the north, to the outskirts of Cardiff in the south. It consists of five valleys; the Rhondda Fawr, Rhondda Fach, Cynon, Taff and Ely valleys.

Rhondda Cynon Taf comprises a mixture of urban, semi-suburban and rural communities, situated in mountains and lowland farmland. It has a high proportion of its working age population that fall into fuel poverty categorisation, and a high need for social, affordable and older person housing.

Rhondda Cynon Taf's total area is 424km^2, 52km^2 of which is in the Brecon Beacons National Park [ML01, ML02] . It has significant potential for renewable generation, and it currently has several windfarms (including Pen y Cymoedd which at 228MW is considered a national asset rather than part of the local system). Some of the upland area of Rhondda Cynon Taf is used for forestry and peat reclamation, which may reduce possible deployment of renewables.

Rhondda Cynon Taf has a coal mining heritage and an industrial past, although the industrial areas have declined over the years.

There is a large university presence in Rhondda Cynon Taf, including The University of South Wales and Coleg Morgannwg. Research and development work includes battery and hydrogen technologies.

Rhondda Cynon Taf's major roads are the A465, the A470 and the M4. The valleys in Rhondda Cynon Taf typically run north-south, and as such there are good public transport links with Cardiff from many primary areas, but with less easy public transport east west between valleys and especially limited from the peripheral areas.

2. The current energy system

Policy context

Summary of policies

Sponsors: Delivery partners:

Welsh Government policy

Key national policies that relate to this LAEP include:

- Both the UK[M74] and Welsh[M49] governments have set net zero emissions targets for 2050, and the Welsh public sector has set a net zero target by 2030[M54].
- The Welsh Government has set its low carbon delivery plan for 2021-25 and is targeting a reduction of 44% against a 1990 baseline[M03]. It considers a just transition as key and sees decarbonisation as a means to deliver social and economic justice.
- **The Well-being of Future Generations (Wales) Act 2015**[M06] provides the legally binding framework for public sector activities to be in line with sustainable development principles in Wales, outlining seven goals for prosperity and sustainability.
- **Net Zero Wales**[M03], published in 2021, sets out 123 policies and proposals to meet the second carbon budget (2021-25). Policy 20 of Net Zero Wales aims to de-risk and integrate investment in Wales through energy planning

Regional policy

Key regional policies that relate to this LAEP include:

- **The CCR Energy Strategy (2021)** [MC31] establishes a strategic pathway identifying key interventions to deliver on the region's ambitions for decarbonising its energy system. This regional strategy is comprised of baseline energy assessment, results from future energy system modelling, an economic evaluation and outlines the subsequent steps for transitioning CCR's energy system.
- **The South East Wales Valleys Transport Plan (2015)**[ML27] was developed collaboratively by the local authorities of Blaenau Gwent, Caerphilly, Merthyr Tydfil, Rhondda Cynon Taf and Torfaen. This articulates a vision and objective for sub-region's transport system. It outlines both short-term and long-term strategic interventions designed to realise these objectives. This is to be superseded by an updated Regional Transport Plan in 2025.
- The Cardiff Capital Region **Regional Economic and Industrial Plan**[MC35] sets out a number of levers including: **Green Technologies**: Grow the green economy through innovation initiatives centred on green technologies and future skills. **Net Zero Transition:** Begin the transition of the regional transport network to net zero through the deployment of green technologies and infrastructure. **Net Zero Energy Production**: Support the development of net zero energy production facilities in the region to give greater energy security and reduce dependency on imported energy.

2. The current energy system

Policy context

Sponsors:

Delivery partners:

Local policy

Key local policies that relate to this LAEP include:

- **Think Climate RCT (2022-2025)**[ML18] sets out the Council's targets and commitments in tackling climate change. It has the goal of a carbon neutral Council by 2030, and the County Borough as close as possible to carbon neutral by 2030. The Corporate Plan (2020-2024) is linked to climate pledges.
- **The Corporate Asset Management Plan (2018-2023)** [ML19] sets out how to reduce energy use in Council buildings and increase the supply of renewable energy generated.
- **The Decarbonisation Strategy (2023-2025)** [ML20] Includes an action plan with clear actions for the next few years and longer-term ambitions.
- The current **Local Development Plan** (LDP [ML21]) was adopted in 2011 and although the end date is 2021, will remain in force until the Revised LDP is adopted. The Revised LDP dated 2022 - 2037 has been prepared to the Preferred Strategy Stage.

The Council is currently developing its new **Corporate Plan**[ML22] which will be in place from April 2024 and which further embeds the Council's climate ambitions into its work. The new Corporate Plan aims to deliver our Strategic Vision for an RCT where all people, communities, and businesses can grow and live in a healthy, green, safe, vibrant, and inclusive County Borough where they can achieve their full potential in all aspects of their lives and work, both now and in the future by improving the Social, Economic, Environmental and Cultural Well-being of Rhondda Cynon Taf through its four Well-being Objectives.

Other relevant strategies include: **Electric Vehicle Charging Strategy** (2021-2030)[ML23] and associated implementation plan, **Fleet Transition Plan** (2022)[ML24], **Procurement Strategy** (2022)[ML25] and **Well-Being Plan** (2018-2023)[ML26].

2. The current energy system

Our collaborative approach to developing and delivering our LAEP

Stakeholder engagement approach

Sponsors: Delivery partners:

Delivering our LAEP calls for a collective effort from all types of organisations in and beyond the local authority boundary. The local energy system extends beyond Rhondda Cynon Taf County Borough Council's influence which is why stakeholder engagement is the foundation for the development of our LAEP.

We prioritised stakeholders based on their level of local influence and / or knowledge of specific elements of the local energy system and their role in the development of the LAEP. The importance of recognising the involvement of regional stakeholders emerged early in the LAEP. They have a unique role, ensuring cohesion of action for specific element(s) of the energy system across neighbouring LAEPs in the same region and offering regional efficiencies where local objectives are aligned.

We engaged stakeholders at different stages of the development process to make sure they could help shape the plan and key development milestones. We held regional steering groups for the Cardiff Capital Region, attended by the regional and local authority leads, as well as bi-weekly meetings with the local authority leads. Three workshops were held regionally and involved primary stakeholders from across each local authority in the Cardiff Capital Region. These workshops were used at stages where it was important to agree a way forwards that was appropriate for the region, as well as each local authority.

As part of the overarching programme, a national forum brought together all suppliers, local authority leads, the regional leads, Welsh Government and the Technical Advisor to share learnings and maintain a consistent approach across Wales. The suppliers and regional leads also had regular catch ups to share assumptions and challenges.

*This report is accompanied by a **Technical Report** which includes more detailed information on the analysis methodology and engagement of stakeholders throughout the plan's development.*

Sector	Examples of stakeholders engaged
Buildings	housing associations
Transport	Transport providers
Renewable energy generation	Energy project developers Community energy groups
Industry and private sector	Local businesses, larger industrial players
Community engagement	Charities, social enterprise,
Networks	Distribution Network Operators, gas distribution networks
Public sector	Public services board, public service providers, Welsh Government, educational institutions

Table 2.1: Summary of stakeholders

Rhondda Cynon Taf

Chapter 2: The current energy system

Rhondda Cynon Taf's energy baseline

2. The current energy system

Rhondda Cynon Taf's energy baseline

How to read a sankey diagram

This section provides a detailed overview of the local energy system baseline, and describes the methodology and assumptions used to understand current energy infrastructure, what types of energy are used, what technologies are used to convert it from one form to another (e.g. heat) and how much is consumed.

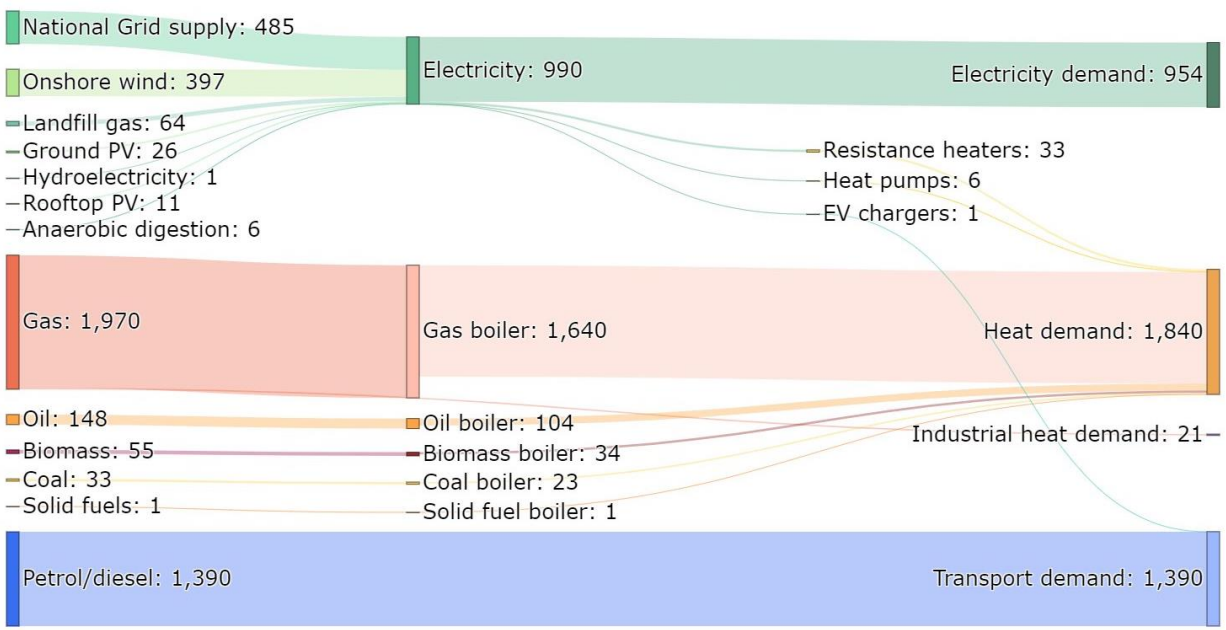
Results presented reflect the energy baseline in Rhondda Cynon Taf in 2023, apart from the transport data (2015) and industry data (2019). Transport and industry datasets are the least likely to have changed in terms of electrification over the years 2019 to 2023, and transport is the most likely dataset to have changed overall due to COVID-19.

Sankey diagrams are a way of **visualising energy transfer** from energy sources to energy demands via energy vectors or conversion technologies.

They are read **from left to right** and show a **snapshot of a scenario in time** e.g., 2050.

Energy transfers are **drawn to scale** and so are helpful to identify the size of each transfer and compare different scenarios.

The average Welsh home uses 3.325MWh/year of electricity, which is 0.003GWh for comparison with the scale on the Sankey. In terms of gas, a typical home uses 12MWh/year, which is 0.012GWh for comparison with scale on the Sankey.[M40]



1. Where the energy comes from
This side represents the different **energy sources**, including generation technologies and imports from the national grid

2. How the energy is being converted

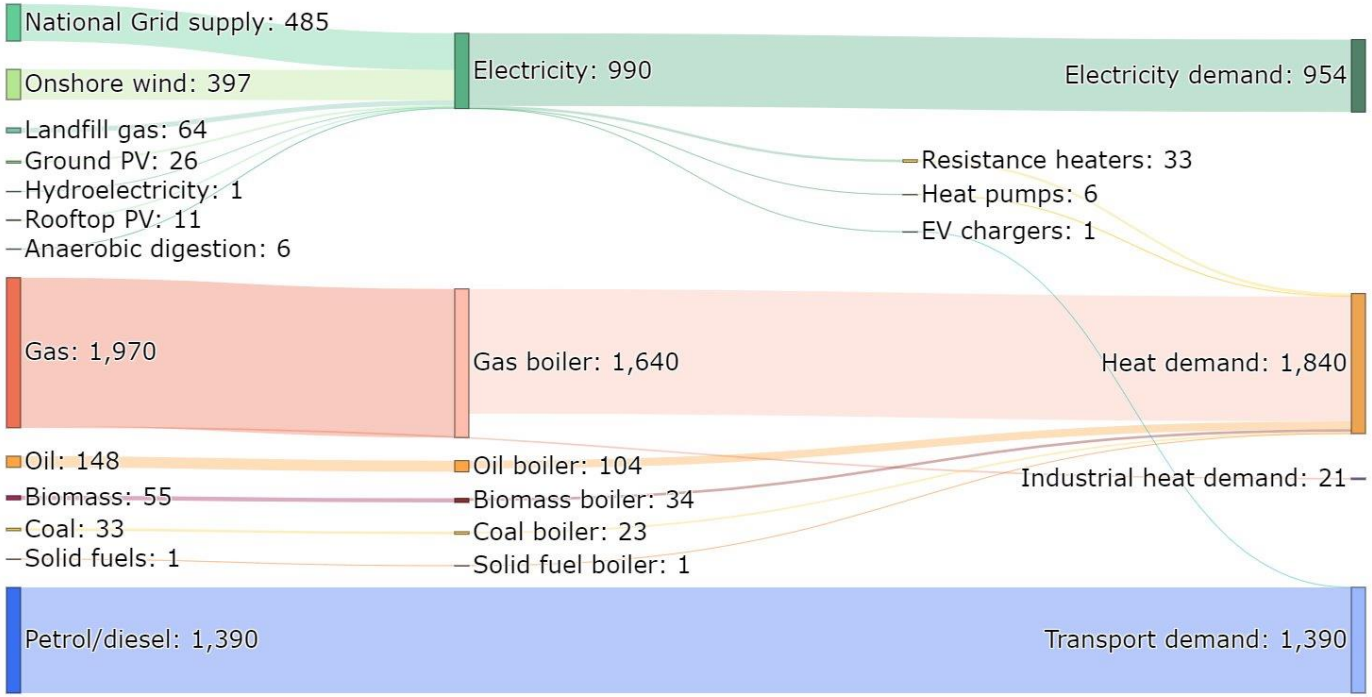
3. Where the energy is being used
This side represents the **final demands** for each energy vector: heat demand, electricity, demand, transport demand.

Figure 2.1: How to read a Sankey diagram (units are GWh/year)

2. The current energy system

Rhondda Cynon Taf's energy baseline

Energy demand



Electricity made up 23% of total energy demand:

- >50% total electrical demand in the area was met from renewable sources.
- 40% total electrical demand was met by local wind farms.
- 4% of electricity was used for heating.
- Rhondda Cynon Taf County Borough Council purchased 100% of its electricity REGO certified.

Heat made up 44% of total energy demand:

- 90% of heat demand was met by gas boilers.
- 34% of homes had EPC rating of A-C.
- 96% of homes were connected to gas grid.
- 47% of homes were terraced houses (2021).

Transport makes up 33% of total energy demand:

- Nearly 100% of vehicles were internal combustion engine.

Figure 2.2: Sankey diagram showing energy input, conversion and output in Rhondda Cynon Taf in GWh/year. This baseline does not include national assets.

2. The current energy system

Rhondda Cynon Taf's energy baseline

Energy demand by sector

Figure 2.3 shows the baseline electricity Rhondda Cynon Taf, based on meter level electricity consumption data. The demand is generally based around areas of higher density of population and businesses.

Figure 2.4 shows transport energy consumption in Rhondda Cynon Taf. This data represents all trips that either start of terminate in each LSOA for all vehicle types (excluding off-road vehicles and public transport). Traffic passing through Rhondda Cynon Taf on major roads such as the M4, A470 and A465 are therefore not represented by this data, with highest transport demand in areas with higher population and employment.

