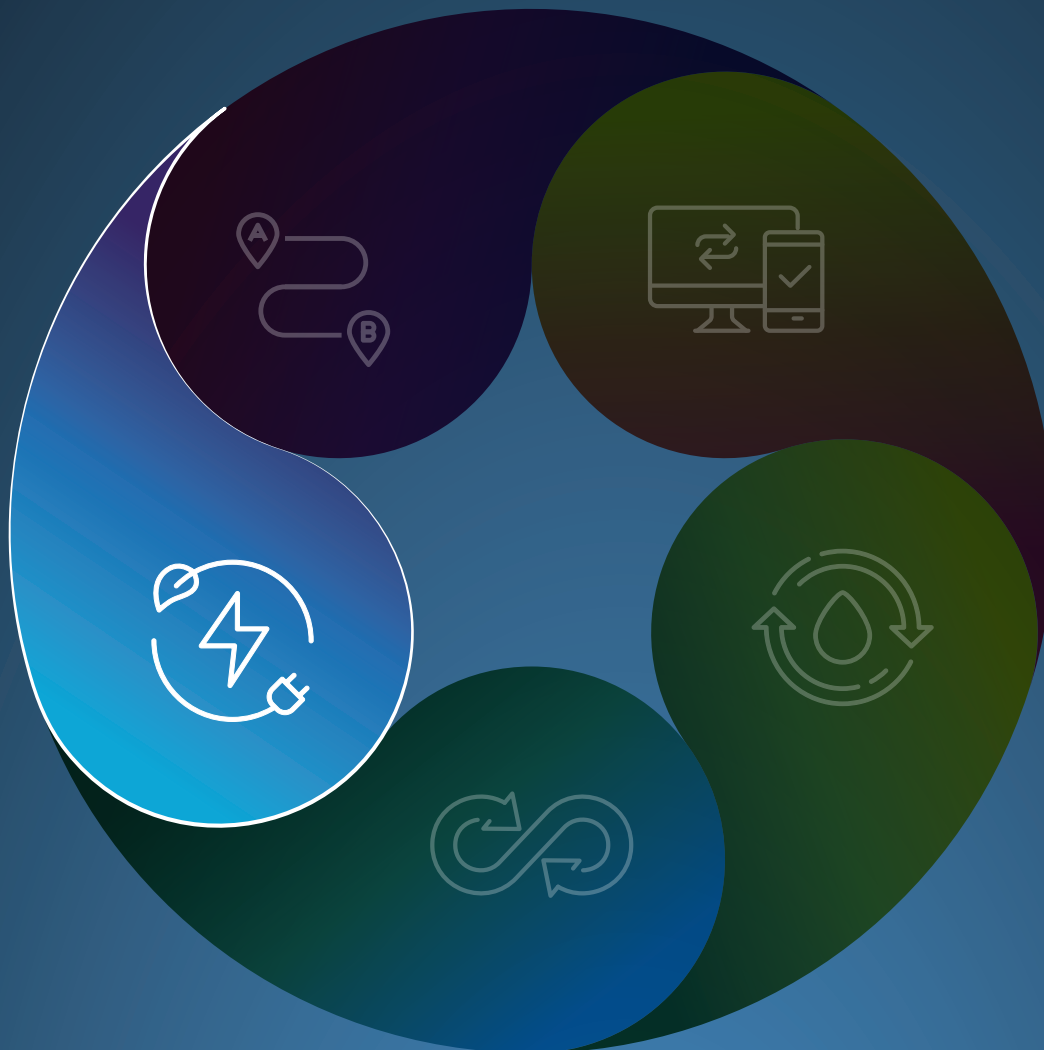




Comisiwn **Seilwaith**
Cenedlaethol **Cymru**
National **Infrastructure**
Commission **Wales**

in partnership with



ENERGY SECTOR INFRASTRUCTURE INSIGHTS

State of Play and Future Challenges

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Glossary

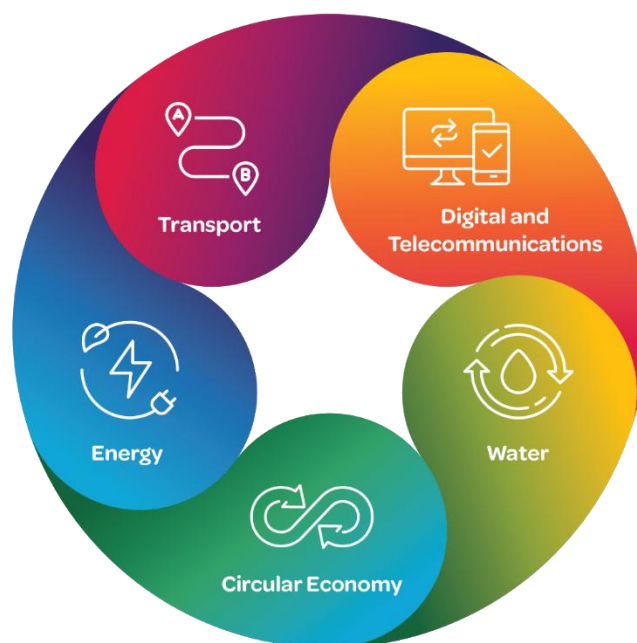
Acronym	Full Meaning / Definition
AI	Artificial Intelligence
ASHP	Air Source Heat Pump
BEIS	Department for Business, Energy & Industrial Strategy
CCS	Carbon Capture and Storage
CCUS	Carbon Capture, Utilisation and Storage
CJCs	Corporate Joint Committees
DESNZ	Department for Energy Security and Net Zero
DNO	Distribution Network Operator
DNS	Developments of National Significance
GHNF	Green Heat Network Fund
GW	Gigawatt
HNDU	Heat Networks Delivery Unit
HNIP	Heat Networks Investment Project
Hynet	HyNet North West
IDNO	Independent Distribution Network Operator
LAEP	Local Area Energy Plan
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MW	Megawatt
NESO	National Energy Systems Operator
NGED	National Grid Electricity Distribution
NGET	National Grid Electricity Transmission
NICW	National Infrastructure Commission for Wales
NRW	Natural Resources Wales
Ofgem	Office of Gas and Electricity Markets
PEDW	Planning and Environment Decisions Wales
PPW	Planning Policy Wales
RESP	Regional Energy Strategic Plan
RLDP	Replacement Local Development Plan
SDG	Sustainable Development Goals

Acronym	Full Meaning / Definition
SIP	Significant Infrastructure Projects
SMR	Small Modular Reactor
SPEN	SP Energy Networks
SSEP	Strategic Spatial Energy Plan
SWIC	South Wales Industrial Cluster
TWh	Terawatt-hour
WWU	Wales & West Utilities

1 Introduction

1.1 Context

- 1.1.1 This report is one of five Infrastructure Insights reports commissioned by the National Infrastructure Commission for Wales (NICW) to consider key infrastructure needs for Wales over the next 80 years across the following sectors:



1.2 Energy Sector Overview

- 1.2.1 The Welsh energy infrastructure sector is defined by challenges in supply, demand and the networks linking the two. Addressing issues faced in these key components will be integral to Wales achieving the net-zero ambitions of the UK and Welsh Government's. These components of the sector can be defined as follows:

- **Supply** – The generating or sourcing of energy, typically through power stations, renewable energy, or other production facilities. It involves converting raw resources (such as wind, sunlight, coal, gas, or water) into usable forms of energy like electricity or heat. This process includes activities such as fuel extraction, energy conversion, and initial delivery into the energy supply network ('grid'). In this category energy sub-types such as hydrogen and also energy storage are included; these are likely to be increasingly used to enable further penetration of renewable generation.
- **Networks** – This encapsulates the process of transporting and managing energy from the point of generation or supply to the point of use. This includes the infrastructure and operations involved in delivering and balancing both the electricity and gas systems. For electricity, it covers the transmission of high-voltage power over long distances and distribution at lower voltages to homes and businesses and is known as the 'grid'. For gas, the network encompasses high-pressure transmission pipelines and lower-pressure

distribution. The networks ensure safe, reliable, and efficient delivery of energy across regions and localities.

- **Demand** – This encompasses the behaviours, patterns, and timing of energy use across households, businesses, and industry. Demand reflects how, when, and why electricity is drawn from the network to power appliances, machinery, lighting, and other needs and gas is used to provide heat and hot water in homes, businesses and industry.

- 1.2.2 Wales' energy supply is characterised by a diverse mix of energy generation types. Wales produces more electricity than it consumes, exporting significant amounts to the rest of the UK. However Welsh Government's 'Energy Generation Wales 2023' report outlines that that over 50% electricity produced in Wales is generated using natural gas,¹ which is imported from abroad to liquified natural gas terminals at Milford Haven. Therefore, Wales' export capacity is partly reliant on foreign energy supplies. The fact that Wales is both an electricity exporter, but also large importer of energy causes tensions, leading communities to feel that they are disproportionately impacted by perceived negative impacts of electricity generation, and gas imports and transmission, which is then used by others.
- 1.2.3 Supporting Welsh net zero targets, the energy supply system has shifted in recent years, moving away from coal, which has been phased out of the electricity mix, towards low-carbon sources focussing primarily on onshore and offshore wind. However, gas still plays a significant part in the energy mix and coal is still extracted in Wales at the Aberpergwm coal mine. Development of wind power has caused different tensions in particular regarding wider concern around the need for new transmission and distribution infrastructure (often in the form of overhead lines). As well as an uptick in renewable energy deployment, the phase out of coal has also been facilitated by reducing electricity demand.
- 1.2.4 Wales' electricity transmission network provides and exports high voltage power from the more urban areas in northern and southern Wales, where, historically, the major energy generators have been focussed, such as the gas fired power stations in Pembroke and Connah's Quay, and coal at Aberthaw. The electricity distribution system provides lower voltage power to homes and businesses across Wales. Both the electricity transmission and distribution systems require upgrade, with the electricity distribution system requiring an upgrade to meet demand in rural areas and the electricity transmission network requiring an upgrade to enable export of electricity from new renewable sources, including remote onshore wind farms. Similar to the electricity network, there is limited gas supply in rural areas, particularly in central and western Wales, and this limits consumer options and locks in higher rates in these areas. These issues also create challenges for decarbonisation in these areas.
- 1.2.5 Energy demand in Wales is shaped by a combination of high industrial consumption particularly from sectors like steel, chemicals, and manufacturing (much of which is clustered in northern and southern Wales), and a significant proportion of older, less energy-efficient housing stock, which increases heating needs. Rural areas often rely on electricity or off-grid fuels such as oil for heating due to limited gas network coverage.
- 1.2.6 This report provides an analysis of the 'state of play' of the energy sector in Wales. In recent years a number of other studies, including a 2023 report by NICW 'Preparing Wales for a Renewable Energy 2025', have focussed on renewable energy in Wales. This study aims to use these findings but broaden the knowledge and understanding for the whole energy sector, rather than duplicate.