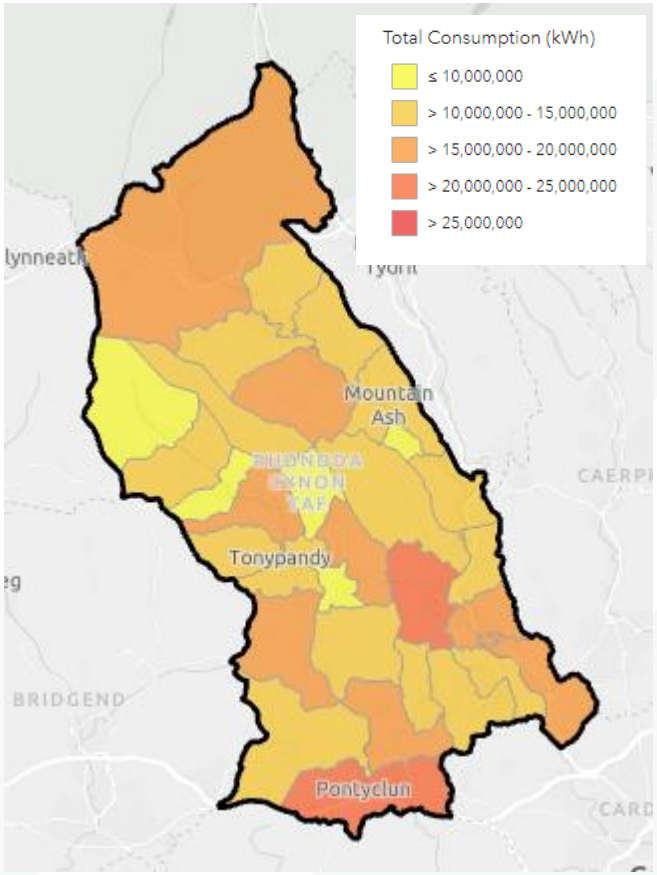


Figure 2.3: Electricity consumption by Middle Super Output Area (MSOA) across Rhondda Cynon Taf in 2023. The data is based on meter level electricity consumption data

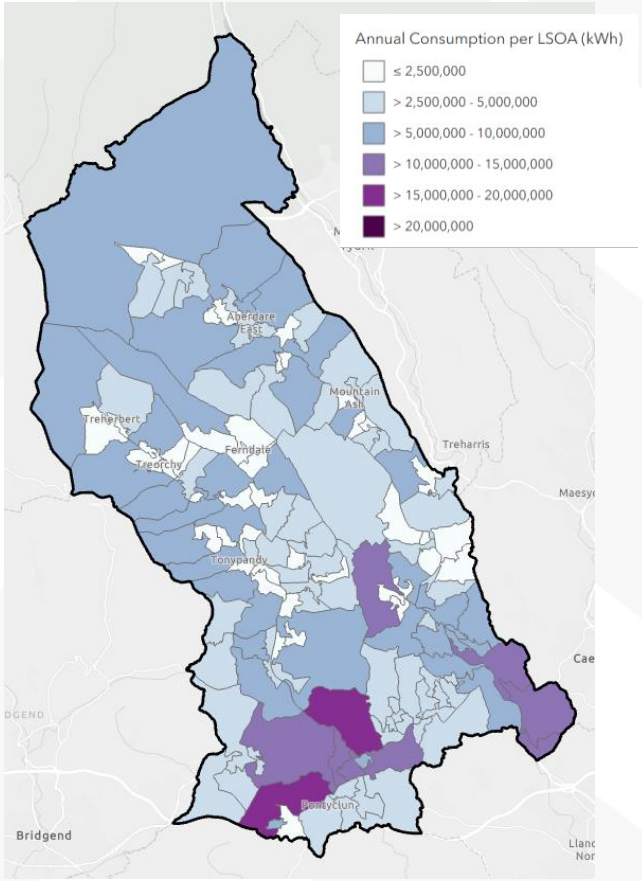


Figure 2.4: Transport energy consumption (combined total across cars, light goods vehicles (LGV) and heavy goods vehicles (HGV) by Lower Super Output Area (LSOA), in 2015 as a baseline year

2. The current energy system

Rhondda Cynon Taf's energy baseline

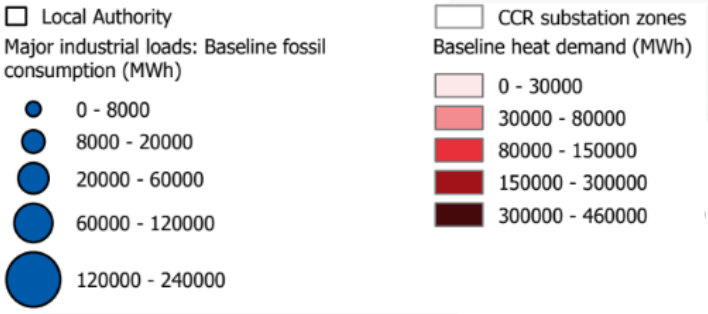
Energy demand by sector

Figure 2.5 presents Rhondda Cynon Taf's heat consumption at modelling zone level, which is delineated by primary substation service areas. In 2019, the vast majority of residential buildings (97%) were connected to the gas network[ML04], explaining the high consumption shown throughout the majority of the area.

The substation zone with highest gas consumption was Tonypandy, which has the highest number of homes of all the substation zones.

The nature of industrial sites in Rhondda Cynon Taf varies, with a mix of fragmented sites and industrial clusters, although the industrial areas of Rhondda Cynon Taf have reduced over the years.

Major industrial loads as defined by Department for Energy Security and New Zero's (DESNZ) in Rhondda Cynon Taf are Larigan Power Station, Forrest Wood Coating Plant owned by Cemex UK, Maxibrite and Hanson Quarry's Penderyn site.



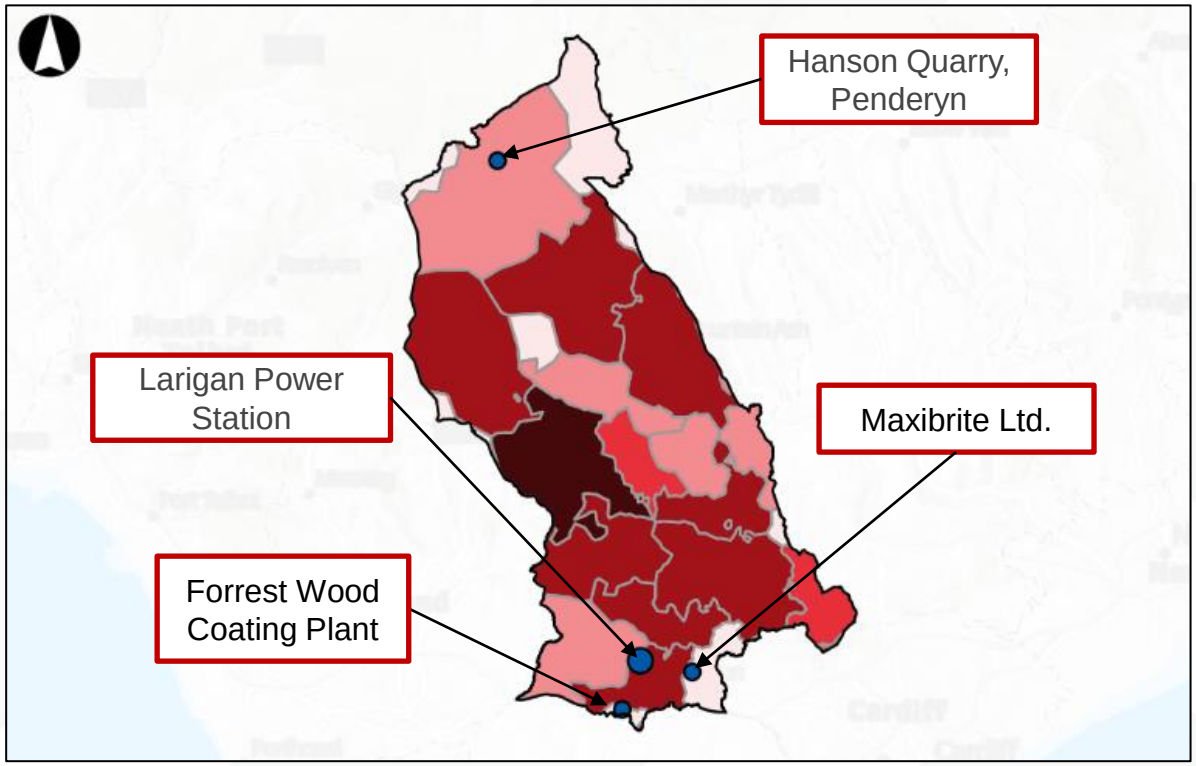
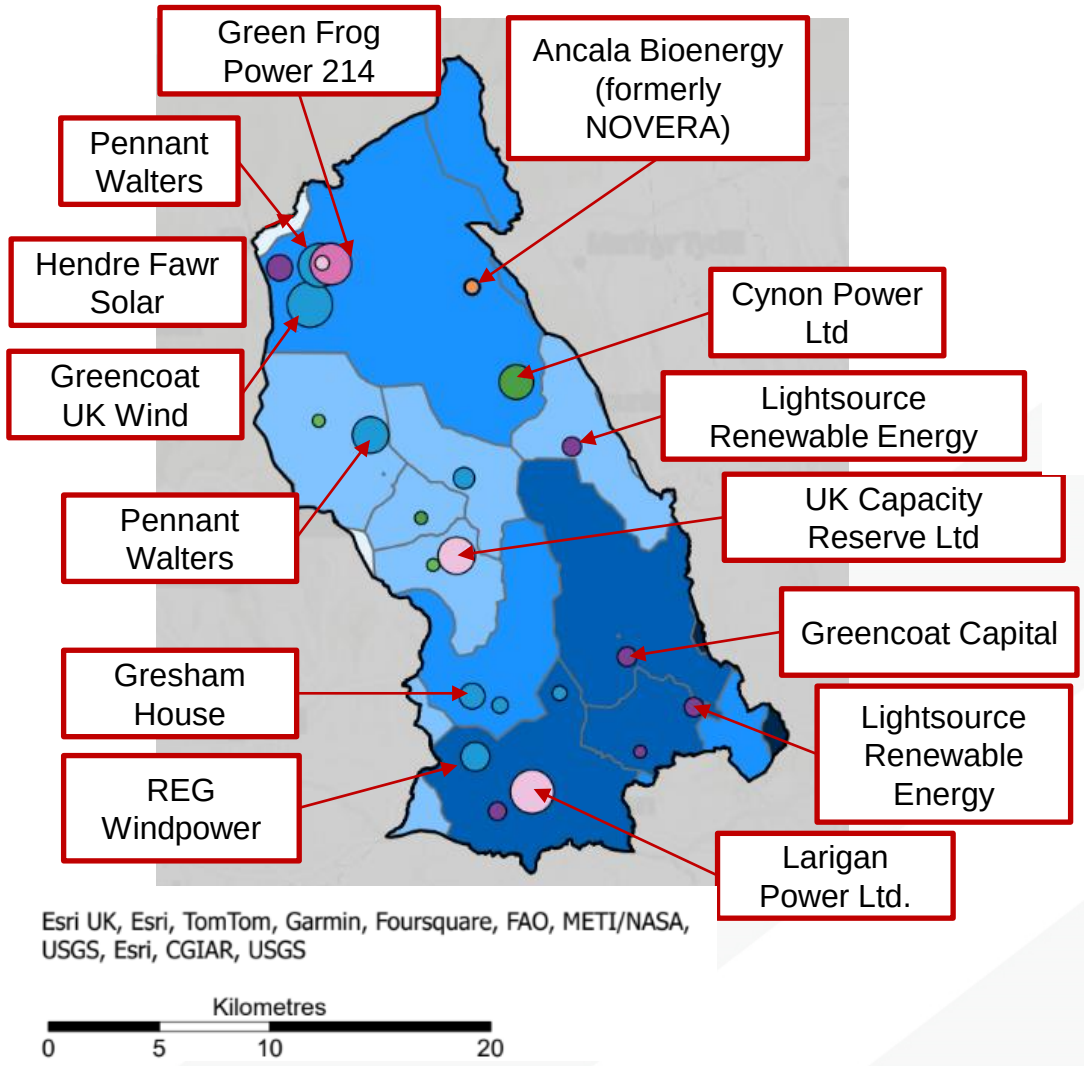


Figure 2.5: Major industrial loads (2019) and heat demand (2023) by substation zone across Rhondda Cynon Taf

2. The current energy system

Rhondda Cynon Taf's energy baseline

Energy generation



Baseline Local Generation Technology

- Anaerobic Digestion
- Biomass
- Energy from Waste
- Fossil (Gas)
- Fossil (Oil)
- Hydropower
- Landfill Gas
- Onshore Wind
- Sewage gas
- Solar PV (Ground)

Renewable energy

Renewable electricity generation installed capacity

180MW total renewables installed capacity

120MW wind turbines

28MW ground-mounted PV

12MW roof mounted PV

20MW landfill gas

Fossil fuels

Fossil fuel electricity generation installed capacity:

60MW total fossil fuel installed capacity

40MW gas

20MW oil

Baseline Local Generation Existing Capacity (MW)

- 1
- 5
- 10
- 50
- 100

Roof PV by district

Baseline rooftop PV (MW) by outward code

- 0 - 0.2
- 0.2 - 0.8
- 0.8 - 1.6
- 1.6 - 2.5
- 2.5 - 4.0

Figure 2.6: Local energy generators and their respective capacities (MW) and domestic and non-domestic rooftop solar PV (MW) by outward code (2023)

2. The current energy system

Rhondda Cynon Taf's energy baseline

Energy demand by sector

Generation and demand headroom in a local authority's electricity distribution network refers to the capacity surplus or deficit between the electricity generated and the electricity consumed, crucial for maintaining a stable and reliable power supply to meet the community's needs.

Presently, Rhondda Cynon Taf faces challenges due to existing grid limitations, which often lead to delays in new connections and substantial associated expenses. These constraints impact the ability to develop new energy sources and infrastructure, highlighting the need for grid upgrades and enhancements.

Rhondda Cynon Taf's demand headroom varies across the region, from 0 to 8MW per substation (median range of 0 to 2MW) representing varied short-term opportunities for increased energy demand.

Rhondda Cynon Taf's generation headroom varies across the region, from 0 to 8MW per substation (median of 0 to 2MW) representing varied opportunities for electricity generation, these areas are similar to the demand headroom areas but with little generation headroom in the North of the county, most likely due to existing wind generation in that area.

Generation headroom

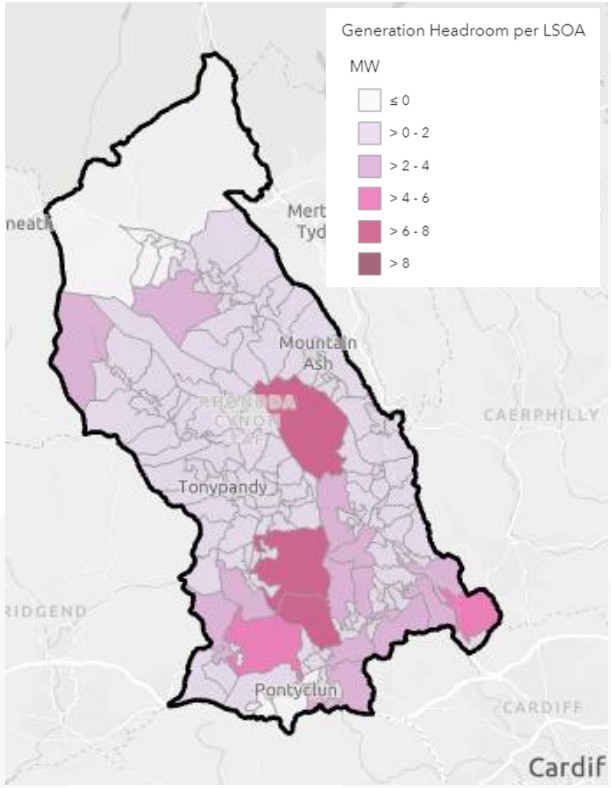


Figure 2.7: Electricity generation headroom (2023). Electricity generation headroom is the difference between the capacity of the network to have energy exported to it from generators, and the actual supply

Demand headroom

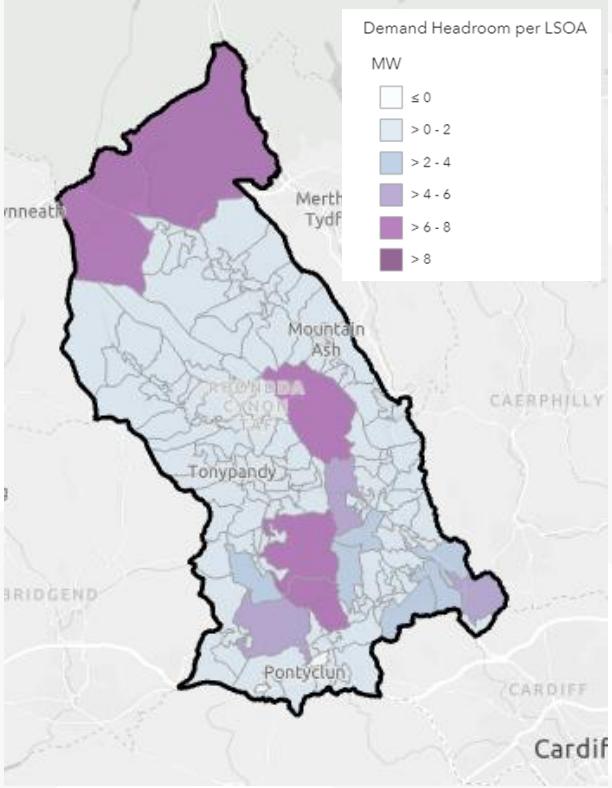


Figure 2.8: Electricity demand headroom (2023). Electricity demand headroom is the difference between the capacity of the network to meet demand, and the actual demand

2. The current energy system

Rhondda Cynon Taf's energy baseline

Local environmental, social and economic factors that influence energy

Sponsors: *Delivery partners:*

Land

424km^2 total land area - about a third wooded and about a third urban[ML03]

Even within the main urban areas an average of 18.5% is tree covered[ML03]

>50% total electrical demand from renewables

Demographics

Population: 241,000 (Welsh population 3.1 million)[ML05]

570 persons per km^2 (Welsh average 150 person per km^2)[ML05]

Population growth in last 10 years: 3% [ML05]

71% homes EPC D and below (Welsh average 60%) [ML06]

47% terraced houses (2021)

Socio-economics

12% of households in fuel poverty (Welsh average 14%) ML07

16% social housing (Welsh average 20%)

92% of addresses residential

41,300 commuters out of the area, with 13,500 people commuting in[ML08]

Emissions

Wales average: 7tCO_2e per capita[M68]

Largest carbon emission sectors in 2023:

- 36% road vehicles
- 57% buildings
- 7% local electricity generation and industry

2023 emissions less than two thirds of 2005 levels[ML09]

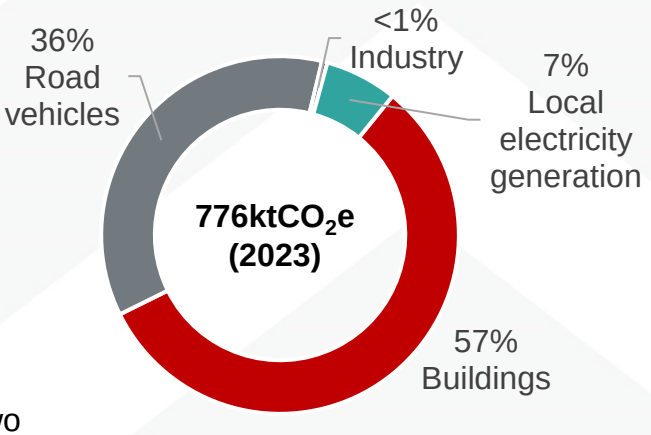


Figure 2.9: Emissions by sector. Industrial loads are 'large point sources' as defined by DESNZ

2. The current energy system

Rhondda Cynon Taf's energy baseline

Progress to date

Sponsors: Llywodraeth Cymru Welsh Government; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; CARBON TRUST

Rhondda Cynon Taf County Borough Council has worked to reduce its organisational GHG carbon emissions, and to provide the means for the wider community to do the same, as we transition to a net zero 2050 energy system.

Rhondda Cynon Taf County Borough Council climate related commitments are that by 2030:

- Rhondda Cynon Taf will be a carbon neutral Council
- The County Borough will be as close to carbon neutral as possible
- The County Borough will have contributed to meeting the Welsh Government's ambition of a Net Zero public sector

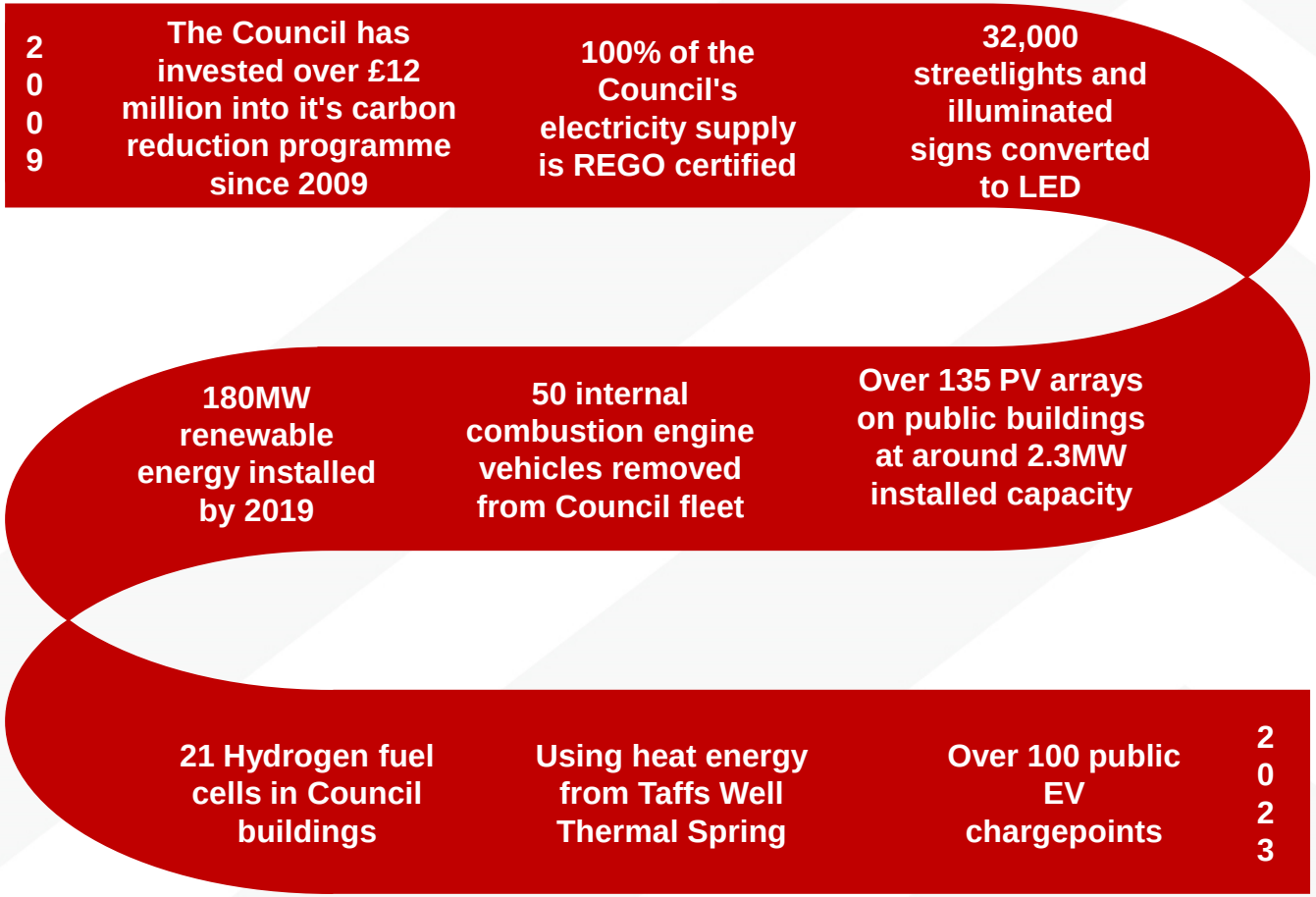


Figure 2.10: Summary of Council actions to date that have contributed to decarbonising the local energy system

2. The current energy system

Rhondda Cynon Taf's energy baseline

Plans for the future

Sponsors: *Delivery partners:*

Renewable generation

Rhondda Cynon Taf already has a large amount of renewable energy electricity generation, with significant potential for more. A renewable energy assessment undertaken in 2021 highlighted large amounts of land which had theoretical potential for renewables. However, it is acknowledged that some of this land may not be ideally suited for renewable energy projects, and that land use for renewables needs to be balances with other types of beneficial outcomes such as biodiversity, flood mitigation, soil and vegetation carbon and agriculture.

Further refinement of the 2021 assessment will be undertaken, taking into account additional factors such as peat restoration, priority habitat, SINC designations and the suitability of the land, to more accurately determine a likely potential capacity for generation. This assessment will also take into account the different impacts of different renewable energy technologies.

Assets over 100 MW are not in scope of this LAEP and are not included in the total renewables numbers given here because these are considered national assets. For example, Pen y Cymoedd wind farm has an installed capacity at 228 MW and is therefore not included in the modelling or discussion.

Onshore wind power is the prominent renewable energy source harnessed within Rhondda Cynon Taf, with around 120MW installed capacity in 2023. Solar power also plays a vital role in the local energy mix, with 40MW installed capacity in Rhondda Cynon Taf in 2019, from both rooftops and dedicated ground-mounted solar farms.

In addition to wind and solar, Rhondda Cynon Taf utilises various other renewable electricity generation sources, including hydroelectric, landfill gas and anaerobic digestion facilities. These sources further diversify the energy mix, ensuring reliability and sustainability.

Schemes in planning include the 94MW Twyn Hywel Windfarm which is in both Rhondda Cynon Taf and Caerphilly County Borough. Schemes consented but not yet operational include the 9MW wind farm at Abergorki (near Meardy Colliery), and the 8.5MW repowering of Taff Ely windfarm. Renewables projects in planning include a 7.2MW wind farm at Llwyncelyn, and a 9.9MW ground-mounted PV scheme at Rhiwfelin Fawr Farm. There is significant potential for generation on Rhondda Cynon Taf County Borough Council owned assets, which the Council is exploring.

2. The current energy system

Rhondda Cynon Taf's energy baseline

Plans for the future

Sponsors: *Delivery partners:*

Reducing energy demand

Rhondda Cynon Taf County Borough Council is looking into ways to reduce their energy use and have invested over £12 million into its carbon reduction programme since 2009, including converting streetlights to LEDs, and PV arrays and fuel cells on their buildings. The Council does not own social housing, this is predominantly owned by Trivallis Housing Association.

Working in partnership with the Cardiff Capital Region, Rhondda Cynon Taf County Borough Council is installing public EV chargepoints across the area, in addition to independently installing EV chargepoints for its own staff and fleet.

Rhondda Cynon Taf County Borough Council is developing a number of active travel schemes and is currently on site constructing the Phase 1 (complete) and Phase 2 of the Rhondda Fach Community Route (between Maerdy and Ferndale).

The Council's Integrated Transport Unit has previously introduced subsidised bus travel, and funding has been secured for 2024/2025 to enable the Council to identify opportunities to introduce similar measures in the future. Subsidised bus travel during school holidays has also been applied in 2023/2024.

Rhondda Cynon Taf

Chapter 3: The future energy system

3. The future energy system

Overview

Vision

A sustainable energy future, focusing on reducing carbon emissions cost-effectively and building a resilient energy infrastructure. Central to this vision is community engagement and ownership, ensuring accessible and affordable energy solutions for all. Our goal is to lead in energy innovation, aligning with the Welsh Government's net zero targets, while respecting our natural heritage and enhancing community well-being. This vision represents a commitment to a sustainable, inclusive, and prosperous future for Rhondda Cynon Taf.

Objectives of the plan

We have worked with stakeholders to define the following objectives for our plan:

1. To maximise reductions in carbon emissions while minimising financial costs
2. To provide a resilient energy system, capable of increasing local clean energy provision to meet a greater proportion of future energy demand
3. To provide community engagement, leadership, and ownership of our energy system
4. To deliver affordable solutions for all in the transition to Welsh Government's target of a net zero public sector

Understanding the future energy system

We know that we need to transition our energy system in Rhondda Cynon Taf to net zero by 2050.

We also know that there are multiple plausible and attractive future energy systems for Rhondda Cynon Taf depending on a range of factors. This includes how innovation might impact on the cost of technologies over time, as well as wider policy decisions that will be made by Welsh and UK Governments. These factors will influence the uptake of hydrogen, for example.

Scenario analysis

To inform our plan, we used scenario analysis to explore what a net zero future energy system could look like under different future outcomes, including considering the potential for reduction measures and potential energy sources. We modelled four future energy scenarios and modelled the most cost- and carbon-effective way to meet demand in each one. Through doing this, we were able to identify technologies that played a significant role in all the future scenarios modelled. These technologies represent low- and no-regrets options (meaning that they are likely to be most cost-effective and provide relatively large benefits) which are very likely to be important parts of the future energy system, regardless of the uncertainty of the future.

Deployment modelling

We looked at how aspects of each energy proposition might be deployed between now and 2050, creating **deployment pathways**. Deployment pathways indicate:

- the scale of change required over time,
- the sequencing of activity that needs to happen to achieve a net zero energy system.

Deployment pathways for different components were informed by broader plan objectives, local and regional strategic priorities, policies and national targets and using this context, helped us to define a suitable level of ambition, and bring all this evidence together into an action plan.

3. The future energy system

Overview

The current energy system (*Chapter 2*)

Rhondda Cynon Taf's energy baseline

- We used available data sources to create a picture of how energy is generated and used in Rhondda Cynon Taf, focusing on the local energy system, which is defined in earlier chapters.

The future energy system (*Chapter 3*)

Scenario analysis

- We defined modelling parameters such as the maximum amount of solar and wind which can be installed in Rhondda Cynon Taf.
- We modelled four future energy scenarios and explored the most cost- and carbon- effective mix of technologies to generate energy to meet future demand.
- We compared the results to identify low-regret energy system components to consider as high priorities for near-term action.

Deployment modelling

- We modelled the rate of deployment for low-regret energy system components, helping us understand by how much we need to ramp up adoption of different technologies over time.
- We estimated the wide benefits of each scenario, looking at the impact of GHG emissions, air quality and employment in the local area.

Action planning (*Chapter 4*)

Energy propositions

- We looked at **where** critical system components could be prioritised for deployment and identified priority focus zones, accounting for technical and social factors.
- We took what we learnt from scenario analysis, deployment modelling and zoning analysis to create 5/6 energy propositions that form the framework for Rhondda Cynon Taf's LAEP, and the focus for the next 5-6 years.

Action routemap

- We asked local stakeholders to think about their influence over the energy system, and what they could do to support delivery of each energy proposition.
- We then combined this feedback into an action routemap describe the collective effort required to deliver the ambitions and near-term energy propositions set out in Rhondda Cynon Taf's LAEP.

Figure 3.1: Summary of steps taken to produce the LAEP

3. The future energy system

Scenario analysis

Summary of future energy scenarios

Do Nothing	•A scenario for comparison which considers committed activities, and assumes that current and consulted upon policy goes forward and remains consistent. •This scenario provides a cost counterfactual. •There is no decarbonisation target for this scenario, and we do no use it in optimisation modelling.
National Net Zero	•Uses the lowest cost and carbon combination of technologies to meet Wales' 2050 net zero target. •Assumes a moderate level of energy demand reduction across the system. •Model is allowed to import and export to the electricity grid, this assumes that the electricity grid is decarbonised and reinforced to allow for the demands, likely to be a combination of offshore wind, hydrogen CCGT, grid level battery storage, nuclear (these are considered as national assets and outside the scope of the LAEP).
Low Demand	•Considers the lowest future energy demand across different sectors. •Explores the impact of energy-reducing initiatives (home fabric improvements) and uptake of active travel and public transport use. •Model finds the lowest cost and carbon combination of technologies to meet predicted future energy demand. •Import and export of electricity as National Net Zero
High Demand	•Considers the highest future energy demand across sectors. •Model finds the lowest cost and carbon combination of technologies to meet predicted future energy demand. •Import and export of electricity as National Net Zero
High Hydrogen	• Considers the highest plausible future energy demand across sectors • High local Hydrogen production • Considers hydrogen for heavy goods vehicles and industrial demand

Figure 3.2: Summary of future energy scenarios

3. The future energy system

Scenario analysis

National Net Zero scenario

Sponsors: Delivery partners:

Figure 3.3 shows a potential future energy system for Rhondda Cynon Taf. This system results from modelling to create the most cost and carbon optimal system. We have run a number of scenarios to support us in making decisions. The optimisation modelling informs the deployment modelling and the actions that go into the plans, **but is not the "final plan" for the local authority area.** The actions will help estimate future potential and inform goals, for example a renewable energy assessment will indicate suitable capacity for wind and PV in Rhondda Cynon Taf. A comparison of the outputs of the main parts of the enery system for all scenarios is provided in table 3.1 overleaf.

Green hydrogen imports and hydrogen could be generated from electrolysis to serve transport and industrial demand.

There could be a significant increase in renewable energy generation, especially ground-mount PV (40 x higher than baseline).

Electricity supplied by the National Grid could increase by 52% from the baseline.