¹ Energy Use in Wales 2023

1.3 Focus of this Report

1.3.1 Focussing on the energy sector in Wales, the purpose of this report is to:

- Assess and explain the current key issues impacting the energy sector in Wales
- Identify future needs, issues, challenges and risks over the next 80 years and consider the potential impact or consequences of these risks to Wales (doing so through the lens of the Well-being of Future Generations Act)
- Identify priority issues, of most critical significance for Wales
- Guide future Commissioners on the key issues and challenges they might consider for as a priority for action and development within the next Senedd term.
- Present existing data to evidence the state of the Welsh energy sector now and into the future, to enable future monitoring of performance across this sector.

1.3.2 It is important to note that this report is intended to provide a high-level overview of the issues across the sector and to highlight those which will be important for Welsh Government to consider further. The scope of the study was to provide a narrative and overview of the issues based on sector experience, readily available headline information and with targeted input from key stakeholders. The scope did not allow for primary research or detailed analysis of existing data. Research was completed during 2025, and the document presents the state of play as of then.

1.3.3 In line with NICW's overarching ambitions and remit, this report takes a long-term view of energy. Broadly, it considers the following timescales:

- **Short Term** – 0 – 15 years ahead, therefore looking beyond the next Senedd term but within the timeline of most existing plans and policies, including Future Wales: The National Plan 2040.
- **Medium Term** – 15 – 50 years ahead as a key area of focus, to enable forward planning and help shape understanding beyond current policy horizons to consider the next likely significant issues and challenges.
- **Long-term** – 50 – 80 years ahead as a lighter touch consideration, recognising the difficulties and uncertainties around very long-term thinking but recognising the importance of a long-term perspective in helping to ensure the actions we take across the sector in the short term are suitably informed, resilient and future proof.

1.4 Stakeholder Input

1.4.1 For this overview of state of play and future challenges to be informed by the real experience of stakeholders working across the sector, an online workshop was held on the 10 September 2025. This was attended by representatives from Welsh Government as well as a range of organisations working across the energy sector in Wales.

1.4.2 Information gained from these sessions has informed the narrative throughout this report.

1.5 Assumptions

1.5.1 To assist with this longer-term timeframe, and to ensure that the five Infrastructure Insight reports are consistent, this review has been based on a series of broad assumptions about what a future Wales

might look like. This is based on established, published sources and is intended to provide a guide and to help frame thinking around scale of change across Wales at a high level only:

- **Climate change** will have cross-cutting impacts in Wales. For example, current worst-case projections anticipate increases in temperature of 3.8 to 6.8°C in the summer by 2070; significant changes in the seasonality of weather extremes, with significant increases in heavy hourly rain anticipated;² and sea level rises of between 22cm and 28cm in Cardiff.³
- Wales has made progress towards emissions reductions. However, many of these changes are considered to have come about due to progress in the energy and industry sector. Significant further reductions will have been achieved through the closure of the Port Talbot Steelworks in 2024. Change is still needed to further accelerate emissions reductions in line with Wales' Carbon Budgets, with the Climate Change Commission identifying concern that these changes are not taking place at a fast enough rate.⁴⁵
- Energy use – Welsh electricity demand is projected to at least double and potentially triple by 2050.⁶
- **Population** is anticipated to increase in Wales over the short – medium term, with a 5.9% increase projected by mid-2032 and a 10.3% increase projected by 2047.⁷ This increase will be driven by migration, with natural change being negative over the same time period.
- **Age profile** - The number of people in Wales aged over 65 is set to increase by 19.6% in the short term and will be over 1 million by 2060.⁸
- In terms of **economic development**, longer term forecasts identify the challenges faced by relatively weak productivity when compared to other parts of the UK. Challenges with productivity are to be exacerbated by an ageing population. Changing working patterns and emerging industries resulting from technical innovation are considered to both provide opportunities and challenges.⁹
- **Nature and biodiversity** in Wales are under threat. Changes in how we manage land in Wales combined with the effects of climate change will continue to impact nature in the future and will require transformative action to address.¹⁰

² ukcp18_headline_findings_v4_aug22.pdf

³ Adapting to climate change - Progress in Wales

⁴ Wales' Fourth Carbon Budget

⁵ Progress Report: Reducing emissions in Wales

⁶ Energy use in Wales, third edition 2022

⁷ National population projections: 2022-based [HTML] | GOV.WALES

⁸ Ibid.

⁹ Welsh Budget 2023: Chief Economist's report

¹⁰ State of Natural Resources Report 2025

1.6 Structure of this Report

1.6.1 Following this introduction, this Infrastructure Insight document takes the following structure:

- **Chapter 2** provides an overview of the energy sector in Wales.
- **Chapter 3** investigates the current state of play in the energy sector, seeking to establish a baseline for the sector.
- **Chapter 4** considers what the vision for the energy sector in Wales could look like.
- **Chapter 5** looks at future challenges across the sector in the short term.
- **Chapter 6** considers medium to longer term challenges.
- **Chapter 7** summarises the key challenges and identifies important next steps.
- **Chapter 8** considers how progress can be monitored over time.

2 Background and Context

2.1 Why is the energy sector important to Wales?

- 2.1.1 Fundamentally, energy is a pivotal infrastructure both in Wales and globally. It underpins nearly every aspect of modern life: powering and heating homes, businesses, transport, industry, and public services. Reliable and affordable energy supply supports economic growth, job creation, and social wellbeing, while also enabling the operation of critical infrastructure such as hospitals, schools, and communications networks. As society transitions to low-carbon sources, energy becomes even more important for meeting climate goals, ensuring national security, and supporting innovation in new technologies. In short, access to secure, sustainable energy is fundamental to prosperity, resilience, and quality of life.
- 2.1.2 The energy sector is especially important to Wales due to its vital role in supporting both economic development and ambitious decarbonisation targets. Welsh industry, including steel, chemicals, and manufacturing, relies heavily on access to affordable, reliable energy to remain competitive and sustain jobs. As Wales seeks to reduce its carbon emissions and transition towards a greener economy, securing cheap and low-carbon energy is essential, not only for meeting climate goals but also for attracting new investment and supporting future industrialisation.
- 2.1.3 Wales also has a rich legacy and unique natural resources that continues to position the country at the forefront of the UK's energy supply. Historically, coal mining was the primary energy source for Wales and a major export, with Welsh coal being renowned internationally. Coal mining for energy use not only powered Welsh industry and homes but also shaped identity and culture for generations. The country was an early pioneer in renewable energy, with sites like Cwm Dyli in Snowdonia among the first hydroelectric power stations in the world.
- 2.1.4 Wales boasts one of the largest tidal ranges in Europe, offering significant potential for tidal energy, and is leading the way in floating offshore wind development in the Celtic Sea. Onshore and offshore wind farms across Wales already make significant contributions to the national grid, strengthening energy security and supporting export capacity. Together, these factors make the energy sector a cornerstone of Wales's economic and environmental ambitions. New technologies that will accelerate the energy transition are also being developed in Wales, including Small Modular Reactors (SMR) on Anglesey, and Carbon Capture and Storage (CCS) and hydrogen as part of the Hynet project.
- 2.1.5 Wales is also a key entry point for imported liquefied natural gas at Milford Haven, which feeds into the UK gas system. There are two terminals in Milford Haven, out of a total of three in the UK, which make these vital national assets. These terminals allow access for Wales to the global energy market and strengthen Wales' position in the UK energy market, providing jobs, investment, and infrastructure benefits to Pembrokeshire.

- 2.1.6 Tables 2.1 and 2.2 provide an overview of how the energy sector is critical to the overall wellbeing and success of Wales, with reference to seven goals (Table 2.1) and five ways of working (Table 2.2) set out in The Well-being of Future Generations (Wales) Act.

Table 2-1 – Contribution of Energy to Wellbeing Goals

Well-being goal	Contribution of this sector
A prosperous Wales	Affordable, low-carbon energy supports economic growth, attracts investment, creates green jobs, and reduces costs for businesses and households. However, dependence on high-carbon energy and volatile fossil-fuel markets can increase costs.
A resilient Wales	Energy systems that work in harmony with nature protect natural resources, reduce emissions, and create opportunities for nature restoration. This approach makes Wales less vulnerable to climate and supply shocks, while supporting the recovery and resilience of natural ecosystems. If energy infrastructure is poorly planned or extractive, it can damage ecosystems, raise emissions and leave Wales more vulnerable to climate and supply shocks
A healthier Wales	Clean energy lowers air pollution and greenhouse gases, improving public health and tackling fuel poverty, improving warmth in winter and reducing overheating in summer for better living conditions. Emissions and local pollution from fossil-fuel extraction and combustion worsen air quality and public health and can deepen fuel poverty.
A more equal Wales	Fair access to affordable energy reduces social and regional inequalities, particularly by supporting vulnerable and rural communities. Without targeted action, unequal access to affordable, reliable energy can widen social and regional inequalities.
A Wales of cohesive communities	Community energy projects can build local pride, generate revenue, create jobs, and strengthen the resilience of both urban and rural areas. Large, externally owned projects that deliver few local benefits can erode trust, displace local value and strain community cohesion.
A Wales of vibrant culture and thriving Welsh language	Local energy schemes can fund cultural activities, support Welsh-speaking communities, help preserve heritage sites, and assist in restoring natural landscapes impacted by industrialisation. Industrial development and landscape change from energy projects risk damaging cultural heritage, disrupting Welsh-speaking communities and diminishing places of cultural significance.
A globally responsible Wales	Decarbonising the energy system cuts Wales's global carbon footprint and encourages ethical, sustainable energy practices worldwide. Conversely, continued dependence on fossil fuels or exporting high-carbon practices undermines Wales's credibility and contributes further to global emissions.