Annual electricity use could be 2.9 times larger than the baseline

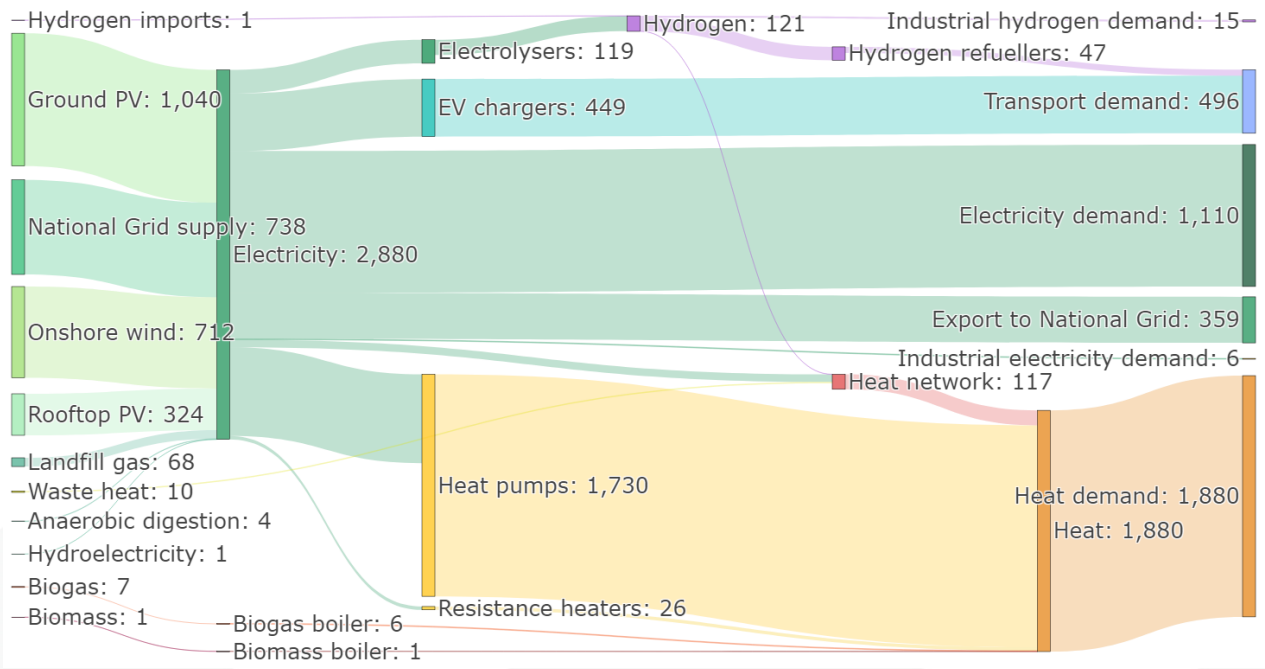


Figure 3.3: National Net Zero scenario Sankey diagram (GWh, 2050)

Majority of transport demand could be met through EV chargers. Hydrogen refuellers meets 9% of demand

12% of the generated electricity could be surplus and is subsequently exported

Heat supply could be predominately met by heat pumps (92%), with smaller contributions from heat networks, resistance heaters, biogas & and biomass

3. The future energy system

Scenario analysis

Energy system components

Table 3.1 provides an overview of the variations in energy components observed in the optimisation modelling results across future energy scenarios, benchmarked against the baseline results.

Optimisation modelling shows solar and onshore wind generation consistently increasing across all scenarios. The model selects PV over wind as it considers it the lower cost way of carbon reduction but does not take into account other more complex factors. The actions from this LAEP include a detailed energy assessment to get a clearer indication of renewable energy capacity of each technology in Rhondda Cynon Taf.

Transport demand decarbonises, primarily due to the supply of electricity through EV chargepoints. Hydrogen is incorporated into the energy mix in all scenarios, sustaining Rhondda Cynon Taf's industrial and transport demands.

Heat demand is predominantly catered for by heat pumps, a trend that is consistent across all scenarios. The modelling process used does not account for the ability (or inability) to physically install a heat pump, which might be more challenging in denser areas of terraced housing in particular. Other solutions such as heat networks should therefore be considered, and potential areas for heat networks are discussed in the technical report

Energy Elements	Baseline	National Net Zero	High Demand	Low Demand	High Hydrogen
Ground-mount PV	26GWh	↑ to 1,040GWh			
Rooftop PV	11GWh	↑ to 324GWh			
Onshore wind	397GWh	↑ to 712GWh			
Landfill gas	64GWh	↑ to 68GWh	↑ to 69GWh	↓ to 51GWh	↑ to 76GWh
Biomass	34GWh	↓ to 1GWh			
Anaerobic digestion	6GWh	↓ to 4GWh		↓ to 2GWh	↓ to 4GWh
Hydrogen import	0GWh	↑ to 1GWh			↑ to 3GWh
Electrolysers	0GWh	↑ to 119GWh	↑ to 111 GWh	↑ to 119GWh	↑ to 299GWh
Import from Grid	485GWh	↑ to 738GWh	↑ to 753 GWh	↓ to 401GWh	↑ to 852GWh
EV chargers	1GWh	↑ to 449GWh	↑ to 489 GWh	↑ to 449GWh	↑ to 374GWh
Hydrogen refuellers	0GWh	↑ to 47GWh	↑ to 43 GWh	↑ to 47GWh	↑ to 126GWh
Heat pumps	6GWh	↑ to 1,730GWh		↑ to 1070GWh	↑ to 1,730GWh
Heat networks	0GWh	↑ to 117GWh		↑ to 115GWh	↑ to 117GWh
Resistance heaters	33GWh	↓ to 26GWh		↓ to 11GWh	↓ to 26GWh

Table 3.1: Comparison of the 2050 scenarios to the baseline

3. The future energy system

Deployment modelling

Impact on energy demand

Deployment modelling sets out how quickly each energy component could be deployed in each optimisation scenario and the Do Nothing scenario. The rate of change in the Do Nothing scenario is based on current deployment rates and policy levers, whereas the other scenarios show trajectories that meet the optimisation models, taking into account the need for growth in the supply chain.

Figure 3.4 shows how the energy demand could change over time in the different sectors for the baseline, 2030 and 2050. The energy demand is then converted into carbon emissions, numbers of jobs and air quality as you can see on the next page.

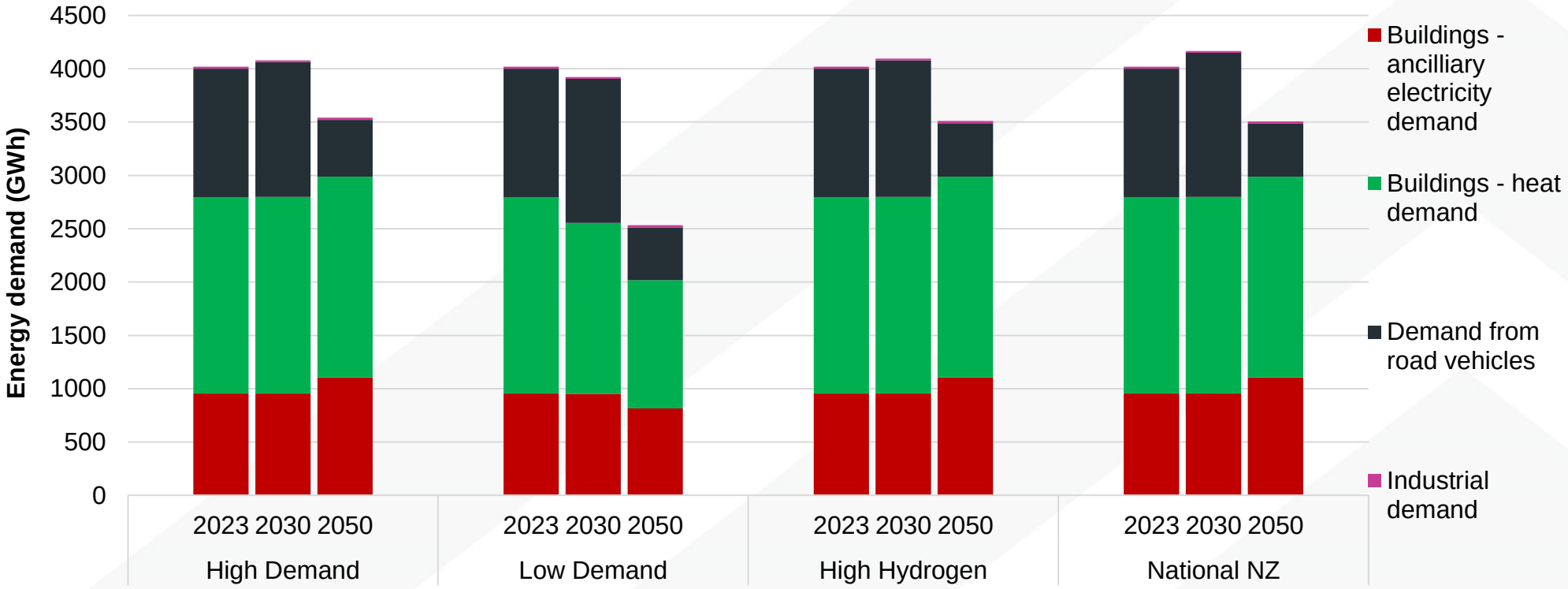


Figure 3.4: Energy demand over time for each scenario

3. The future energy system

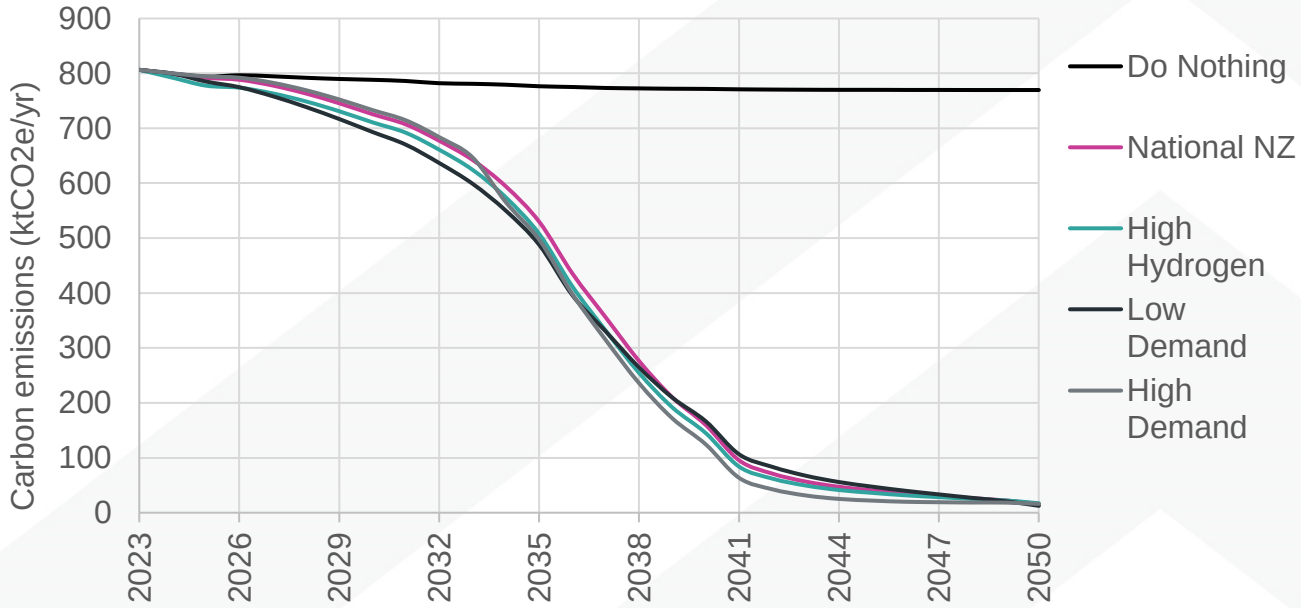
Deployment modelling

Impact on GHG emissions

Figure 3.6 shows the gap in the GHG emissions between the Do Nothing scenario and the optimised scenarios, and Our deployment modelling provides additional evidence on the realism of delivering the changes suggested by the optimisation modelling. It helps us to determine the actions needed in the next five years to set us on the pathway to net zero in 2050. There are also bigger systemic changes that will be needed to achieve the scale of change set out in this plan.

None of the scenario's fully reach net zero by 2050 due to residual emissions. The most common sources of residual emissions in 2050 are from electricity demand (FES projection for grid carbon factor goes very low, but not zero or negative)[ML17] and electricity generation from landfill gas and anaerobic digestion. Offsetting would be needed to reach net zero, however this is not in the scope of the LAEP.

The deployment modelling also shows how these pathways contribute to the Welsh Government emissions reduction targets. For Rhondda Cynon Taf, we see that the 2023 baseline is a 59% reduction on the 1990 levels, with the pathways all performing better than the targets to 2050. 2050 is slightly missed, because there is residual electricity in the network, however the average reduction is 99% against the 1990 levels.



Scenario	2030	2040	2050
Welsh Gov targets	-63%	-89%	-100%
National Net Zero	-56%	-90%	-99%
High Hydrogen	-57%	-91%	-99%
Low Demand	-58%	-90%	-99%
High Demand	-56%	-92%	-99%
Do Nothing	-53%	-54%	-54%

Figure 3.5: GHG emissions ($ktCO_2e$) over time for each scenario compared to the Do Nothing scenario (bottom) % GHG emissions reduction for each scenario compared to the Welsh Government emissions reduction targets

3. The future energy system

Deployment modelling

Socio-economic impacts

Reducing the amount of energy we use and using renewable energy sources for power generation can have wider environmental, social and economic benefits so it is important that they are fully understood to support decisions that impact the future of the energy system. For example, for every £1 invested in energy efficiency measures, the NHS can save £0.42 (amounting to annual savings of £1.4 billion in England alone)[M41].

Employment impacts

Investments in local energy systems can be expected to have employment benefits by providing local, skilled jobs. These will include direct jobs from construction and operational phases of the development as well as associated supply chain and multiplier effects[M42].

Impact on air quality

It can also impact the quality of the air which in turn impacts: human health, productivity, wellbeing and the environment, which is why it is so important to understand when planning future policy or programmes of work. Activity costs presented in Table 3.2 show estimates for the impact of air pollution per unit of fuel consumed in each future energy scenario and estimates for the employment impacts associated with each future energy scenario, compared to the Do Nothing scenario

Metric	Do Nothing	National Net Zero	High Demand	Low Demand	High Hydrogen
Energy reduction (GWh, relative to 2023)	~0%	-13%	-12%	-37%	-13%
Cumulative air quality activity costs between 2023-2050 (£'million) (2022 prices)	£500	£280	£240	£270	£260
Employment impacts between 2023-2050 (FTE)	1500	5400	5400	7200	5700

Table 3.2: Summary of economic impacts for each scenario: employment impacts and air quality activity costs. Figures shown relate to the period 2023 – 2050. Air quality activity costs are presented using 2022 prices and are not discounted

4. The future local energy system

Deployment modelling

Summary of deployment for low-regret energy system components

Deployment modelling can help us better understand what the impacts of each scenario are over time. It provides a starting point to frame the challenge and for more detailed analysis. We have included theoretical pathways which have a high degree of uncertainty as there are many variable factors and unknowns. The deployment modelling can't consider every factor, some of the things that will impact deployment include:

1) Technological advance and innovation
2) Supply chains and how they develop
3) Large scale activity to decarbonise infrastructure at other levels: regional, UK and beyond.

2023:

- **300 buildings** with heat pumps installed
- **76,000 homes** rated EPC D or below
- **120** EV charge points[a]
- **13 MW** rooftop solar PV
- **30 MW** of ground solar PV capacity
- **120 MW** of onshore wind capacity

By 2030:

- **Up to 13,500 buildings** with heat pumps installed
- **Up to 26,000 homes** retrofitted
- **Up to 2,300** EV charge points[b]
- **174 MW** rooftop solar PV
- **Up to 400 MW** of ground solar PV capacity
- **Up to 130 MW** of onshore wind capacity

By 2050:

- **Up to 80,000 buildings** with heat pumps installed
- **Up to 62,000 homes** retrofitted
- **Up to 17,000** EV charge points[b]
- **360 MW** with rooftop solar PV
- **Up to 1150 MW** of ground solar PV capacity
- **Up to 210 MW** of onshore wind capacity

[a]According to the National Charge Point Registry as of May 2023[M43] and information provided by Rhondda Cynon Taf County Borough Council. Refers to individual charge points.

[b]Assuming 4.5kWp per charge point. Note that the power rating selected will be dependent on location and use case. E.g. Rapid chargers are more suitable at service stations due to the length of stay of customers.