Table 2-2 - Contribution of energy to the five ways of working

Way of Working	Contribution of this sector
Long-term	The energy sector invests in renewable generation, grid modernisation, and storage to ensure a resilient, low-carbon energy supply for future generations. However, short-term profit pressures and policy uncertainty can delay investment in renewables and grid upgrades, risking an unreliable and carbon-intensive energy future.
Prevention	Proactive measures such as energy efficiency programmes, decarbonisation of heat and power, and support for low-emission technologies reduce environmental harm and future health risks. Without consistent commitment, gaps in energy efficiency and decarbonisation efforts may allow ongoing environmental damage and rising health risks.
Integration	Energy initiatives are aligned with wider economic, social, and environmental objectives, including supporting local jobs, improving community well-being, and contributing to national decarbonisation targets. Misaligned energy projects that overlook social or environmental factors can undermine community trust and result in negative outcomes.
Collaboration	Cross-sector partnerships with local authorities, academia, businesses, and communities accelerate innovation, knowledge sharing, and delivery of integrated energy solutions. Limited or uneven partnerships between sectors and communities can cause conflict between stakeholders.
Involvement	Stakeholder and community engagement is embedded in project planning and delivery, ensuring local interests and priorities are reflected in energy developments. Insufficient stakeholder engagement risks overlooking local concerns, leading to opposition, delays, or developments that fail to meet community needs.

2.2 Relationship with Nature

- 2.2.1 NICW is committed to giving nature a formal voice in infrastructure decisions, as recommended in their 2024 Building Resilience to Flooding in Wales by 2050 (recommendation 3). The purpose of this is to treat ecosystems as key stakeholders in infrastructure decision making. These steps aim to enhance long-term resilience, honour the Well-being of Future Generations Act, and align infrastructure with biodiversity recovery and climate adaptation.
- 2.2.2 The energy sector in Wales is increasingly being planned and delivered with nature considerations built into siting, design and mitigation of projects. However, trade-offs are inevitable as efforts are made to address the demands of the climate and nature emergencies. Current policy frameworks aim to balance decarbonisation with biodiversity outcomes and emphasise nature-based solutions. However, they rely on evolving guidance, planning tests and project-level mitigation to manage impacts rather than guaranteeing uniform outcomes everywhere. This can create uncertainty and result in negative environmental outcomes if approaches aren't consistent. These changes are

underpinned by recent updates to Planning Policy Wales (Edition 12)¹¹ (PPW), which significantly increased the protection given to nature in planning policy.

2.3 What Shapes the Sector Today?

- 2.3.1 The energy sector in Wales is influenced by legislation and policy produced by various international organisations, and the UK and Welsh government. Key policy and legislation relevant to the Welsh energy sector is identified and summarised in Table 2.3.

Table 2-3 – Context – Legislation, Policy and Plans

Policy/Legislation	Summary
International	
Paris Agreement (2015)	A legally binding international treaty to limit global warming to well below 2°C. The UK (and by extension Wales) is committed to meeting ambitious greenhouse gas reduction targets in line with this agreement.
United Nations Sustainable Development Goals (SDGs)	A universal set of 17 interconnected goals adopted by all United Nations Member States in 2015 as part of the 2030 Agenda for Sustainable Development. SDG 7 (Affordable & Clean Energy) and SDG 13 (Climate Action) directly influence Welsh policies via UK commitments and the Well-being of Future Generations Act.
Aarhus Convention	Guarantees public rights on access to environmental information and participation in decision-making, impacting Welsh energy project transparency.
UK Level	
Climate Change Act 2008	Legally binding target to reduce UK greenhouse gas emissions to net zero by 2050. Wales must contribute to overall UK targets.
Climate Change Act 2008 (2050 Target Amendment) Order 2019	Amended the UK's Climate Change Act to set a legally binding target of net zero greenhouse gas emissions by 2050, replacing the original 80% reduction target. It came into force in June 2019, making the UK the first major economy to legislate for net zero.
UK Energy Act 2023	Updates regulatory frameworks for energy security, market reform, and net zero delivery. Wales benefits from UK-wide investment and innovation in renewables, hydrogen, and storage.
Energy Prices Act 2022	Introduced in response to the sharp rise in global energy prices in 2022. Its primary purpose is to give the UK Government powers to implement emergency measures to protect consumers and businesses from unaffordable energy costs.

¹¹ [Planning Policy Wales - Edition 12](#) – See paragraph 5.7.9.

Policy/Legislation	Summary
Wales Specific	
Well-being of Future Generations (Wales) Act 2015	Requires public bodies in Wales to consider the long-term impacts of their decisions on economic, social, environmental, and cultural well-being. Drives all public policy, including energy and climate, towards sustainability and “A Prosperous Wales.”
Environment (Wales) Act 2016	Sets a statutory framework for managing Wales’s natural resources sustainably, introduces carbon budgeting, and requires the Welsh Government to set and meet emission reduction targets. Underpins climate and energy strategies.
Written Statement: Publication of Summary of Responses to the Consultation on Wales’ Renewable Energy Targets (July 2023)	This Ministerial Written Statement confirmed that the Welsh Government targets for renewable energy are as summarised: – 100% renewable electricity by 2035 – 1.5 GW locally owned renewable capacity by 2035 – install 580,000 heat pumps by 2035 – Net zero emissions by 2050 – These targets are out in Section 3.2 of this report.
Planning (Wales) Act 2015	Reformed the planning system in Wales, introducing a streamlined process for major energy projects and also integrated low-carbon transition into planning policy.
Infrastructure (Wales) Act 2024	Builds on and updates the Planning (Wales) Act 2015 by replacing the older Developments of National Significance (DNS) process with a new, streamlined Infrastructure Consent regime for major projects. While the 2015 Act introduced a centralised system for planning decisions on large developments, the 2024 Act simplifies and unifies the process, broadens the types of infrastructure covered (including marine and energy projects), and aims to speed up delivery by creating a single consent route overseen by Welsh Ministers.
Net Zero Wales Carbon Budget 2	The Welsh Government’s plan for meeting its second carbon budget, setting out sectoral actions on renewables, energy efficiency, low-carbon heat, and more. Key roadmap for delivering net zero by 2050 and responding to the requirements of the Climate Change Act 2008 (and subsequent 2019 amendment) and the obligations of the Paris Agreement.
Net Zero Strategic Plan	Outlines Wales’s approach to achieving net zero emissions by 2050, focusing on leadership, collaboration, and a just transition. The plan emphasises public sector leadership, community involvement, and integrating net zero goals into all government decision-making.
Heat Strategy for Wales (2024)	Sets out the Welsh Government’s vision for decarbonising heat across homes, businesses, and public buildings to help achieve net zero by 2050. The strategy focuses on improving energy efficiency, accelerating the rollout of low-carbon heating solutions (such as air

Policy/Legislation	Summary
	source heat pumps (ASHP) and renewable heat networks), and supporting skills, innovation, and fair access to affordable, clean heat.
Future Wales: The National Plan 2040	National spatial development plan, including policies to support renewable energy generation, grid infrastructure, and climate adaptation across Wales. Sets a clear direction for large-scale energy projects.
Planning Policy Wales (Edition 12) (PPW)	PPW sets out the Welsh Government's national planning policies and principles that guide planning authorities in determining energy infrastructure applications, ensuring that energy projects align with Wales's climate targets, sustainability goals, and planning plan policies.
Strategic Policy Position for Hydrogen (2026)	Sets out how Wales aims to support and grow a clean hydrogen economy, using hydrogen to help reach its climate goals. It highlights the government's commitment to working with industry and communities to integrate hydrogen across energy, transport, and industry sectors.
Strategic policy position for Carbon Capture and Storage	Outlines Wales's commitment to supporting the safe development and use of carbon capture and storage technology as part of its journey to net zero, emphasising the role of CCS in reducing industrial emissions.
Transitional Regional Energy Strategic Plan (2026)	The tRESP for Wales is designed to guide the transition our energy system towards a cleaner, more reliable, and cost-effective future. It serves as a strategic planning tool to address evolving energy challenges and opportunities during the transition to a low-carbon grid.

2.3.2 The policy position and legislative requirements set out in the above have driven policy direction and in response, strategies and plans have been set out by key stakeholders that further influence the Welsh energy sector for example:

- The NESO '*Future Energy Scenarios 2025*' report outlines key pathways for achieving net zero across the UK. by 2050, highlighting the need for infrastructure upgrades, low-carbon technologies, and active consumer participation. It recognises Wales' vital role in expanding renewable energy and integrating local energy systems to meet these decarbonisation goals.
- National Grid's policy document '*Wales: Future Network Blueprint*' outlines a strategic plan to modernise and decarbonise Wales's electricity grid by 2035, with a strong focus on enabling greater integration of renewable energy sources, supporting local energy ownership, and advancing smarter, more flexible ways to manage the network for the benefit of communities across Wales.
- The Wales & West Utilities Business Plan 2026-2031 outlines the company's strategy to deliver safe, reliable, and affordable gas services while supporting the transition to net zero. Key priorities include investing in the network to enable a supply of low-carbon gases like hydrogen and biomethane and working closely with stakeholders to ensure energy affordability and support for vulnerable customers.
- Every Welsh Local Authority has produced a Local Area Energy Plan (LAEP), which is a strategic, data-driven framework developed to guide the transition to net-zero energy

systems by 2050. These assess local energy needs and resources, identifying opportunities to reduce energy consumption, switch to low-carbon fuels, and enhance energy efficiency across buildings, transport, and industry. They also highlight areas suitable for renewable energy generation and storage, ensuring that infrastructure development aligns with decarbonisation goals.

- Stakeholders have raised that Building Regulations need to be tightened to drive the energy hierarchy, eliminate the use of fossil fuels and drive the inclusion of on-site renewable technologies.

2.4 Who is Responsible?

- 2.4.1 There are a broad range of stakeholders responsible for shaping and managing the Welsh energy sector, reflecting the complexity of energy transition and delivery in Wales. These include the Welsh Government, which sets strategic policy and climate targets; UK Government departments, which regulate energy markets and large-scale infrastructure; local authorities, which play a crucial role in planning and community engagement; energy companies and network operators; Ofgem as regulator; and consumer and environmental groups advocating for fairness and sustainability. The key stakeholders and their functions are summarised in Table 2.4 below.

Table 2-4 – Key Stakeholders

Organisation	Remit	Role
UK Government	Legislator, enabler	The UK Government is responsible for regulating the overall energy market in Wales, including setting energy policy, market rules, and ensuring security of supply through national infrastructure and transmission networks. It also has a consenting role for large-scale energy generation projects.
Welsh Government	Legislator, enabler and generator	The Welsh Government is responsible for devolved aspects of the energy sector in Wales, including setting climate targets, shaping planning policy for energy infrastructure, and developing strategies for energy efficiency and renewable energy. It also has consenting responsibilities for energy infrastructure projects classified as Significant Infrastructure Projects. The Welsh Government leads on community energy initiatives and ensures that energy transition aligns with Wales's well-being and sustainability goals. Through Trydan Gwyrdd Cymru, the Welsh Government owned renewable energy developer, the Welsh Government are also seeking to play a role as a state-owned energy generator. The Welsh Government engage with key stakeholders including NESO to shape the future energy network in Wales.
NRW	Regulator and Statutory Consultee	Natural Resources Wales (NRW) is the principal environmental regulator for Wales. NRW is responsible for permitting and regulating energy infrastructure projects to ensure they comply with environmental laws and standards. They also play an integral role as the main environmental consultee when developing infrastructure projects.
Ofgem	Regulator	Ofgem (the Office of Gas and Electricity Markets) is the independent regulator for electricity and gas markets across Great Britain, including Wales. Ofgem is responsible for protecting consumer interests, promoting competition, regulating network operators and suppliers, and ensuring the security and reliability of energy supplies. From 2026 Ofgem will also become the regulator of heat networks.
Welsh Ministers /Planning and Environment Decisions Wales (PEDW)	Consenting authority	The Welsh Ministers decide planning applications for Developments of National Significance (DNS). DNS include wind farms, power stations and electricity network upgrades. Planning and Environment Decision Wales (PEDW) handle DNS applications on behalf of the Welsh Ministers. Not that this system is about to change in line with the Infrastructure Wales Act 2024, which will introduce Significant Infrastructure Projects (SIPs)
Local Authorities	Local Planning Authority Various Consultee Responsibilities Investor and Enabler	Local Authorities in Wales play a key role in the energy sector by overseeing planning decisions for energy infrastructure such as substations and smaller renewable energy projects, facilitating local renewable energy projects, and implementing energy efficiency initiatives within their communities. There are also several bodies within Local Authorities that play important roles as consultees on topics such as environmental health, highways and ecology.

Organisation	Remit	Role
National Energy Systems Operator (NESO)	Operates electricity system	NESO plans Great Britain's entire energy system, operates the electricity network, and ensures a secure and affordable supply of energy for today and the future. It balances real-time electricity supply and demand and guides the transition to a cleaner energy future by combining the previous roles of the Electricity System Operator (ESO) with new responsibilities for gas network planning.
Gas and electricity network operators	Overseeing, maintaining and improving the network	Gas and electricity network operators are responsible for transporting energy from producers to homes and businesses. Gas distribution operations are managed by Wales & West Utilities, and gas transmission by National Gas. Electricity distribution is overseen by National Grid Electricity Distribution and SP Energy Networks, while National Grid operates the high-voltage electricity transmission system. Green Gen Cymru are a relatively new Independent Distribution Network Operator who are bringing forward proposals to develop a distribution system in central Wales. These operators ensure the safe, reliable, and efficient delivery of energy, support network upgrades for decarbonisation, and respond to faults and emergencies.
Energy Developers	Developing the generation and network capacity	Energy developers play a vital role in Wales's energy transition by identifying, designing, and delivering renewable and low-carbon energy projects such as wind farms, solar parks, and battery storage facilities. They drive investment and innovation, navigate planning and regulatory requirements, and work with landowners, communities, and local authorities to bring forward projects.
Supply Chain & Installers	Supplying equipment, services, and local expertise	Supplying equipment, services, and local expertise, the Welsh energy supply chain includes manufacturers, suppliers, contractors, and specialist installers who deliver components and technologies and provide installation, maintenance, and engineering services. Smaller companies, often accredited installers of micro-generation (e.g., rooftop solar, heat pumps, domestic batteries), enable households and businesses to generate their own clean energy, supporting local jobs and decarbonisation while helping consumers access grants, advice, and energy efficiency improvements.
Energy Consumers / Wider Society	Customer	Energy consumers, including households, businesses, and public sector organisations, are central to Wales's energy system. Their choices and behaviours drive demand for electricity and gas, influence the uptake of renewable technologies, and shape energy efficiency improvements. As the energy transition accelerates, consumers play an increasing role in supporting demand-side management.

- 2.4.2 As displayed in Table 2.4, the Welsh energy sector is shaped by a diverse range of organisations, each with distinct roles and responsibilities that together enable the country's energy transition and support its climate ambitions. At the national level, the UK Government sets the regulatory framework, market rules, and oversees the security of supply, while also consenting large-scale generation projects. The Welsh Government is responsible for devolved policy areas such as climate targets, planning, and energy efficiency, and is increasingly active in energy generation (acting as owner of Trydan Gwyrdd Cymru), as well as fostering community energy and ensuring the transition aligns with broader well-being goals. This is a complex arrangement, and Table 2.5 sets out the areas of relevant policy areas that are devolved to Wales and those that are reserved, so are overseen by the UK Government.
- 2.4.3 Key regulatory and enabling bodies are Natural Resources Wales (NRW), which acts as the principal environmental regulator and statutory consultee, and Ofgem, which oversees market integrity, consumer protection, and network reliability across Great Britain. Local authorities are central to planning, consultation, and local energy delivery, while network operators maintain and upgrade the electricity and gas systems to support decarbonisation and secure supply. Energy developers drive innovation and investment in new generation and storage projects, engaging with communities and navigating regulatory requirements. Ultimately, energy consumers play a vital role as their choices, demand, and participation in energy initiatives are crucial for achieving Wales's net zero goals.
- 2.4.4 There are a wide range of organisations that also engage with the energy sector outside of this core group of stakeholders. For example, academic institutions by advancing research, innovation, and skills development; environmental NGOs, which advocate for sustainability and represent environmental interests in policy debates; and industry associations, which support the interests of energy companies and help shape sector development.

Table 2-5 – Overview of Reserved and Devolved aspects of Energy Policy Areas

Policy Area	Generally Reserved (UK level)	Welsh / Devolved Role (where applicable)	Current Welsh Government Leverage
Electricity and Gas Markets	Regulation of wholesale markets, network charging rules, Ofgem regulation, licensing, market rules	None (except for local planning and consenting for some projects)	Limited
National Grid, Transmission and Distribution	Transmission planning, interconnectors, grid reinforcement investment	Limited role in local routing decisions and consenting interfaces, regional strategy and influence e.g. NESO	Advisory role through engagement with NESO
Heat Networks - Regulation	Consumer protection, technical standards (current/future). Ofgem regulation of market from January 2026	Enforcement, local authority roles, design standards via building regulations or devolved codes, zoning,	Ability to guide design
Heat Networks - Funding	Major capital funding (Heat Network Efficiency Scheme, Heat Networks Investment Project and Heat Networks Delivery Unit)	Welsh Government pilot or match funding, feasibility grants, local support schemes	Some leverage but limited by absence of ringfenced capital funding powers and access to funding pots such as the Green Heat network Fund
Decarbonisation Strategy	UK net zero targets and carbon budgets, cross-UK frameworks	Welsh specific targets and carbon budgets, Welsh low-carbon/heat strategies consistent with UK targets	Wales can set its own targets
Building Regulations	Minimum energy efficiency standards (reserved, but can be devolved)	Welsh building regulations implementation, enforcement	Wales has power of Building Regulations
Planning & Consenting	Major / cross-border / large infrastructure / offshore projects (beyond threshold)	Local planning, onshore infrastructure under threshold (e.g. ≤ 350 MW), marine licensing in Welsh waters	Wales has power over planning and consenting, up to certain thresholds
Renewable Energy Consenting	Offshore wind, large-scale projects, cross-UK coordination	Onshore renewables below threshold, local planning consent, consenting for some offshore zones in Welsh competence	Wales has power over planning and consenting, up to certain thresholds

Policy Area	Generally Reserved (UK level)	Welsh / Devolved Role (where applicable)	Current Welsh Government Leverage
Fuel Poverty / Energy Efficiency	UK-wide schemes (Energy Company Obligation, Warm Home Discount)	Welsh programmes (Nest, Arbed), local schemes, targeted to Wales	Wales can put its own schemes in place.
Heat Strategy (Policy Setting)	UK Heat & Buildings Strategy, frameworks, regulation of certain technologies	Welsh Heat / Low-Carbon strategy, plan delivery, policy design within competence	Wales has put its own heat strategy in place but many of its outcomes impinge on UK Government support and policy.
Local Area Energy Planning (LAEP)	Guidance, voluntary support	LAEP programme funding/support	Wales has instructed LAEPs across all Local Authorities.
Zoning for Heat Networks	Proposed national zoning/regulation powers (in England)	No formal devolved zoning power yet; potentially controllable under Welsh competence if chosen	

3 Current State of Play

3.1 Context

- 3.1.1 Wales is undergoing significant transformation, with an ongoing shift from its historical reliance on coal and gas for electricity generation to a strong focus on decentralised renewable sources. At the same time, electricity demand is anticipated to increase significantly as the reliance on electrification increases (see Figure 3.6). Heat remains a major component of energy consumption, accounting for approximately 45% of Welsh energy use as of 2021,¹² highlighting the importance of decarbonising heating systems alongside electricity. Supporting this change is a network that was designed: for a centralised energy system developed at a time when electricity demand was much lower; or before technologies such as hydrogen and carbon capture were potential options for the energy mix.
- 3.1.2 Current data on energy generation is based on 2023 data, as reported in the Energy Generation in Wales 2023,¹³ published in March 2025. Data on energy use is reported in the Energy Use in Wales Third Edition,¹⁴ published May 2024, which reports on 2021 energy usage.