Figure 3.6: Rhondda Cynon Taf's energy system component deployment rates – high demand scenario

Rhondda Cynon Taf

Chapter 4: Action planning

4. Action planning

Energy propositions

Sponsors: Delivery partners:

We shared what we learnt from exploring different energy futures and deployment pathways with our stakeholders and discussed with them what key drivers will be critical for the transition to net zero. We then considered their feedback, our strategic vision and objectives, and the agreed energy propositions to bring together a framework for Rhondda Cynon Taf's LAEP. There are numerous inter-dependencies and interactions between these propositions, as shown here. This highlights the importance of a whole system approach with a coordinated programme of delivery to meet the net zero target by 2050.

Rhondda Cynon Taf's vision

A sustainable energy future, focusing on reducing carbon emissions cost-effectively and building a resilient energy infrastructure. Central to this vision is community engagement and ownership, ensuring accessible and affordable energy solutions for all. Our goal is to lead in energy innovation, aligning with the Welsh Government's net zero targets, while respecting our natural heritage and enhancing community well-being. This vision represents a commitment to a sustainable, inclusive, and prosperous future for Rhondda Cynon Taf.

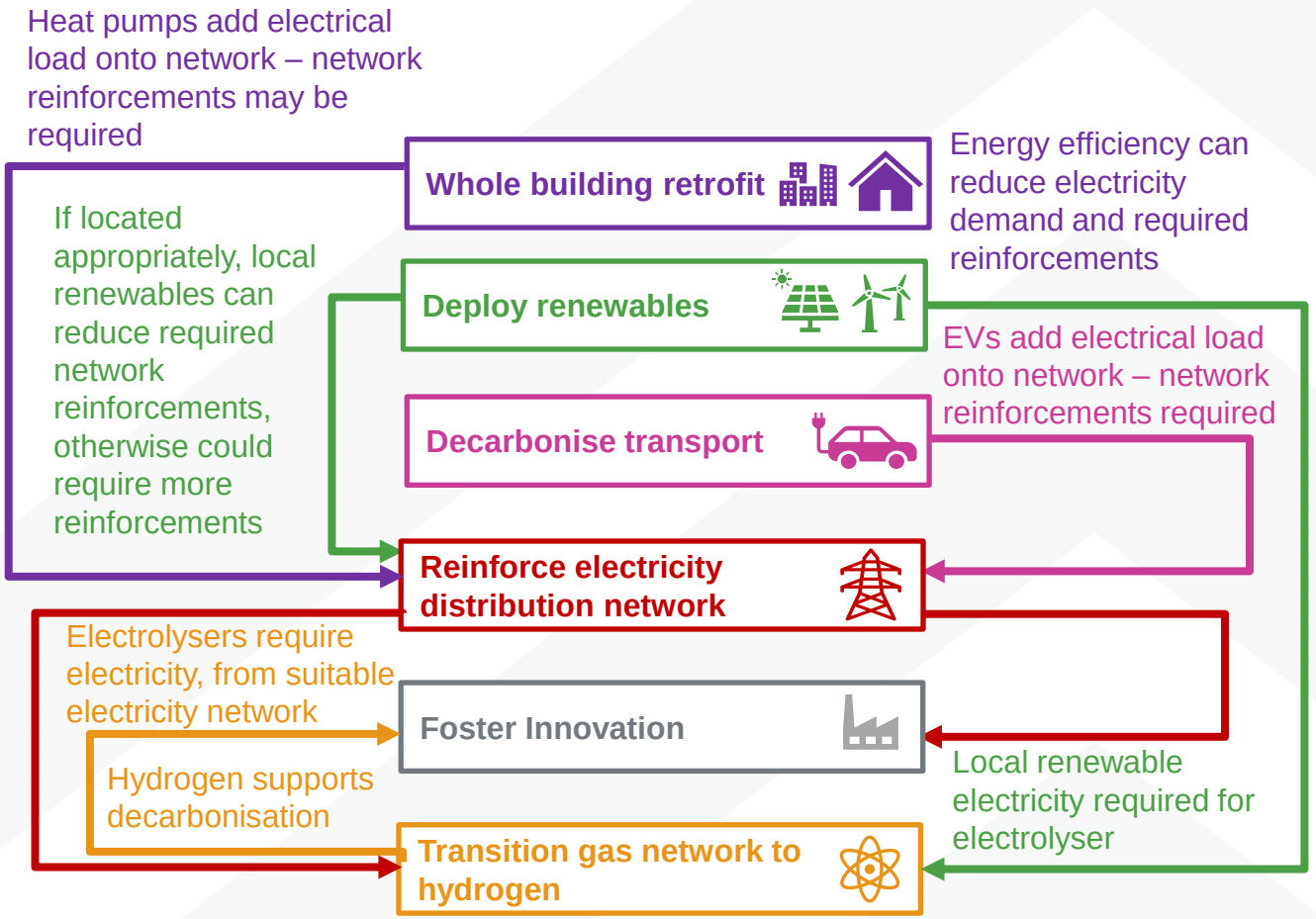


Figure 4.1: Summary of energy propositions and their inter-dependencies

4. Action planning

Energy propositions

Rhondda Cynon Taf's Energy propositions in more detail

Sponsors: Llywodraeth Cymru Welsh Government; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; CARBON TRUST

Retrofit whole buildings

Ambition: Enhance the energy efficiency of existing buildings through retrofitting measures aimed at reducing overall demand, while also transitioning away from fossil fuel-intensive heating systems. The following interventions will be considered for this proposition:

- Improving building fabric
- Installing heat pumps where appropriate
- Installing rooftop PV

CAPEX: £1,400 – 7,200 million

Deploy renewables

Ambition: Increase Rhondda Cynon Taf's renewable energy output by undertaking an assessment of capacity and using the outcome of this to give clear guidance on renewables in the LDP. The following interventions will be considered for this proposition:

- Installing ground-mounted solar PV
- Installing wind turbines

CAPEX: £580 million

Decarbonise transport

Ambition: Reduce car use in Rhondda Cynon Taf by promoting use of active travel and public transport. Facilitate the adoption of EVs by installing chargepoints across the area. The following interventions will be considered for this proposition:

- Installing EV chargepoints
- Promote the sustainable transport hierarchy

CAPEX: £50-75 million

Foster Innovation

Ambition: Encourage a range of solutions to decarbonisation in Rhondda Cynon Taf by exploring opportunities for innovative technologies. The following interventions will be considered for this proposition:

- Hydrogen pilot schemes
- Minewater heating schemes

CAPEX: £13-33 million

Reinforce and transition energy networks

Ambition: Make interventions to the electricity network that are required to ensure increasing electricity demand can be met. Make interventions to the gas network that are required to ensure future hydrogen demand could be met.

CAPEX: key uncertainty

The CAPEX given here is the total CAPEX needed to meet the figures in the optimisation model - not the total that Rhondda Cynon Taf County Borough Council itself needs to spend to implement the actions. The CAPEX figure for the transport scenario only includes the cost to install EV chargepoints - it does not include investment required to improve active travel routes and public transport networks.

4. Action planning

Energy propositions

Identifying priority focus zones and action routemap

Although the exact form of the decarbonised energy system in 2050 is uncertain, there are actions we can take now with relative certainty that will help us maintain the ability to meet our 2050 Net Zero ambition and capitalise on the opportunities that this transition will bring.

Plan on a page

As a starting point, our "plan on a page," shown in Figure 4.2 on the next page, indicates the location and scale of recommended near-term changes required across Rhondda Cynon Taf. The map highlights seven modelling zones identified as priority focus zones for the low-regret energy system components included in Rhondda Cynon Taf's energy propositions: heat pumps, EV chargers, rooftop PV, ground-mounted PV, onshore wind, and insulation retrofits.

To prioritise where each low-regret energy system component should be deployed, each modelling zone was ranked using various technical and social factors such as the available capacity at each substation and the Welsh Index of Multiple Deprivation. For more details on the methodology behind the "plan on a page", please see the Technical Report.

Action routemap

Our energy propositions describe where our priorities lie based on the evidence presented thus far. Our **action routemap** takes each energy proposition and outlines critical, enabling actions that we will take collectively alongside our stakeholders in the coming decade, with a particular focus on what we can achieve in the next 5-7 years. Our action routemap has been developed as a dynamic plan that recognises the influence that wider contextual changes at national and local level will have on the way we choose to transition to a net zero energy system, such as national regulation, policy and strategic plans. As a result, we expect to regularly review and update our routemap based on these dependencies.

Each action will require four key elements to be successful:

- Mobilising finance
- Strong and consistent policy frameworks
- Identifying delivery owners
- Community engagement

As Rhondda Cynon Taf, our role in delivering each energy proposition will vary. Some actions call for council action in the material delivery of programmes, whilst others require the council to act as the facilitator for market-driven change.

Through the LAEP process, we also identified that some of the actions are best delivered collaboratively through the regional partnership. This is because there are economies of scale, and it would be more efficient to have joined up and focused public resources. The regional actions will require detailed design work, to create projects and programmes, to progress them to implementation stage - with an initial focus on the tried and tested. The council will take an active role in supporting CCR going forward.

Local ownership is a key focus throughout this plan, and where possible the action taken should leverage the progress made through the Welsh Government's recent Co-operation Agreement[M63] with Plaid Cymru, which includes key goals on tackling climate change in a way that maximises local benefits.

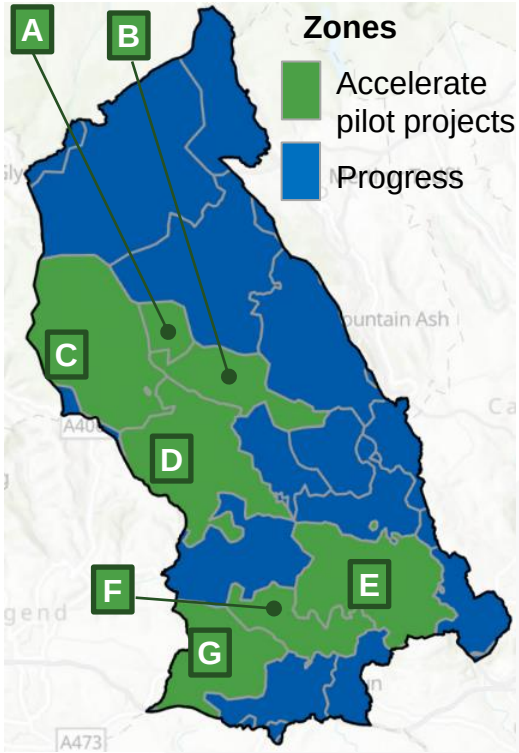
The following section provides further detail on each of the actions that we will undertake under each energy proposition, as well as our key asks of others. Due to the relative uncertainty of longer-term actions, we have chosen not to focus on detailed scoping of these in this report and instead, focus on actions we intend to deliver in the short-term, subject to appropriate support. For more details on the action plan, please see chapter 5 in our Technical Report for further details.

4. Action planning

To support transformation of the energy system, pilot projects may be useful. The plan on a page below highlights areas that could provide a useful focus for these pilots. Figure 0.3 identifies zones with particularly favourable conditions for specific energy components, making them ideal locations for pilot studies. The summary tables (shown below) detail the (i) installed capacity opportunity, (ii) required investment for each component and (iii) total investment necessary for both energy component installation and electricity network infrastructure in each zone by 2030. Ranges have been calculated by taking the minimum and maximum results from each future energy scenarios modelled (see the Technical Report for more detail). Note: intervention should be maintained in the 'Progress' zones to transition the local area to net zero.

Sponsors: Rhondda Cynon Taf; Llywodraeth Cymru Welsh Government; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; Carbon Trust



		(i)	(ii)	(iii)
A	Maerdy			Zone A total £ 3 - 14m
		0.35 - 0.55MW (60 - 90 heat pumps)	£0.26 - 0.41m	
		0.06 - 0.07MW (16 - 18 chargers)	£0.05 - 0.06m	
B	Middle Fan			Zone B total £14 - 72m
		1.3 - 2.0MW (210 - 340 heat pumps)	£0.9 - 1.5m	
		0.16 - 0.21MW (40-50 chargers)	£0.13 - 0.17m	
C	Ynysfeio			Zone C total £29 - 158m
		2,500 - 2,800 homes	£10 - 140k	

		(i)	(ii)	(iii)
D	Tonypandy			Zone D total £56 - 300m
		4,500 - 5,500 homes	£20 - 270m	
E	Upper boat primary			Zone E total £78 - 286m
		17MW	£18m	
		78MW	£34m	
		16MW (2050)	£18m (2050)	
F	Talbot Green Primary			Zone F total £37 - 120m
		12MW	£13m	
G	Pencoed Primary			Zone G total £ 24 - 98m
		4MW	£4.7m	
		6MW (2050)	£7m (2050)	

Suggested energy components to pilot in each zone

	Heat pumps		Ground-mounted PV		Rooftop PV
	EV charger		Onshore wind		Insulation measures

Figure 4.2: Rhondda Cynon Taf's spatial representation of opportunities, including 2030 ambition and investment (million £). Zone boundaries are defined by primary substation service areas.

4. Action planning

Action routemap

National policies and targets

Sponsors: Llywodraeth Cymru Welsh Government; Rhondda Cynon Taf; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; Carbon Trust

	Action	2024	2025	2026	2027	2028	2029	2030
National targets	Up to 1GW of electrolytic hydrogen secured (2025) [UK][M44]							
	Decision on hydrogen to heat buildings (2026) [UK][M45]							
	Up to 10GW hydrogen capacity (50% electrolytic) [UK][M44]	Progressing towards 2030						
	Up to 50GW of offshore wind capacity including up to 5GW of innovative floating wind (2030) [UK][M44]	Progressing towards 2030						
	Future Homes Standard consultation suggests all space heating and hot water demand be met through low carbon sources in new builds (2025) [M46]							
	All new social homes built to Welsh Development Quality Requirements 2021 without fossil fuel heating (from 2025)[M47]							
	All existing social homes to have a plan for minimising environmental impact and improving energy performance (2027) [Wales][M48]							
	-37% GHG emissions by 2025 (rel. to 1990) [Wales][M49]							
	-63% GHG emissions by 2030 (rel. to 1990) [Wales] [M49]	Progressing towards 2030						
	Meet the equivalent of 100% of electricity needs from renewable sources by 2035 [Wales][M26]	Progressing towards 2035						
	1.5GW of renewable capacity to be locally owned (exc. Heat pumps) (2035) [Wales] [M26]	Progressing towards 2035						
	580,000 heat pumps to be installed in Wales by 2035, contingent on scaled up support from the UK Government and reductions in the cost of technology[x] (2035) [Wales] [M26]	Progressing towards 2035						
	Minimum EPC E to rent out any property (from 2020 onwards) and EPC C from 2030 [UK][M51]							
	1 public charge point for every 7 to 11 electric vehicles (2025) [Wales][M23]							
	Rapid charging available every 20 miles on the strategic trunk road (2025) [Wales] [M23]							

4. Action planning

Action routemap

National policies and targets

Sponsors: *Delivery partners:*

	Action	2024	2025	2026	2027	2028	2029	2030
National targets	-10% car miles travelled/person (2030) [Wales] M03	Progressing towards 2030						
	80% new cars and 70% new vans sold to be 0 emissions (2030) (ZEV mandate) [UK] M53	Progressing towards 2030						
	100% new cars and vans sold to be 0 emissions (2035) (ZEV mandate) [UK] M53	Progressing towards 2035						
	Net zero public sector by 2030 [Wales] M23	Progressing towards 2030						

4. Action planning

Sponsors: Delivery partners:

Action routemap

Enabling actions

(N) Action will be implemented at a national scale, across all of Wales

(R) Action will be implemented at a regional scale, across CCR local authorities

(L) Action will be implemented at a local scale, across Rhondda Cynon Taf

Timescale for the action is ongoing

Enabling actions

Action	2024	2025	2026	2027	2028	2029	2030	Proposed leads
E.1.1: Develop a governance structure and performance management framework								R
E.1.2: Facilitate monitoring of the LAEP across the Region				Review annually				R
E.1.3: Develop a business plan for delivery of the LAEPs across the region								R
E.2.1: Develop a regional Strategic Development Plan (SDP)[MC33]								N
E.2.2: Develop a national energy plan								R N
E.3.1: Map and identify skills and labour needs				Review every 5 years				R N
E.3.2: Review and develop educational programmes to meet skills needed								R N
E.3.3: Develop a communication strategy to promote jobs								R
E.3.4: Identify supply chain needs				Review every 5 years				R N
E.4.1: Investigate possible procurement and investment frameworks that could be considered for larger projects of scale								R

4. Action planning

Sponsors: Delivery partners:

Action routemap

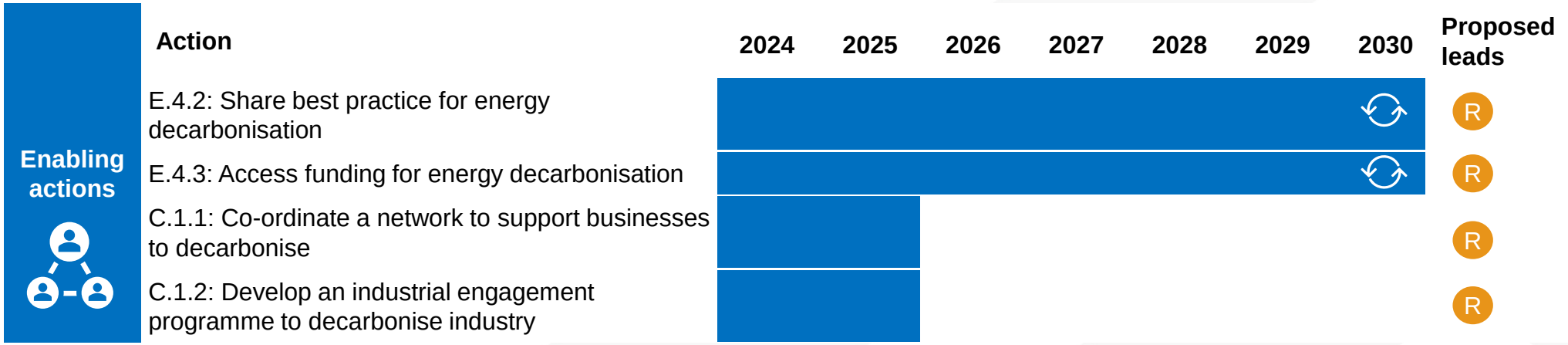
Enabling actions

N Action will be implemented at a national scale, across all of Wales

R Action will be implemented at a regional scale, across CCR local authorities

L Action will be implemented at a local scale, across Rhondda Cynon Taf

Timescale for the action is ongoing



4. Action planning

Sponsors: Delivery partners:

Action routemap

Retrofit whole buildings

N Action will be implemented at a national scale, across all of Wales

R Action will be implemented at a regional scale, across CCR local authorities

L Action will be implemented at a local scale, across Rhondda Cynon Taf

Timescale for the action is ongoing

Retrofit whole buildings

Action	2024	2025	2026	2027	2028	2029	2030	Proposed leads
B.1.1: Develop a retrofit prioritisation plan			Review annually					R
B.1.2: Develop a delivery plan for owner-occupied retrofit			Review every 5 years					R N
B.1.3: Review the current ECOFLEX programme			Review annually					R
B.1.4: Prioritize damp-proofing and insulation								L
B.1.5: Integrate solar PV into suitable building retrofits								L
B.1.6: Increase occupancy rates in retrofitted buildings								L
B.1.7: Consider mechanisms for encouraging greater uptake of retrofit								N
B.1.8: Apply lessons learnt from ORP[M67] through the Welsh Zero Carbon Hwb[M66]								N

4. Action planning

Action routemap

Retrofit whole buildings

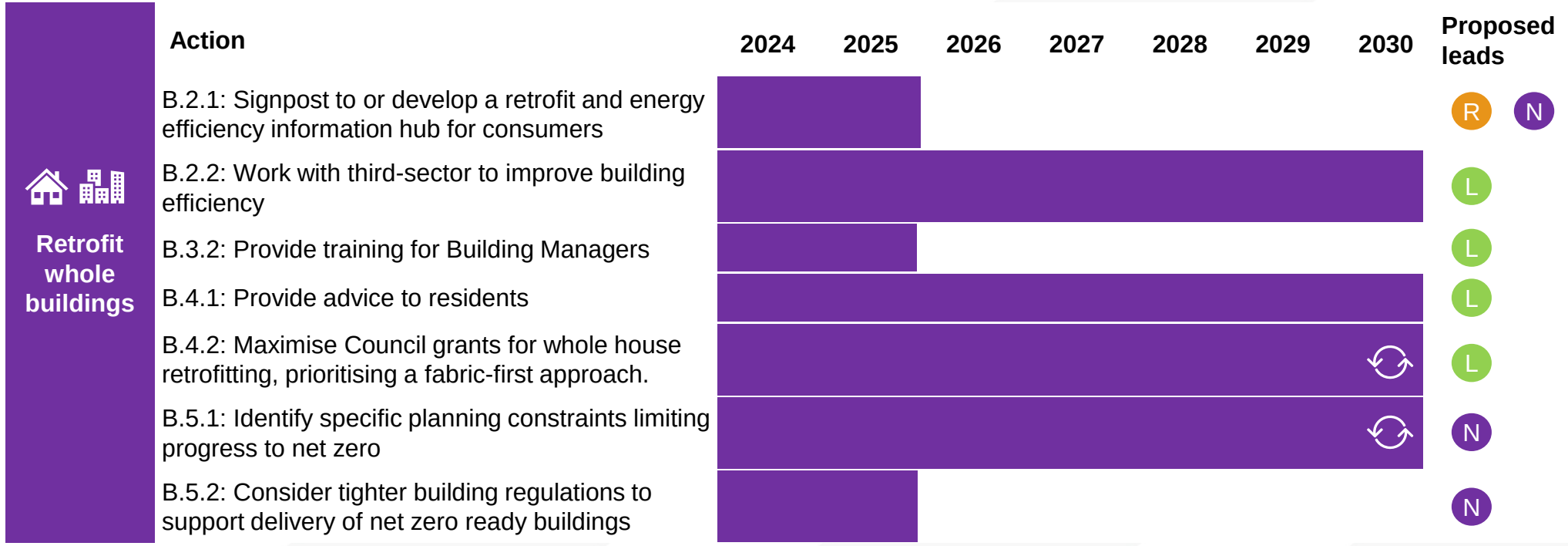
- (N) Action will be implemented at a national scale, across all of Wales
- (R) Action will be implemented at a regional scale, across CCR local authorities
- (L) Action will be implemented at a local scale, across Rhondda Cynon Taf
- Timescale for the action is ongoing

Sponsors: Llywodraeth Cymru Welsh Government; Rhondda Cynon Taf; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; Carbon Trust

Retrofit whole buildings

Action	Proposed leads
B.2.1: Signpost to or develop a retrofit and energy efficiency information hub for consumers	R, N
B.2.2: Work with third-sector to improve building efficiency	L
B.3.2: Provide training for Building Managers	L
B.4.1: Provide advice to residents	L
B.4.2: Maximise Council grants for whole house retrofitting, prioritising a fabric-first approach.	L
B.5.1: Identify specific planning constraints limiting progress to net zero	N
B.5.2: Consider tighter building regulations to support delivery of net zero ready buildings	N



4. Action planning

Action routemap

Deploy renewables

N Action will be implemented at a national scale, across all of Wales

R Action will be implemented at a regional scale, across CCR local authorities

L Action will be implemented at a local scale, across Rhondda Cynon Taf

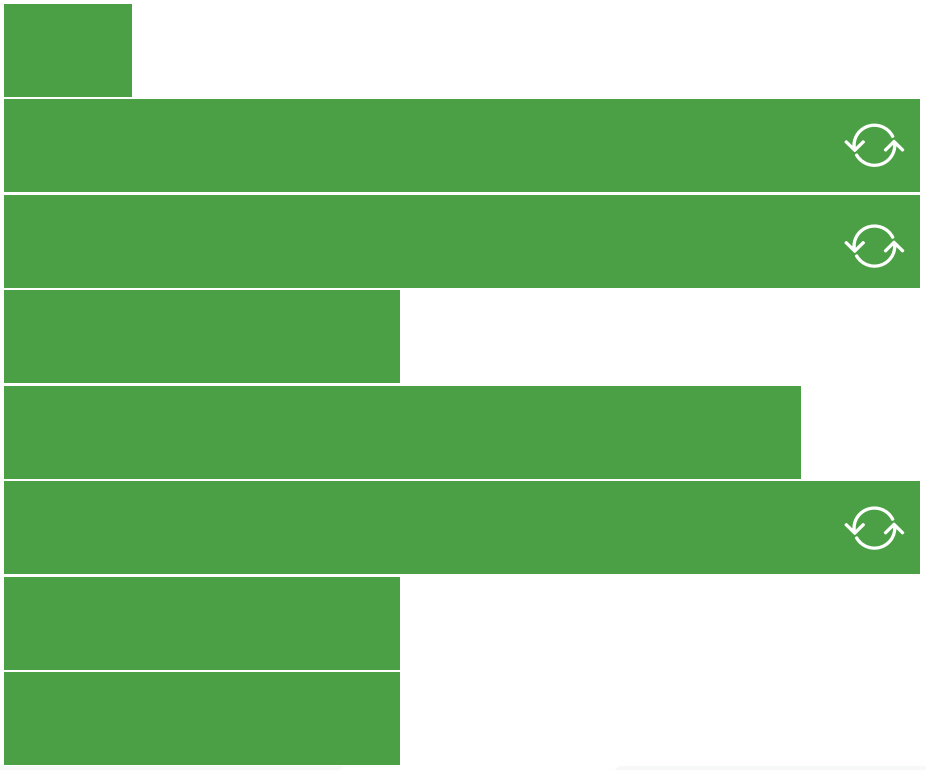
Timescale for the action is ongoing

Sponsors: Llywodraeth Cymru Welsh Government; Rhondda Cynon Taf; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; Carbon Trust

Deploy renewables

Action	Proposed leads
R.1.1: Create a regional renewable energy investment prospectus	R
R.1.2: Attract investment in renewable energy (including community projects)	R
R.1.3: Investigate collaboration grants to promote renewable generation	L
R.2.1: Develop a renewable energy communication campaign	R
R.2.2: Develop and deliver on a masterplan for renewables on the Aberthaw site	R N
R.3.1: Identify public sector land suitable for renewables	N
R.4.1: Update policy in the RLDP on the development of renewable energy	L
R.4.2: Conduct a Renewable Energy Assessment	L



4. Action planning

Action routemap

Decarbonise transport

(N) Action will be implemented at a national scale, across all of Wales

(R) Action will be implemented at a regional scale, across CCR local authorities

(L) Action will be implemented at a local scale, across Rhondda Cynon Taf

Timescale for the action is ongoing

Sponsors: Llywodraeth Cymru Welsh Government; Rhondda Cynon Taf; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; Carbon Trust

Decarbonise transport

Action	2024	2025	2026	2027	2028	2029	2030	Proposed leads
T.1.1: Produce a Regional Transport Plan (RTP)[MC34]								R
T.2.1: Develop a plan to fund and roll out EV chargers							↻	R
T.2.2: Explore commercial models for investment into EV charging								R
T.2.3: Explore models and approach for ULEV car sharing schemes (Car Clubs)								R
T.2.4: Develop a national procurement framework for EV infrastructure								N
T.2.5: Implement the Council's Electric Vehicle Charging Strategy							↻	L
T.2.6: Aim for all our new purchased cars and light goods vehicles to be ultra-low emissions vehicles by 2025								L
T.3.1: Expand Challenge Fund green hydrogen vehicle pilot								R
T.4.1: Promote the sustainable transport hierarchy								L

4. Action planning

Action routemap

Foster innovation

N Action will be implemented at a national scale, across all of Wales

R Action will be implemented at a regional scale, across CCR local authorities

L Action will be implemented at a local scale, across Rhondda Cynon Taf

Timescale for the action is ongoing

Sponsors: Llywodraeth Cymru Welsh Government; Rhondda Cynon Taf; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; Carbon Trust

Foster innovation

Action	2024	2025	2026	2027	2028	2029	2030	Proposed leads
I.1.1: Develop plans for viable and alternative energy technologies e.g. heat networks, mine water, energy storage and hydrogen								R
I.1.2: Creation of Net Zero Clusters (Partnerships) across the region in key net zero themes as identified in the LAEPs.								R
I.1.3: Identify opportunities for smart local energy systems								R L
I.1.4: Explore opportunities for hydrogen pilot schemes							⟳	L
I.1.5: Explore opportunities for mine water heating schemes								L

4. Action planning

Action routemap

Energy networks

Sponsors: Delivery partners:

- Action will be implemented by Wales and West Utilities (WWU)
- Action will be implemented by National Grid Distribution Network (NGED)
- (N) Action will be implemented at a national scale, across all of Wales
- (R) Action will be implemented at a regional scale, across CCR local authorities
- (L) Action will be implemented at a local scale, across Rhondda Cynon Taf
- Timescale for the action is ongoing

Energy networks

Action	2024	2025	2026	2027	2028	2029	2030	Proposed leads
N.1.1: Provide data for forecasting to NGED and WWU							ongoing	R
N.1.2: Hold regular engagement meetings between the Rhondda Cynon Taf Council, NGED and WWU							ongoing	L
N.1.3: Consolidate project pipelines across electricity and gas networks								nationalgrid
N.2.1: Inform local authorities about our available data resources							ongoing	nationalgrid
N.2.2: Respond to consultations in support of required investment							ongoing	L
N.2.3: Include new projects from the LAEP in strategic planning process								nationalgrid
N.3.1: Highlight gas infrastructure opportunities							ongoing	
N.3.2: Include new projects from the LAEP in strategic planning process								

4. Action planning

Action routemap

Energy networks

Sponsors: Delivery partners:

Action will be implemented by Wales and West Utilities (WWU)

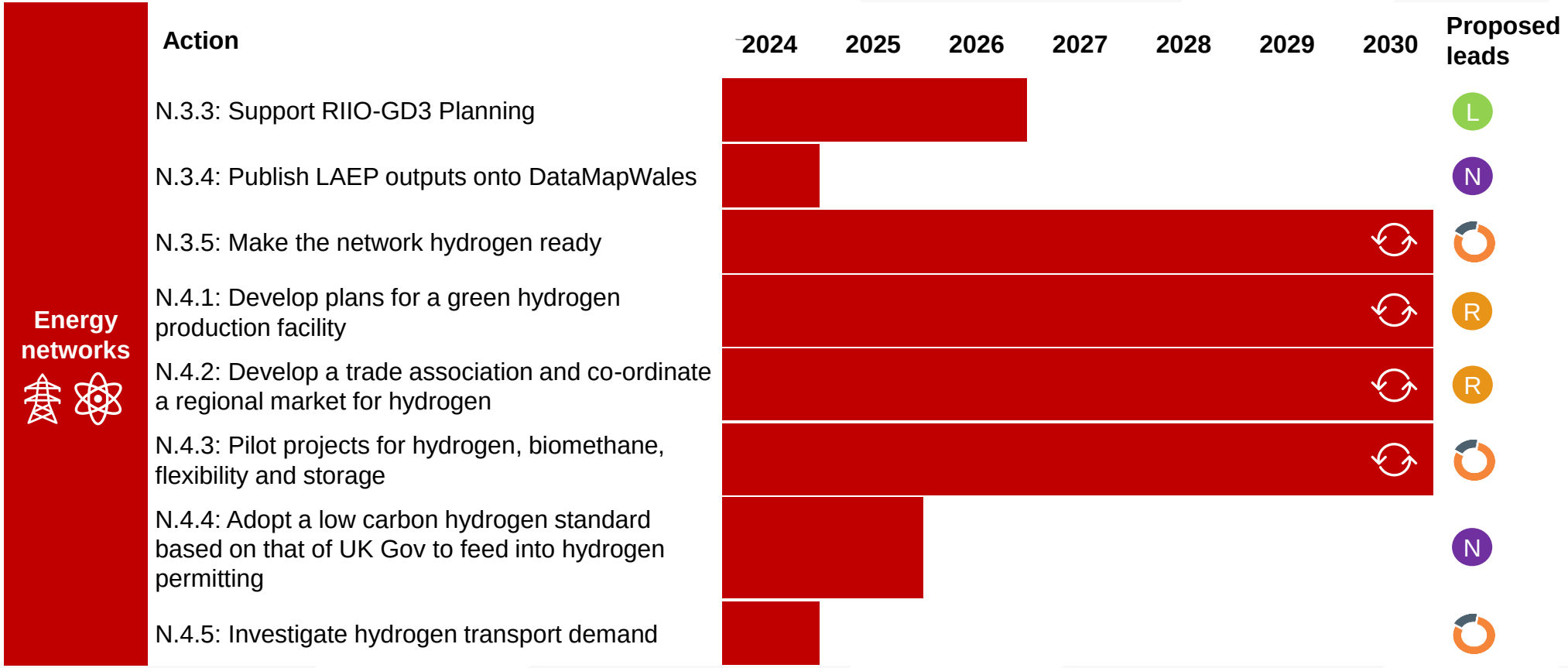
Action will be implemented by National Grid Distribution Network (NGED)

N Action will be implemented at a national scale, across all of Wales

R Action will be implemented at a regional scale, across CCR local authorities

L Action will be implemented at a local scale, across Rhondda Cynon Taf

Timescale for the action is ongoing



Rhondda Cynon Taf

Chapter 5: Next steps

5. Next steps

Our LAEP in the context of programmes and projects

Our LAEP gives us a good understanding of the current state of our local energy system, and what it will take to decarbonise it. We have set out a plan of action for the next seven years, and intend on delivering this subject to sufficient political, and financial support.