3.2 Energy Targets

- 3.2.1 The Welsh Government originally set the following energy supply or generation targets in 2017¹⁵:
- Wales to generate 70% of its electricity consumption from renewable energy by 2030
 - 1GW of renewable electricity capacity in Wales to be locally owned by 2030
 - By 2020 all new renewable energy projects to have at least an element of local ownership
- 3.2.2 To respond to the increased urgency of tackling climate change and due to global energy market volatility, underpinned by the Russian invasion of Ukraine, the Welsh Government reassessed their targets, publishing the following targets in July 2023:¹⁶
- 100% renewable electricity by 2035: Wales aims to generate the equivalent¹⁷ of its total electricity consumption from renewable sources by 2035. This includes wind (onshore and offshore), solar, hydro, and other renewable technologies.
 - At least 1.5 GW of locally owned renewable capacity by 2035: This goal is aimed at ensuring that communities and local organisations benefit directly from the transition to clean energy.
 - 580,000 heat pumps to be installed by 2035 (aspirational target contingent on scaled up support from the UK Government): Recognising the growing role of electricity in heating, Wales is pushing for rapid expansion of low-carbon heat technologies.

¹² [Energy Use in Wales - Third Edition](#)

¹³ See 1.

¹⁴ See 11.

¹⁵ [Natural Resources Wales / Energy in Wales](#)

¹⁶ [Written Statement: Publication of Summary of Responses to the Consultation on Wales' Renewable Energy Targets \(14 July 2023\) | GOV.WALES](#)

¹⁷ "equivalent" means that the total amount of electricity generated from renewable sources in Wales will match or exceed the country's total annual electricity consumption, even if some of the renewable electricity is exported or not directly consumed within Wales. At certain times backup fossil fuels, likely gas, may still be needed to ensure energy supply and grid stability.

- Net zero emissions by 2050: In line with the UK Climate Change Act, Wales is legally committed to reaching net zero greenhouse gas emissions by 2050.

- 3.2.3 In announcing these new targets, the Welsh Government has set out that it will work with communities, developers, and the UK Government to rapidly expand renewable energy capacity. The targets support the UK's overarching goal of a fully decarbonised power system by 2035 and net zero emissions by 2050. Compared to the UK-wide approach, Wales places greater emphasis on local ownership and community benefit, positioning itself as a key contributor to national decarbonisation while tailoring its strategy to regional strengths and values.
- 3.2.4 What do these targets mean? It is anticipated that Wales will consume 21.66 TWh of electricity in 2035.¹⁸ To achieve the targets, the equivalent amount will have to be provided by renewable energy. As identified in Figure 3.1, 7.8 TWh was generated by renewables in 2023, which is 36% of the 2035 target. No major schemes have been commissioned since 2023, so a significant task remains in achieving the target.

3.3 Recent Welsh Government Reforms to Achieve Targets

Creating Trydan Gwyrdd Cymru

- 3.3.1 To further accelerate progress, the Welsh Government launched the publicly owned Trydan Gwyrdd Cymru in 2024 to support renewable energy development. Its mission is to unlock Wales' renewable potential by developing large-scale projects on Welsh Government owned land, starting with onshore wind on the Woodland Estate (forestry managed by Natural Resources Wales), while ensuring economic and social benefits stay in Wales. The company aims to deliver 1 GW of new renewable generation capacity by 2040, reinvesting profits locally and creating jobs and skills opportunities.
- 3.3.2 Trydan Gwyrdd Cymru has moved quickly since its launch in July 2024, announcing its first three major onshore wind projects at Clocaenog Dau in Denbighshire and Conwy (up to 132 MW), Glyn Cothi in Carmarthenshire (up to 162 MW), and Carreg Wen in Rhondda Cynon Taf (up to 108 MW). Together, these schemes could deliver around 400 MW of clean electricity.

The Infrastructure (Wales) Act 2024

- 3.3.3 Streamlining the planning and consenting processes to support the integration and distribution of renewable energy were perceived to be key issues to address to achieve the updated targets. Resultantly, change to the system has been proposed through the Infrastructure (Wales) Act 2024.
- 3.3.4 The Infrastructure (Wales) Act 2024 overhauls how significant infrastructure projects are consented in Wales. Given Royal Assent on 3 June 2024, the Act came into effect on 15 December 2025. It introduces a unified and simplified consenting regime referred to as Infrastructure Consent (IC).
- 3.3.5 An IC will consolidate several separate approval regimes such as planning permission, highways and traffic consents, and environmental permitting into a single consent. So, whereas a developer building an offshore wind farm previously needed to apply separately for planning permission under the Town and Country Planning Act, a marine licence for offshore components, and possibly an environmental

¹⁸ [Wales-Target-Advice-Full-Dataset.xlsx](#) – see Summary Data Sheet Figure D

permit, under the new system, these can all be authorised through one IC.

- 3.3.6 This is achieved by legally replacing or integrating these regimes into a unified framework, with Welsh Ministers overseeing the process, supported by clear procedures for application, examination, and decision-making. The result is anticipated to be a more efficient, transparent, and predictable pathway for delivering major infrastructure projects in Wales. For energy, this new process will apply to generation plants (wind farms, solar farms, biomass plants etc), and overhead electricity schemes if they meet defined thresholds. The process will align the Welsh consenting regime for large projects with that which exists in England, allowing for knowledge share and efficiencies.

3.4 Electricity Generation

- 3.4.1 The figures for Welsh electricity generation are identified in Figure 3.1.

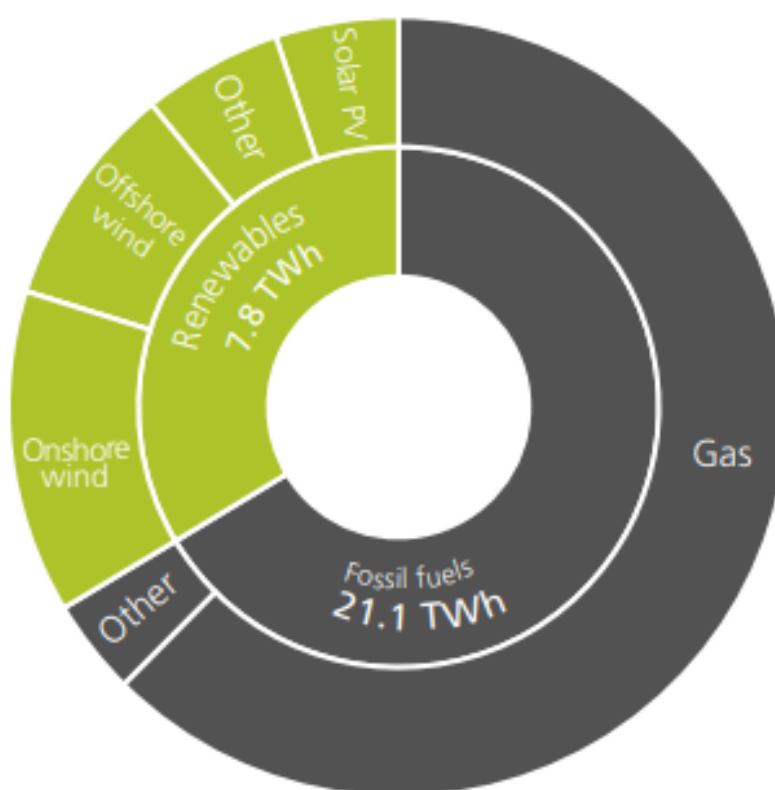


Figure 3-1: Electricity Generation in Wales 2023. Source: Energy Generation in Wales 2023 (2025)

Fossil Fuels

- 3.4.2 As of 2023, fossil fuels remained the primary source of electricity generation, accounting for over 70% of the mix. This primarily comes from natural gas, which remains an important part of the energy mix. There are large gas-fired power stations at Pembroke (which is the second largest in Europe), and Connah's Quay. The majority of electricity produced by gas comes from these power stations. Diesel makes up most of the remainder of generation from fossil fuels and is used to fuel short-term operating reserve and backup generators. As recently as 2016, coal accounted for 14% of Welsh energy generation,¹⁹ however, this has now been completely phased out following the closure of Aberthaw Power Station in 2020.

Renewable Energy

- 3.4.3 Renewables made up the remainder of energy generation in Wales. Figure 3.2 displays the growth in deployment of onshore and offshore wind and solar between 2008 and 2024. Collectively, these three provide the most renewable energy in Wales. Notably solar has increased in capacity very significantly in recent years and in 2023/24 overtook wind.

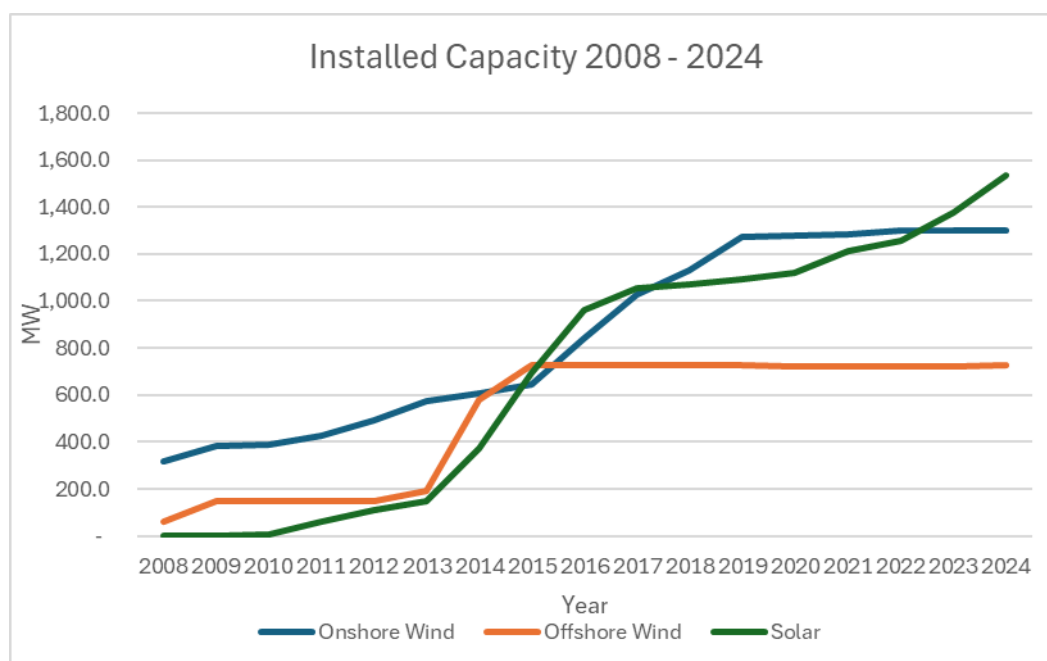


Figure 3-2 – Installed capacity for onshore wind, offshore wind and solar. Source: BEIS Regional Renewable Statistics (2025)²⁰

¹⁹ [energy-generation-2016-report.pdf](#)

²⁰ [Regional Renewable Statistics - GOV.UK](#) – See Regional Statistics 2003-2024: Installed Capacity Spreadsheet

Offshore wind

- 3.4.4 In 2023, offshore wind provided 28% of Wales's renewable electricity, with a total capacity of 726 MW. This remains unchanged since the Gwynt y Môr wind farm began operating in 2015 off the coast of north Wales. Given the scale of renewable energy deployment required to meet targets, the continuation of this status quo, with no offshore wind deployed in 10 years, is concerning. The reasons for this curtailing of deployment are complex. Key factors are understood to be limited onshore grid capacity, a lack of new Crown Estate leasing rounds until recently, regulatory complexity, and a market focus on more commercially attractive regions like the North Sea. Notably, the North Sea has been more attractive to developers due to its larger scale opportunities, well-established supply chains, existing port infrastructure, and a mature offshore wind industry that reduces costs and project risks.
- 3.4.5 Several projects are in development, such as the 576 MW Awel y Môr extension (awaiting final investment decision), and the 1.5 GW Mona project, which received development consent in June 2025. The Crown Estate's fifth leasing round intends to add 4.5 GW in the Celtic Sea, by launching commercial floating wind in southwest Wales, potentially creating 10,000 jobs. In addition, investment in port infrastructure, especially at Port Talbot and Milford Haven, part of the newly designated Celtic Freeport, will be critical for assembling and deploying these technologies, supported by government and private funding to drive economic growth and supply chain development in Wales. As seen with the recent preference for development in the North Sea, a developed onshore supply chain is important to facilitating offshore development.
- 3.4.6 Therefore, there is now a pipeline of offshore wind projects that are coming forward and strategic onshore hubs associated with these are emerging. However, recent deployment has not been sufficient to meet targets, and further role out requires further investment.

Onshore wind

- 3.4.7 In 2023 and 2024, Wales saw no new major onshore wind sites commissioned, marking five years of declining deployment. 2024 was the first year since 2000 without any new capacity added. Similar to offshore wind, this is not sufficient to meet current targets. This is a stark difference to the rapid deployment that took place in the early 2010s, and the drop is explained by the ending of UK Government funding under the Renewables Obligation Scheme in March 2017. Several projects are currently in planning or development stages, including new turbines and wind farm extensions. Garn Fach, Twyn Hywel and Alwen Forest Wind Farms were approved in 2024 and 2025 and will provide an additional 237.4MW once operational. A strong pipeline of projects exists, and it will be important to ensure these projects are delivered.
- 3.4.8 Many of Wales' earliest wind farms, installed during the 1990s and early 2000s, are approaching the end of their operational lifespans, with approximately 600MW potentially requiring repowering by 2035.²¹ This means a growing number of wind farms now require decisions about decommissioning, repowering, or replacement. Repowering these sites with newer, more efficient turbines can significantly increase generation capacity without increasing land take, helping Wales progress towards its 100% renewable electricity target. However, challenges exist including obtaining planning consent for larger turbines, securing land access for upgrades, and managing the transport and recycling of old components.

²¹ [Welsh Energy Targets Review: Graphing Outputs](#)

Solar

- 3.4.9 As displayed in Figure 3.2, solar is the renewable energy with the greatest installed capacity in Wales, overtaking onshore wind in 2022. However, solar does not generate as much energy as wind due to a lower capacity factor, as solar panels can only generate electricity during daylight hours and are more affected by weather and seasonal variation, whereas wind turbines can operate day and night.
- 3.4.10 In 2023, Wales installed 108 MW of new solar PV capacity more than double the previous year, with very small-scale projects (<10 kW) making up about 64% of this growth. Over 15,300 new solar PV projects were commissioned, the highest annual figure since 2011, bringing the total capacity to 1.3 GW across more than 86,000 installations and this rose to over 1.5GW in 2024. This sustained growth, driven by factors such as rising energy prices, government incentives, increased consumer confidence, and falling installation costs, was highlighted by the commissioning of major projects such as the 49.99 MW Porth Wen Solar Farm and 8.99MW Bryngolwg Solar Farm. Most capacity is concentrated in southern Wales, particularly in the Cardiff Capital Region and Swansea Bay City Regions, with Pembrokeshire leading among local authorities, providing 209 MW. Larger schemes are coming forward in northern Wales however, with the 160MW Alaw Mon Solar Farm scheme approved on Anglesey in August 2025 providing enough capacity to power the equivalent of all homes on the Island.²² Therefore, solar deployment at a micro and macro scale is accelerating, which aligns with wider trends. Concerns over land use conflicts exist which may limit a continuation of this trend, namely environmental protection and food security. However, it is not the case that these uses must be mutually exclusive, particularly in the case of land used for livestock farming and with biodiversity net benefits being a requirement for sites.

A Net Zero System Based on Wind and Solar

- 3.4.11 Solar, and offshore and onshore wind produce the majority of Welsh renewable energy. Based on current levels of renewable generation supply, if Wales were to scale up the generating capacity of these three technologies to deliver the 21.66 TWh of renewable energy annually required for a net-zero electricity system, while maintaining these proportions, based on reasonable UK capacity factors²³ (and not accounting for battery storage or hydrogen technology), it would require approximately 3.8 GW of onshore wind, 2.1 GW of offshore wind, and 4.5 GW of solar PV. This highlights that reaching a 21.66 TWh target would necessitate a substantial expansion of generation capacity across all technologies, when compared to current deployment (this point is illustrative, and it is appreciated that this is unlikely to be the future energy mix; future pathways are modelled elsewhere).

Hydropower

- 3.4.12 In 2023, Wales commissioned one new hydropower project, a small scale 0.1 MW community-owned scheme in northern Wales, bringing the country's total hydropower capacity to 170 MW across 380 sites, generating approximately 332 GWh annually. Most capacity comes from six large-scale projects (10–41 MW each) commissioned between 1924 and 1989, sited predominantly in northern and central Wales. Since 2000, only one new megawatt-scale project has been built, in Carmarthenshire. The Feed-in-Tariff, introduced in 2010 but now closed to new applications, spurred hundreds of small-scale installations totalling 18 MW.

²² [Home | Alaw Mon Solar Farm](#)

²³ 27% for onshore wind, 45% for offshore wind, and 10% for solar PV

- 3.4.13 Gwynedd and Ceredigion host the most hydropower capacity, benefiting from natural resources in Eryri National Park and the Cambrian Mountains. Electric Mountain (Dinorwig Power Station) acts as a crucial pumped-storage facility in Wales, with an installed capacity of 1,728 MW, providing rapid-response electricity to balance the grid, support renewable energy integration, and ensure energy security during peak demand or emergencies.

Other Renewable Technologies

- 3.4.14 There are a range of emerging technologies that are beginning to form a part of the energy mix. In 2023, tidal had less than 10 MW of capacity, limited to early-stage and demonstration projects, and therefore represented only a minimal share of the renewable mix. Geothermal energy was not yet a significant contributor but remains under consideration for future development.
- 3.4.15 Wales has previously developed schemes to take advantage of its tidal range, namely the Severn Estuary Barrage (8,600 MW), cancelled in 2010 and the Swansea Bay Lagoon (320 MW), which was cancelled in 2018. These projects were both cancelled due to cost concerns by the UK Government, and environmental issues, highlighting the challenges of developing large-scale tidal energy. Following setbacks on these schemes, the Western Gateway instructed a Commission to investigate the potential of tidal energy in the Severn Estuary in 2024. The outcomes of this work, published in March 2025, set out recommendations that should be implemented to realise the potential of tidal energy in the Severn Estuary and throughout the UK.²⁴ Tidal lagoons can also provide co-benefits for nature and flood management by creating new habitats for wildlife and acting as natural barriers that help protect coastal areas from flooding and erosion.

Community Ownership

- 3.4.16 Wales originally set a target of 1GW of community ownership of renewables projects by 2030. In 2023, this was amended to 1.5GW by 2035. Performance toward the original target has been strong, with 900MW of community owned renewables having been delivered in 2023, with twice as many schemes coming forward in 2023 compared to 2022.²⁵ At this point, Wales was estimated to have over 89,500 locally owned projects. To support community owned energy, the Welsh Government's Ynni Cymru programme has been established to support projects that deliver community owned schemes. In autumn 2024, it launched a £10 million grant fund to help organisations develop smart local energy systems in Wales, with projects to be completed by March 2025. Whilst progress is strong, issues around the complexity of establishing community ownership schemes exist and there is considered to be a lack of agency at the community level to engage. Therefore, there is a need for greater support deliver more community owned schemes and reach the 2035 target. Opportunities for large scale projects to deliver shared ownership and local benefits should be encouraged.

Renewables Summary

- 3.4.17 The scene, in terms of deployment and existing project pipeline is mixed, with some technologies such as solar performing better than others. Onshore and offshore wind provide the backbone of Welsh renewable energy supply, but the deployment of new schemes has stalled and this needs to be addressed to meet the 2035 target. Feedback from sector experts identified that renewable energy deployment in Wales faces a complex set of challenges, underpinned by ambiguous and sometimes conflicting planning policies causing delays and uncertainty, particularly when balancing energy targets against biodiversity and agricultural priorities. Grid and infrastructure limitations, as discussed

²⁴ [Severn-Estuary-Commission-Report-1.pdf](#)

²⁵ See 12.

below, further constrain progress as export capacity is limited in areas with the greatest potential for renewable energy deployment. Physical transport bottlenecks, and technical barriers such as radar and aviation constraints also hinder new developments. Community renewable energy initiatives struggle due to inconsistent support, unclear ownership models, and regulatory inflexibility.