We have assessed each proposition against the diagram to the right in terms of which stage of the development journey it is at. To take each proposition to delivery, programmes and projects will need to go through the entire journey.

Figure 5.1 shows how projects move from context and vision setting, to procurement and project delivery.

Stage 0 Context setting: This stage involves understanding the context, key challenges, strategic objectives as well as our role to support delivery.

Stage 1 Delivery option assessment: This stage involves the initial options exploration with the defining of potential long list commercial options, an appropriate evaluation framework and initial market testing.

Stage 2 Detailed project development (including market testing): Following the initial long listing exercise, detailed development of a shortlist of potential commercial options will be developed and tested with the market. This process will be iterative, as options will be refined based on feedback from the market as well as commercial and technical limitations.

Stage 3 Procurement and project delivery: Stage will include selection of the commercial delivery option which best delivers the objectives and is commercially deliverable. This will be taken forward to procurement (if required) and subsequent delivery.

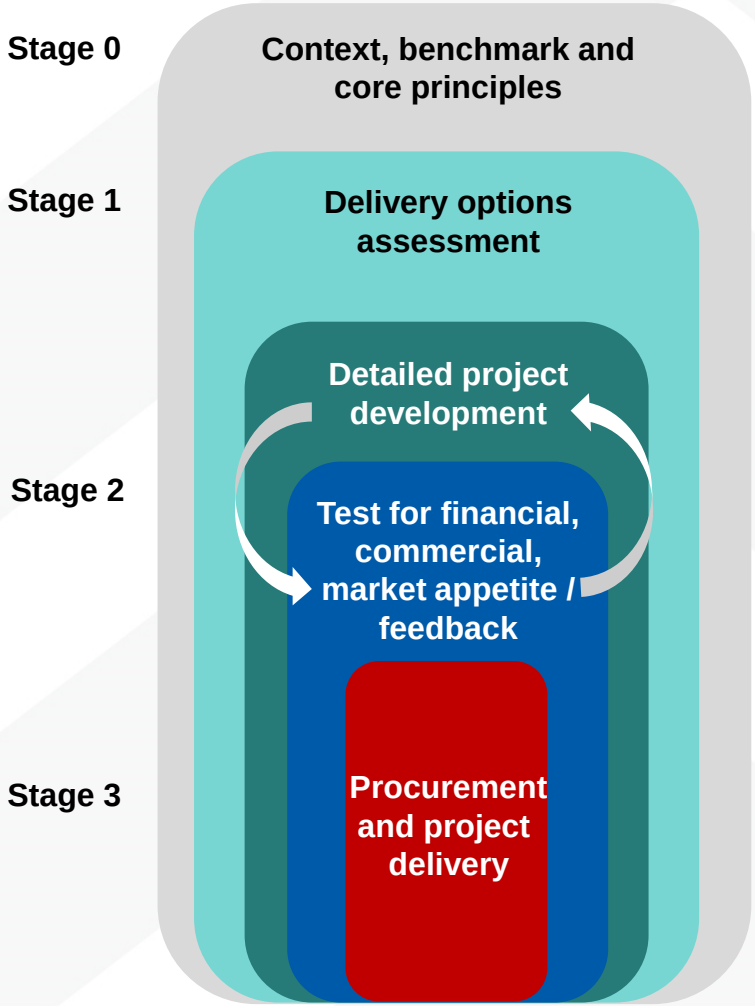


Figure 5.1: How programmes and projects develop

5. Next steps

Enabling conditions for success

Governance

Delivery of our LAEP will be overseen by Rhondda Cynon Taf County Borough Council and the Cardiff Capital Region. It is recommended by the Council's Climate Change Working Group: Local Area Energy Plan (LAEP) Sub Group that a clear programme management process be identified and clear lines of responsibility, for steering the entire process, be agreed by senior management (e.g., by the appointment of a Programme Manager).

Recognising the number of different stakeholders who play an important role in delivering the change that will be required to meet the objectives and actions set out in this plan, we will work with the Cardiff Capital Region and partners across different sectors. The Cardiff Capital Region will lead on developing and setting up a governance structure that will enable wider input in the plan.

To deliver this, we (as Rhondda Cynon Taf County Borough Council) will decarbonise assets within our direct control, such as Council buildings and the Council transport fleet. Further, we will drive and influence the decarbonisation of the wider area through showcasing, leading by example, collaborating and engaging the community.

Our sphere of influence might include:

- **Budget and finance**
- **Defining and helping to achieve the project outcomes**
- **Identifying the priorities**
- **Identifying potential risks and monitoring risks**
- **Monitoring timelines**
- **Monitoring the quality of the project as it develops**
- **Procurement**
- **Planning policy and regulation**

We are involved in a range of projects, initiatives and partnerships with different levels of control. Some of these examples are shown on page 33.

Across the CCR, we see synergies in terms of the propositions chosen. We believe there will be efficiencies in undertaking many of the programmes and projects forward regionally and/or nationally.

Sponsors: RHONDDA CYNON TAF; Llywodraeth Cymru Welsh Government; Prifddinas Ranbarth Caerdydd Cardiff Capital Region

Delivery partners: ARUP; CARBON TRUST

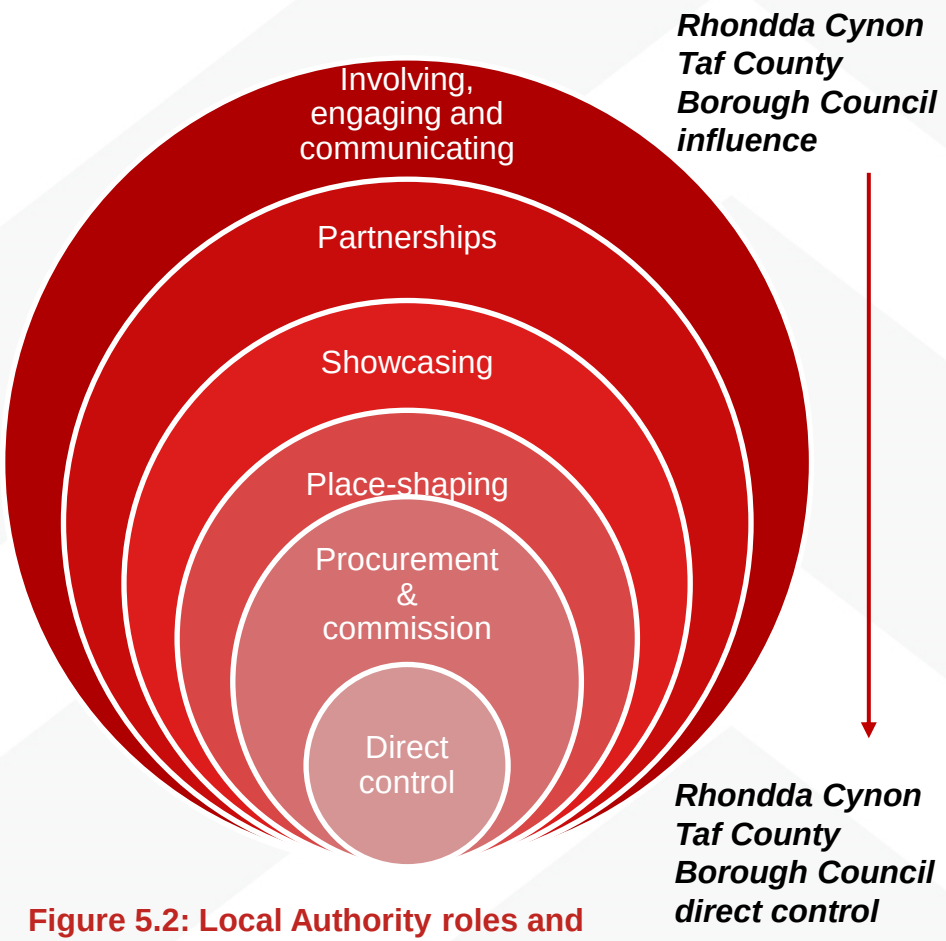


Figure 5.2: Local Authority roles and level of influence

5. Next steps

Enabling conditions for success

Monitoring and reviewing

This plan sets out our key actions for the first five years that will set us on the right journey to achieve the ambitions in our longer-term routemap. The plan needs to be flexible to adapt to changes in the future.

Working across the region the Cardiff Capital Region will develop a consistent performance management framework and facilitate monitoring and review of the LAEPs across the region (see action E.1.2). An annual monitoring report will be produced, building on the Welsh Government's Energy Generation in Wales reports[M61], which will describe our progress against the actions set out in this plan and also against key output metrics as follows:

- Number of homes retrofitted
- Number of non-domestic buildings retrofitted
- Number of EV charging points installed
- Total installed capacity of renewables such as solar PV and onshore wind
- Heat pumps installed
- Hydrogen electrolysers
- Battery installations
- Number of low carbon energy innovations

To monitor these metrics, we will make use of publicly available datasets such as the DFES reports undertaken by NGED[MC70], Energy Performance Certificate Register[M72], the Micro Generation Certification Scheme[M73] and the Renewable Energy Planning Database[M62].

We will develop a baseline understanding of these metrics based on existing data and monitor changes annually.

GHG emission reduction for the area will be tracked as part of the annual reporting process which will be in addition to the Welsh Government public sector reporting that we undertake as a local authority. We recognise that available data will lag a few years behind.

The whole plan will be updated at least every five years to take account of key factors, including policy changes at a UK and Welsh Government level, changes in costs and the effectiveness of technologies.

5. Next steps

Sponsors:

Delivery partners:

What are we going to do first

Once the LAEP and its responsibilities has been accepted by our Senior Leadership Team (SLT) and Cabinet, it will transition from the development to the operational phase.

A responsible team will be selected and will address all the actions. This team will set up work groups to call in the main stakeholders to define objectives and targets for each of the actions. These actions will need to be aligned with the Council's new Corporate Plan.

One of the primary actions regarding renewable energy will be to assess the available land across Rhondda Cynon Taf that would be suitable and acceptable for a renewable energy installations.

What do we want from others?

We can't decarbonise the energy system on our own, while we might have influence over a significant amount of our local system, we do not own it all and we are reliant on others to support the decarbonisation of Rhondda Cynon Taf. We need others to undertake actions assigned to them and to work with us. We want to continue the collaboration started by this LAEP to continue to strengthen our relationships with local stakeholders.

Table of figures

Table of figures

Table of figures

Table of tables

Glossary of terms

Term	Definition or meaning
Action	The process of doing something – a specific action assigned to a responsible person preferably with a date to be completed.
Anaerobic Digestion	Processes biomass (plant material) into biogas (methane) that can be used for heating and generating electricity.
Baseline	The baseline is the data showing the current energy system, containing the 2019 data sets provided by the LA and publicly available data.
Batteries	Devices that store electrical energy to be used at a later time.
Biomass boiler	A boiler which burns wood-based fuel (e.g. logs, pellets, chippings) to generate heat and electricity.
Carbon Capture and Storage (CCS)	The process of capturing and then storing carbon emissions before they enter the atmosphere.
Cardiff Capital Region	The Cardiff Capital Region, that covers the 10 local authority areas covering South East Wales -Blaenau Gwent; Bridgend; Caerphilly; Cardiff; Merthyr Tydfil; Monmouthshire; Newport; Rhondda Cynon Taf; Torfaen; and Vale of Glamorgan.
Certainties	A fact that is definitely true or an event that is definitely going to take place. In terms of a local energy system, certainties include funded projects, etc.
Demand	Local energy demand that the local energy system needs to meet.
Demand headroom	The difference between the electrical capacity of a substation, and the electricity demand at the substation at the time of peak demand.

Glossary of terms

Term	Definition or meaning
Deployment modelling	A model investigating rates by which to deploy specific technologies between the baseline year and 2050 to achieve the end state developed by the optimisation model for each scenario. The model considers broader plan objectives and local, regional, and national strategic priorities, policies, and targets to help us to define a suitable level of ambition and inform an action plan.
Dispatchable energy generation	Energy generation that can turn on and off (i.e. isn't controlled by the weather) – this is likely to be gas turbines of some sort.
Distribution network	Takes energy from transmission network and delivers it to users via pipes or wires at low pressure / voltages.
Electricity network	Interconnected infrastructure which consists of power stations, electrical substations, distribution lines and transmission lines. The network delivers electricity from the producers to consumers.
Electrolyser	A piece of equipment that uses electricity to split water into hydrogen and oxygen.
Energy Proposition	A proposition is an energy component with a scale and a timescale. For instance, X MW of wind turbine to be built in 5 years, 10,000 buildings to retrofit with XX by 2030, or a pilot project such as hydrogen storage innovation. These are typically near term, low regrets energy components that are needed in future energy systems (it is likely that these appear in all scenarios).
Energy System Component	A term used to describe anything that can have a direct impact on energy demand and/or the way energy is supplied. E.g. installing retrofit measures can reduce overall heating demand, increasing solar PV capacity can change the supply mix and the way that the energy system operates.
Focus zone	A modelling zone which has been identified as an area in which to target near-term installation, upgrade, retrofit, or other activities related to a specific energy system component.

Glossary of terms

Term	Definition or meaning
Generation	Local generation – size below 100MW.
Generation headroom	Generation headroom in a local authority's electricity distribution network refers to the remaining primary substation capacity at the time of peak generation, crucial for maintaining a stable and reliable power supply to meet the community's needs
Grid electricity	Electricity that is supplied by the electricity network.
Grid substation	The physical equipment comprising a substation with a 132kV-33kV transformer(s) connecting the grid-level, extra high voltage electricity lines to the primary-level, high voltage electricity lines. The grid substation facilitates connection with the national grid.
Heat network	A distribution system of insulated pipes that takes heat from a central source and delivers it to a number of domestic or non-domestic buildings.
Heat pump	A piece of equipment that uses a heat exchange system to take heat from air, ground or water and increases the temperature to heat buildings.
Hydrogen	A flammable gas that can be burned, like natural gas, to generate heat or power vehicles. The by-product is water only, no carbon.
Infrastructure	Local energy distribution infrastructure, includes storage assets if these are at grid level.
Landfill gas	Gases such as methane that are produced by micro-organisms in a landfill site that can be used as a source of energy.
Lever	We use the term policy levers to refer to the ‘governing instruments’ (Kooiman, 2003) which the state has at its disposal to direct, manage and shape change in public services.

Glossary of terms

Term	Definition or meaning
Local energy system	The distribution level energy system, excludes the transmission and national assets.
Longer-term options	The likely outcome of these is less certain and dependent upon actions and decisions being made that are not under our control, e.g. a national policy or the capability / availability of a technology.
Major industrial load	The power demand of industrial sites in the 2019 NAEI Point Sources data are large enough to be classified as major industrial loads. Sites that aren't included in this database are likely too small to have a significant impact on the energy system singlehandedly.
Modelling zone	A specified area in our modelling which is the smallest level of granularity for analysis. The zones are used through energy modelling, deployment modelling, and mapping. Zones were created by intersecting the Local Authority boundary with the primary substation service area boundary, as described in the "Methodology - electricity and gas network infrastructure" section of the Technical Report. *May also be called "zone" or "substation zone" in the reports.*
National Asset	National infrastructure (can be supply or demand and the accompanying transmission / distribution infrastructure) – defined as over 100MW, unless it produces heat which can only be used locally this is generally excluded from LAEP particularly the modelling.
National grid	A generic term used in the reports referring to the electricity network serving Wales, including both the transmission and distribution networks and facilitating the flow of electricity between neighbouring areas or regions. *May also be called generically "grid" in the reports.*

Glossary of terms

Term	Definition or meaning
National Net Zero	The National Net Zero modelled in the LAEP. Details of assumptions are in the methodology section.
Natural Heritage	This includes features which are of ecological, geological, geomorphological, hydrological or visual amenity importance within the landscape, and which form an essential part of the functioning of the natural environment and natural assets of RCT.
Net Zero	Net zero when used in this LAEP is the energy net zero as it does not include all emissions, only energy emissions.
No regrets/ low regrets	Options which are common to all scenarios, cost-effective, provide relatively large benefits, and are very likely to be important parts of the future energy system, regardless of future uncertainty.
Optimisation modelling	Modelling to create the most cost and carbon optimal system.
Option	A term used to describe ways that a particular objective can be achieved. In the context of this LAEP, an option could be deploying a particular energy system component
Outward code	The first part of a postcode i.e. BS1.
Pathway	A pathway is how we get from the current energy system, to the most likely net zero end point. The pathway will consider what is needed from across the scenarios, the supply chain, number of installers etc. The propositions will make up the more certain part of the pathway, whereas the longer-term energy components will need further definition in the future.