- 3.4.18 Supply chain gaps and limited support for SMEs restrict local economic participation. These issues were becoming increasingly evident amongst participants, as smaller Welsh businesses lack the proactive support and access needed to participate fully in renewables projects. There is also concern that economic benefits from renewable developments are not sufficiently devolved or retained within Wales, prompting calls for greater local control over assets such as the Crown Estate.
- 3.4.19 As many existing renewable energy assets in Wales approach the end of their operational lives, challenges exist in relation to repowering these sites. Repowering provides strong opportunities to increase generation capacity through updated technology, including larger towers and longer rotors. New challenges emerge around repowering these sites and integrating circular economy principles to minimise waste and maximise resource efficiency, and Welsh businesses need to become involved in these processes. At the same time, periods of energy curtailment when renewable generation exceeds grid capacity or demand underscore the urgent need for smarter grid infrastructure and advanced energy storage solutions, ensuring that Wales can fully harness its renewable potential and support a resilient, low-carbon energy system.
- 3.4.20 Together, these issues are considered to have contributed to a slower pace of renewable project delivery in Wales, underpinned by making it less attractive for investment compared to other UK regions and underlining the need for policy alignment, capacity building, and strategic long-term vision.

Nuclear

- 3.4.21 There are not currently any nuclear power stations generating electricity in Wales. There are two historic sites, one at Wylfa on Anglesey and another at Trawsfynydd in the Eryri National Park. Wylfa entered decommissioning after its final shutdown in 2015 and Trawsfynydd has been in advanced decommissioning since 1991.
- 3.4.22 In November 2025, the UK government announced that it had selected the Wylfa site on Anglesey as the location for the country's first Small Modular Reactors (SMRs). This initiative marks a significant investment in next-generation nuclear technology, aiming to provide reliable, low-carbon electricity and create thousands of skilled jobs, supporting both regional economic growth and the UK's net zero ambitions. Already, this has been followed by the announcement of an AI Growth Zone being located in northern Wales, seeking to take advantage of the power generated in the SMRs.²⁶ These plans position Wales at the forefront of the UK's nuclear industry, with the potential to become a hub for advanced nuclear innovation and skills development, linked to SMRs.
- 3.4.23 The lack of devolved powers over nuclear development, means the Welsh Government has limited governance or decision-making authority regarding plans for nuclear and developments at Wylfa specifically. This raises the possibility that decisions may be made by the UK Government without adequately reflecting Welsh priorities. Previous commitments to new nuclear projects at Wylfa have failed to materialise, most notably, the suspension of the Horizon Nuclear Power project in 2020 after

²⁶ [AI Growth Zones to create thousands of jobs and unlock up to £100 billion in investment, as new site confirmed for North Wales - GOV.UK](#)

Hitachi withdrew, following years of planning and anticipation. Such experiences have undermined public confidence, highlighting the risks of top-down commitments that are not delivered and reinforcing calls for greater Welsh control and accountability in future nuclear proposals.

Wales as an Energy Exporter

- 3.4.24 Wales produces more electricity than it consumes, and in 2023 generated 23.2 TWh whilst consuming 14.8 TWh. This meant that 8.4 TWh was exported, or 23.2%. This is primarily used elsewhere in the UK as energy generated in Wales feeds into the wider UK transmission system owned and operated by National Grid Electricity Transmission (NGET). However, these exports are not underpinned by strong renewable energy generation, as it has been established in Table 3.1 that the majority of energy generated in Wales is from fossil fuels. No natural gas is sourced from Wales and therefore, these export figures are underpinned by foreign imports. The implications of this as Wales begins to consume more electricity from its own resources as it progresses toward net-zero will have to be considered, for example in terms of impact on economy, nature and wellbeing.

Preparing Wales for a Renewable Energy 2050

- 3.4.25 In October 2023 NICW published 'Preparing Wales for a Renewable Energy 2050',²⁷ which sets out the areas that require focus in order for Wales to meet its future electricity needs through renewable energy. The report highlights that Wales has significant natural resources and technical potential, but achieving a net zero energy system by 2050 will require urgent action to address barriers such as grid capacity, planning, investment, and skills.
- 3.4.26 Key pieces of work feeding into the report include a technical assessment of Wales's renewable generation potential, scenario analysis on potential energy system pathways, consultation with industry stakeholders, and public engagement exercises to gather views from communities across Wales. This holistic evidence base underpins the Report's call for stronger leadership, urgent grid, planning and governance reforms, and coordinated action to ensure benefits are maximised for Welsh communities. The recommendations intend to accelerate the deployment of renewable electricity across Wales.

²⁷ [Preparing Wales for a Renewable Energy 2050 – report – The National Infrastructure Commission for Wales](#)

3.5 Energy Network

Regional Energy Strategic Plans (RESPs)

- 3.5.1 RESPs, coordinated by NESO, are being produced to create a whole-system, regionally tailored strategic plan that integrates electricity, gas and hydrogen networks. The RESP for Wales is not anticipated to be available until 2027 at the earliest.
- 3.5.2 Through viewing these networks holistically, RESPs aim to enable local net zero ambitions and growth priorities to be directly reflected in infrastructure investment decisions, improving coordination, reducing inefficiencies, and providing greater confidence for timely network development ahead of demand. By aligning local, regional, and national planning, RESPs will help accelerate the transition to a cost-effective, low-carbon energy system.
- 3.5.3 In January 2026, NESO published a transitional Regional Energy Strategic Plan (tRESP), which is a bridging document ahead of the full Wales RESP. The tRESP provides an interim, high-level framework to guide regional whole-system planning. It sets consistent planning assumptions, maps plausible energy pathways, highlights strategic investment needs and provides a common evidence base for network operators and planners.

Electricity Network

- 3.5.4 Electricity transmission in Wales is managed by NGET. This transmission system forms the backbone of the electricity grid, carrying large volumes of power from generation sites, such as power stations and renewable energy sources mentioned above, to regional distribution networks. The network primarily operates at 400 kV and 275 kV voltage levels, with some 132 kV lines in certain areas, enabling efficient long-distance transmission of electricity. Figure 3.3. displays the electricity transmission system in Wales.
- 3.5.5 The transmission network in Wales is geographically divided between the north and south, with no fully integrated Welsh-only grid but rather parts of the wider UK grid crossing into Wales. There are two transmission areas in Wales, one in the north and one in the south. In northern Wales, a 400 kV line runs from the former Wylfa nuclear power station site on Anglesey to Pentir near Bangor, then splits towards Connah's Quay and Wrexham, linking into the wider UK grid. Southern Wales' electricity transmission network is primarily made up of 275 kV overhead lines running east to west across the region, connecting major power stations and substations. The southern transmission area is more expansive, with a denser network and greater coverage to serve its larger population and industrial demand.
- 3.5.6 While the transmission network covers most of Wales, some very remote and rural areas, especially in central Wales, have limited direct transmission infrastructure and rely on distribution networks fed from more distant transmission points. This creates challenges for reliable supply, network resilience, and future grid upgrades in these areas. Importantly this also makes it harder to support local renewable generation and meet growing energy needs and is therefore a key barrier to projects. The inability to meet growing energy needs hampers potential development opportunities. Developing transmission infrastructure in remote and rural Welsh areas is challenging due to difficult terrain, strict environmental regulations, community concerns, and high costs relative to low population density.

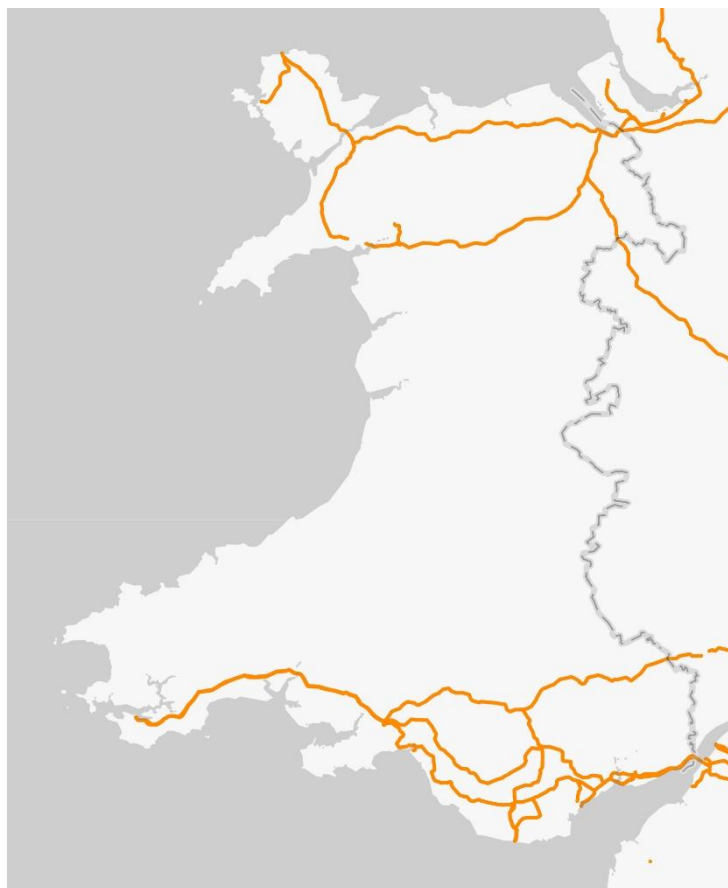


Figure 3-3: Electricity Transmission System in Wales Source: National Grid

- 3.5.7 Currently NGET is in the process of ‘The Great Grid Upgrade’, an initiative to overhaul the electricity grid and provide connections to more affordable sources of home-grown and renewable energy. The existing transmission system was largely built in the 1960s and was designed to connect and distribute electricity mainly generated centrally in coal-fired power stations to homes. The Great Grid Upgrade aims to repurpose the transmission network to connect to more decentralised clean, renewable sources of energy. There are several key projects associated with this in Wales, including the Pentir to Trawsfynydd Reinforcement Project. This Project involves reinforcing and refurbishing the existing high-voltage transmission network in northern Wales, including the installation and replacement of underground cables and equipment at both Pentir and Trawsfynydd substations.
- 3.5.8 In January 2025 NGET published plans as part of the Great Grid Upgrade for a north to south circuit link²⁸ to connect the distribution systems in northern and southern Wales. This aims to enhance renewable energy transmission by connecting Scotland to Wales through a high-capacity electricity interconnector. The project, known as Western Green Link, is identified as coming forward beyond their current investment plan period, which ends in 2031. However, the Energy Systems Catapult have identified that this route is important for achieving the UK wide 50GW of offshore wind capacity target, and in 2023 advised that efforts were being made to expedite the development of this link.²⁹ The delivery of this project is part of a longer-term strategic vision to support the integration of increasing renewable generation and growing electricity demand across Wales.
- 3.5.9 The ability to retain electricity generated in Wales is limited by the composition of the National Grid

²⁸ [download](#) – See PSNC Project (Page 21)

²⁹ [Future Energy Grids for Wales: Insights report](#)

and linkages to England. As displayed in Figure 3.3, the Welsh transmission network is restricted to southern Wales and a small area of northern Wales, and these feed into the wider UK network. Current proposals for grid improvements focus on exporting wind energy from rural mid-Wales via IDNO-led connections and on strengthening north–south transfer capacity through the National Grid Western Green Link Project. These schemes are designed to enable export and regional transfer rather than to integrate or “island” the Welsh grid as a self-contained system.