Glossary of terms

Term	Definition or meaning
Primary substation	The physical equipment comprising a substation with a 33kV-11kV transformer(s) connecting the primary-level, high voltage electricity lines to the consumer-level, low voltage electricity lines.
Primary substation service area	The area bounding the buildings or other electricity demands which are served by a primary substation (or, in ANW, a group of primary substations acting together to serve one area).
Programme	A series of projects, usually with a theme, that is run collectively.
Project	Strategic scale projects being implemented or planned for implementation in the local energy system that will significantly affect local demand or local supply.
Renewable Energy Guarantees of Origin (REGO) Agreement	A scheme that tells consumers what proportion of their electricity comes from renewable sources.
Resistance heating/ heater	Generate heat by passing electrical currents through wires.
Scenario	A scenario is a set of assumptions for a particular end point (usually 2050) which are modelled in our optimisation model. We modelled 5 different scenarios to see what was common across the scenarios and therefore is a “no regrets” measure, and what changed between the modelled scenarios.
Solar PV	Convert solar radiation into electricity using photovoltaic (PV) cells.

Glossary of terms

Term	Definition or meaning
Strategic objective	Strategic objectives are purpose statements that help create an overall vision and set goals and measurable steps to achieve the desired outcome. A strategic objective is most effective when it is quantifiable either by statistical results or observable data. Strategic objectives further the vision, align goals and drive decisions that impact change.
Strategic options	Strategic options are longer-term changes to demand, generation and infrastructure that will lead onto decarbonisation of the local energy system - and the key variables that determine scenarios.
Substation upgrades	Interventions at an existing primary substation designed to increase the capacity of the substation, such as upgrading an existing primary substation or installing a new primary substation. *May also be called 'substation interventions' in the reports.*
Supply	Energy supply options – this is how energy is delivered from the point of source – so a supply option would be solar PV.
Supply/generation headroom	The difference between the electrical capacity of a substation, and the power being supplied to the substation at a given time.

Glossary of terms

Term	Definition or meaning
Transmission network	Move energy via pipes or wires for long distances around the country at high pressure/ voltages.
Uncertainties	Uncertainty results from lack of information or from disagreement about what is known or even knowable.
We	The range of people and organisations in Rhondda Cynbon Taf County Borough who will support the ambition and take action.
Wind power	Harnessing the kinetic energy of wind to turn a turbine to generate electricity.

Units of measure

Unit	Definition or meaning
GWh	Gigawatt hour(s) – a unit of energy representing 1 billion watt-hours.
kgCO2e	Kilogram(s) of carbon dioxide equivalents – a unit of measurement for greenhouse gas warming potential, expressing the equivalent weight of carbon dioxide with the same global warming potential.
ktCO2e	Kilotonne(s) of carbon dioxide equivalents - a unit of measurement for greenhouse gas warming potential, expressing the equivalent weight of carbon dioxide with the same global warming potential. Represents 1 million kgCO2e.
kV	Kilovolt(s) – a unit of potential energy of a unit charge in a point of a circuit relative to a reference (ground) representing 1000 volts.
kW	Kilowatt(s) – a metric unit of power measuring rate of energy consumption or production representing 1000 watts.
kWh	Kilowatt hour(s) - a unit of energy representing 1000 watt-hours.
kWp	Peak kilowatt(s) – the maximum power rating possible produced by an energy generation source (i.e., amount of power produced in ideal generation conditions).
MVA	Mega volt amp(s) – a metric unit of apparent power measuring rate of energy consumption or production and considering the efficiency by which electrical power is converted into useful output. It is related to MW by the power factor of the system or equipment.
MW	Megawatt(s) – a metric unit of power measuring rate of energy consumption or production representing 1 million watts.
MWe	Megawatt(s) electric – a unit of electric power output from a generation source representing 1 million watts electric.

Units of measure

Unit	Definition or meaning
MWth	Megawatt(s) thermal – a unit of thermal power output from a generation source representing 1 million watts thermal.
MWh	Megawatt hour(s) - a unit of energy representing 1 million watt-hours.
tCO_2 per capita	Tonne(s) of carbon dioxide per capita – a unit of mass of carbon dioxide emitted per member of a population per year. Represents 1000 $kgCO_2$ per capita.

Bibliography

Ref. number	Reference
M01	[1] Energy Systems Catapult (2024) The future of Local Area Energy Planning in the UK. Available at: https://es.catapult.org.uk/report/the-future-of-local-area-energy-planning-in-the-uk/ [2] Energy Systems Catapult (2024) Guidance on creating a Local Area Energy Plan. Available at: https://es.catapult.org.uk/guide/guidance-on-creating-a-local-area-energy-plan/
M02	Department for Energy Security and Net Zero and Department for Business, Energy & Industrial Strategy (2021) Net Zero Strategy: Build Back Greener. Available at: https://www.gov.uk/government/publications/net-zero-strategy
M03	Welsh Government (2021) Net Zero Wales Carbon Budget 2 (2021-25) . Available at: https://www.gov.wales/sites/default/files/publications/2021-10/net-zero-wales-carbon-budget-2-2021-25.pdf
M04	Energy Systems Catapult (2024) Homepage. Available at: https://es.catapult.org.uk/
M05	Welsh Government (2024) Data Map Wales, Data and maps from the Welsh public sector. Available at: https://datamap.gov.wales/
M06	Welsh government (2015) Well-being of Future Generations (Wales) Act 2015: the essentials. Available at: https://www.gov.wales/well-being-future-generations-act-essentials-html
M23	Welsh Government (2023) Electric vehicle charging: strategy and reports. Available at: https://www.gov.wales/electric-vehicle-charging-strategy-and-reports
M26	J. James (2023) Written Statement: Publication of Summary of Responses to the Consultation on Wales's Renewable Energy Targets. Available at: https://www.gov.wales/written-statement-publication-summary-responses-consultation-wales-renewable-energy-targets
M40	Department for Business, Energy and Industrial Strategy (2022) Subnational Electricity and Gas Consumption Statistics. Available at: https://assets.publishing.service.gov.uk/media/63a31383e90e075875eae2e7/subnational_electricity_and_gas_consumption_summary_report_2021.pdf

Bibliography

Ref. number	Reference
M41	Age UK (2021) The cost of cold. Available at: https://www.ageuk.org.uk/our-impact/campaigning/the-cost-of-cold/
M42	CAG Consultants (2021) Devon Community Energy: Socio Economic Impact Assessment. Available at: https://cagconsultants.co.uk/wp-content/uploads/2021/06/Final-Report-March2021.pdf
M43	Department for Transport (2020) Find and use data on public electric vehicle chargepoints. Available at: https://www.gov.uk/guidance/find-and-use-data-on-public-electric-vehicle-chargepoints
M44	Department for Business, Energy and Industrial Strategy, Department for Energy Security and Net Zero and Prime Minister's Office, 10 Downing Street (2022) British energy security strategy. Available at: https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy#hydrogen
M45	HM Government (2021) UK Hydrogen Strategy. Available at: https://assets.publishing.service.gov.uk/media/64c7e8bad8b1a70011b05e38/UK-Hydrogen-Strategy_web.pdf
M46	Department for Levelling Up, Housing and Communities (2023) The Future Homes and Buildings Standards: 2023 consultation. Available at: https://www.gov.uk/government/consultations/the-future-homes-and-buildings-standards-2023-consultation
M47	Welsh Government (2021) Welsh Development Quality Requirements 2021, creating beautiful homes and places. Available at: https://www.gov.wales/sites/default/files/publications/2021-08/development-quality-requirements-for-housing-associations.pdf
M48	Welsh Government (2023) Welsh Housing Quality Standard 2023. Available at: https://www.gov.wales/welsh-housing-quality-standard-2023-0
M49	Welsh Government (2021) Climate change targets and carbon budgets. Available at: https://www.gov.wales/climate-change-targets-and-carbon-budgets
M51	Legislation (2015) The Energy Efficiency (Private Rented Property) (England and Wales) Regulations 2015. Available at: https://www.legislation.gov.uk/uksi/2015/962/contents/made

Bibliography

Ref. number	Reference
M53	Department for Transport, Office for Zero Emission Vehicles and A. Browne MP (2024) Pathway for zero emission vehicle transition by 2035 becomes law. Available at: https: https://www.gov.uk/government/news/pathway-for-zero-emission-vehicle-transition-by-2035-becomes-law#:~:text=The%20zero%20emission%20vehicle%20(%20ZEV,increasing%20to%20100%25%20by%202035.
M54	Welsh Government (2021) Net zero carbon status by 2030, a route map for decarbonisation across the Welsh public sector. Available at: https://www.gov.wales/sites/default/files/publications/2021-07/a-route-map-for-decarbonisation-across-the-welsh-public-sector.pdf
M61	Welsh Government (2021) Energy generation in Wales: 2021. Available at: https://www.gov.wales/energy-generation-wales-2021
M62	Department for Business, Energy and Industrial Strategy (2022) Renewable Energy Planning Database (REPD) . Available at: https://www.data.gov.uk/dataset/a5b0ed13-c960-49ce-b1f6-3a6bbe0db1b7/renewable-energy-planning-database-repd
M63	Welsh Government (2021) The Co-operating Agreement: full policy programme. Available at: https://www.gov.wales/co-operation-agreement-full-policy-programme-html
M66	Carbon Hwb (2024) About. Available at: https://zerocarbonhwb.cymru/about/
M67	Welsh Government (2023) Optimised RetroFit Programme. Available at: https://www.gov.wales/optimised-retrofit-programme
M68	InfoBaseCymru (2022) Carbon emissions. Available at: https://www.infobasecymru.net/IAS/themes/environmentandsustainability/environment/tabular?viewId=518&geoId=1&subsetId
M72	Department for Levelling Up, Housing & Communities (2024) Energy Performance of Buildings Data: England and Wales. Available at: https://epc.opendatacommunities.org/
M73	MCS Certified (2023) Micro Generation Certification Scheme. Available at: https://mcscertified.com/

Bibliography

Ref. number	Reference
M74	Department for Business, Energy & Industrial Strategy (2019) UK becomes first major economy to pass net zero emissions law. Available at https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law
MC31	Welsh Government (2021) Regional energy strategy: Cardiff capital region. Available at: https://www.gov.wales/regional-energy-strategy-cardiff-capital-region
MC33	
MC34	Welsh Government (2023) Regional transport plans: guidance for Corporate Joint Committees. Available at: https://www.gov.wales/regional-transport-plans-guidance-corporate-joint-committees
MC35	Cardiff Capital Region (2023) Cardiff Capital Region unveils Regional Economic & Industrial Plan 2023-2028, to create a South East Wales that is more Competitive, Connected and Resilient. Available at: https://www.cardiffcapitalregion.wales/news-events/latest-news/cardiff-capital-region-unveils-regional-economic-industrial-plan-2023-2028-to-create-a-south-east-wales-that-is-more-competitive-connected-and-resilient/
MC70	National Grid Electricity Distribution (2024) Distribution Future Energy Scenarios. Available at: https://www.nationalgrid.co.uk/dso/distribution-future-energy-scenarios
ML01	Brecon Beacons National Park (2012) Basic Facts about the National Park. Available at: https://beacons-npa.gov.uk/wp-content/uploads/basic-facts-about-the-brecon-beacons-national-park.pdf
ML02	Visit Wales (2024) Brecon Beacons National Park. Available at: https://www.visitwales.com/attraction/country-park/brecon-beacons-national-park-1444213
ML03	Rhondda Cynon Taf County Borough Council (2022) Tree and Woodland Strategy. Available at: https://www.rctcbc.gov.uk/EN/Resident/PlanningandBuildingControl/Trees/Relateddocs/TreeStrategyadoptedatCabinetSubCommitteeDec2022.pdf
ML04	Department for Energy Security and Net Zero (2019) MSOA estimates of properties not connected to the gas network. Available at: https://www.gov.uk/government/statistics/msoa-estimates-of-households-not-connected-to-the-gas-network

Bibliography

Ref. number	Reference
ML05	Office for National Statistics (2022) How the population changed in Rhondda Cynon Taf: Census 2021. Available at: https://www.ons.gov.uk/visualisations/censuspopulationchange/W06000016/
ML06	UK Government (2023) Energy Performance of Buildings Certificates: Data dashboard. Available at: https://www.gov.uk/government/statistics/energy-performance-of-buildings-certificates-data-dashboard
ML07	Department for Energy Security and Net Zero (2019) Fuel poverty statistics. Available at: https://www.gov.uk/government/collections/fuel-poverty-statistics
ML08	Welsh Government (2022) Commuting patterns by Welsh local authority and measure. Available at: https://statswales.gov.wales/Catalogue/Business-Economy-and-Labour-Market/People-and-Work/Employment/Commuting/CommutingPatterns-by-WelshLocalAuthority-Measure
ML09	Department for Energy Security and Net Zero (2023) UK local authority and regional greenhouse gas emissions national statistics, 2005 to 2021. Available at: https://www.gov.uk/government/statistics/uk-local-authority-and-regional-greenhouse-gas-emissions-national-statistics-2005-to-2021
ML17	National Grid ESO (2024) Future Energy Scenarios (FES). Available at: https://www.nationalgrideso.com/future-energy/future-energy-scenarios-fes
ML18	Rhondda Cynon Taf County Borough Council (2022) Think climate RCT. Avialable at: https://rctcbc.moderngov.co.uk/documents/s35287/Climate%20Change%20Strategy.pdf?LLL=0
ML19	Rhondda Cynon Taf County Borough Council (2018) Corporate Asset Management Plan 2018/23. Available at: https://www.rctcbc.gov.uk/EN/Business/PlanningPropertyandBuildingControl/RelatedDocuments/CorporateAssetmanagementPlan20182023.pdf
ML20	Rhondda Cynon Taf County Borough Council (2023) The Decarbonisation Strategy (2023-2025). Available at: https://www.rctcbc.gov.uk/EN/GetInvolved/Campaigns/ClimateChangeRCT/externallinks/DecarbonisationExecutiveSummary20232025.pdf

Bibliography

Ref. number	Reference
ML21	Rhondda Cynon Taf County Borough Council (2022) Local Development Plan (LDP) 2022 – 2037. Available at: https://www.rctcbc.gov.uk/EN/Resident/PlanningandBuildingControl/RevisedLocalDevelopmentPlan20222037/RevisedLocalDevelopmentPlanLDP2022%e2%80%932037.aspx
ML22	Rhondda Cynon Taf County Borough Council (2024) The Council's Corporate Plan. Available at: https://www.rctcbc.gov.uk/EN/Council/Performancebudgetsandspending/Councilperformance/TheCouncilsCorporatePlan.aspx
ML23	Rhondda Cynon Taf County Borough Council (2022) Charging Ahead With Electric Vehicle Strategy. Available at: https://www.rctcbc.gov.uk/EN/Newsroom/PressReleases/2022/March/ChargingAheadWithElectricVehicleStrategy.aspx
ML24	Rhondda Cynon Taf County Borough Council (2022) ULTRA LOW EMISSIONS VEHICLES (ULEV) TRANSITION PLAN. Available at: https://rctcbc.moderngov.co.uk/documents/s36719/Report.pdf?LLL=0
ML25	Rhondda Cynon Taf County Borough Council (2021) Procurement strategy. Available at: https://www.rctcbc.gov.uk/EN/Business/TendersandProcurement/Relateddocuments/ProcurememtStrategy/ENProcurementStrategy20212024.pdf
ML26	Rhondda Cynon Taf County Borough Council (2022)Strategic Plan for Wellbeing 2022-2025: A Document for Children and Young People. Available at: https://www.rctcbc.gov.uk/EN/Resident/SchoolsandLearning/AccessandInclusiontoEducation/relateddocs/WellbeingStrategicPlanforChildrenandYoungPeople.pdf
ML27	Torfaen Government (2015) South East Wales Valleys Local Transpot Plan. Available at: https://www.torfaen.gov.uk/en/Related-Documents/Roads-Highways-and-Pavements/Local-Transport-Plan/South-East-Wales-Valleys-Local-Transport-Plan.pdf