Electricity Distribution

- 3.5.10 Electricity distribution in Wales is primarily managed by two main Distribution Network Operators (DNOs): SP Energy Networks and National Grid Electricity Distribution (NGED). SP Energy Networks covers northern Wales while NGED operates in central and southern Wales. Together, these operators ensure that electricity transported by the transmission system is transformed and distributed to customers across Wales.
- 3.5.11 The electricity distribution network distributes electricity throughout Wales. Despite this extensive coverage, some very remote and sparsely populated rural areas, particularly in central and western Wales, may experience limited network reach or lower reliability due to challenging terrain and lower population density.
- 3.5.12 The network infrastructure includes a mix of overhead lines and underground cables. Overhead lines are common in rural and less densely populated areas due to lower installation and maintenance costs, while underground cables are more prevalent in urban and suburban areas to reduce visual impact and improve reliability. The overhead lines vary in voltage levels, typically including low voltage (230V), medium voltage (11kV to 33kV), and high voltage (up to 132kV) circuits, which step down electricity from transmission voltages to levels suitable for homes and businesses.
- 3.5.13 The development of new overhead line infrastructure is important for achieving electrification targets and harnessing renewable energy potential. Also, it will improve network capacity within rural areas allowing for new development to come forward. However, development of these schemes is controversial and has faced significant opposition.
- 3.5.14 Independent Distribution Network Operator (IDNO)s are seeking to develop overhead line routes throughout central Wales. The purpose of their schemes is to provide linkages to the transmission network, which will allow for the export of energy from wind farms coming forward in central Wales and their investment has potential to expand networks and deliver innovative solutions. However, it must be ensured that this work aligns with strategic network planning processes. Coordination is needed to ensure investment aligns with overall strategy and the tRESP and eventual RESP will assist to ensure projects do not progress in isolation.
- 3.5.15 A challenge for IDNOs and DNOs exists in land acquisition and access rights, as they have fewer statutory powers than incumbent utilities to enter land for surveys or secure easements for new network infrastructure. This can lead to delays, increased costs, and difficulties in progressing essential grid upgrades, particularly where landowner consent is required but not forthcoming.
- 3.5.16 Significant barriers also persist for DNOs in relation to smaller upgrades to existing assets, and a lack of statutory powers relating to land access and complex consenting processes cause delay. Equivalent rights of access for DNOs and IDNOs to other utility technologies would assist in addressing these issues. Additionally, expanding permitted development rights to cover a broader range of electricity apparatus, such as allowing upgrades from single-phase to three-phase lines

would streamline infrastructure enhancements and support more agile network development.

- 3.5.17 Currently, Welsh planning policy is seemingly more stringent for new overhead electricity lines when compared to elsewhere in the UK, and this would impact new transmission and distribution routes. Specifically, PPW sets out a preference for undergrounding in the first instance. However, there is evidence indicating that undergrounding is significantly more expensive than overhead lines.³⁰ This policy context is causing complexity and delay for both Grid and renewables projects as it results in a bottleneck prohibiting them connecting. This is at a time when grid upgrades are required to meet current targets, Wales is in competition for investment with other countries, including the remainder of the UK., and budgets for investment are tight.
- 3.5.18 Stakeholder feedback suggests that across Wales local authorities are under resourced to engage with projects of this scale and, in some cases lack the skills and experience to deal with Developments of National Significant (soon to be Infrastructure Consents) or Nationally Significant Infrastructure Projects. Capacity issues are viewed as material risk, causing delay and uncertainty, and resolving these should be a priority.

Gas Network

Gas Transmission

- 3.5.19 The Welsh gas transmission system is part of the UK National Transmission System (NTS), operated by National Gas Transmission. It includes high-pressure pipelines that transport gas from entry points to regional distribution networks and industrial users. The most significant route is the South Wales Gas Pipeline, which runs 197 miles (317 km) from the Milford Haven LNG terminals (South Hook and Dragon) in Pembrokeshire to Tirley in Gloucestershire, where it connects to the wider UK network. This pipeline was completed in 2007 and is the UK's largest high-pressure gas pipeline, capable of carrying about 20% of UK gas demand. The gas transmission network in northern Wales does not have a single long trunk line like southern Wales; instead, it consists of short high-pressure spur pipelines that connect from the National Transmission System in north west England into industrial areas in Deeside and Wrexham. These routes span roughly 30–50 km feeding local distribution networks and major industrial sites.³¹
- 3.5.20 Milford Haven is a critical hub for UK gas supply, with South Hook and Dragon LNG terminals providing regasification capacity equivalent to around 20–25% of total UK gas demand, and they typically handle the majority (70–80%) of UK liquified natural gas imports.^{32,33} Historically, southern Wales was supplied from England, but the flow has now reversed, making Wales a key entry point for imported gas.
- 3.5.21 The overall UK transmission network comprises approximately 8,000km of pipeline, but Wales' share is concentrated in these strategic corridors and is limited to approximately 350km. There are challenges associated with this limited transmission network, as it relies heavily on Milford Haven and has limited system redundancy compared to other parts of the UK. This focus on a single corridor limits alternative routing options, increasing the risk that any maintenance, fault, or capacity constraint

³⁰ [A comparison of electricity transmission technologies: Costs and characteristics](#)

³¹ [Network route maps | National Gas](#)

³² [DUKES_2025_Chapter_4.pdf](#)

³³ [Digest of UK Energy Statistics \(DUKES\): natural gas - GOV.UK](#) – See Dukes Spreadsheet 4.6.

could cause significant supply interruptions, while also restricting the flexibility needed to integrate new hydrogen sources and accommodate future network upgrades efficiently. Limited pipeline capacity hinders the timely expansion and adaptation of hydrogen networks because it restricts the volume of hydrogen that can be transported. Without sufficient capacity, hydrogen projects face delays in securing grid connections and scaling up, slowing industrial decarbonisation efforts and limiting the ability to meet future demand efficiently.

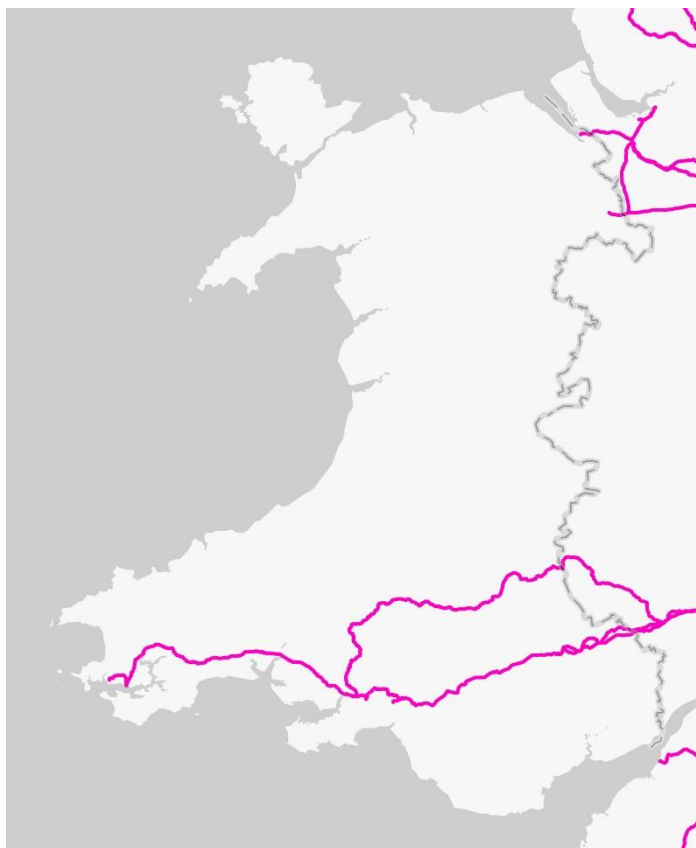


Figure 3-4: Gas Transmission System in Wales

- 3.5.22 Geographic constraints also make adding new routes costly. However, as the UK reduces reliance on natural gas in favour of electrification and low-carbon alternatives, these risks may gradually diminish depending on the extent to which hydrogen becomes a realistic alternative. Notwithstanding this, the risks remain significant during the transition period.

Gas Distribution

- 3.5.23 Gas distribution in Wales is managed by Wales & West Utilities (WWU), one of the UK's eight Gas Distribution Networks. WWU operates throughout all of Wales and the southwest of England. Its role is to transport gas from the National Transmission System to homes, businesses, and industrial sites via medium and low-pressure pipelines.
- 3.5.24 WWU's network contains more than 35,000km of pipeline.³⁴ In Wales, it is divided into two Local Distribution Zones; Wales North and Wales South. These manage the flow of gas from the transmission system into local networks, providing delivery to customers in their region. Coverage is strongest in coastal and valley regions, including Cardiff, Swansea, Newport, Wrexham, and northern

³⁴ [About Wales & West Utilities | Wales & West Utilities](#)

Wales coastal towns. The network includes strategic intermediate-pressure mains that act as local backbones, linking major urban centres and industrial clusters to the gas network. These routes are most critical in densely populated and industrial areas, where they ensure supply continuity and resilience.

- 3.5.25 Large parts of central Wales and rural western Wales lack mains gas access due to low population density and challenging terrain. In 2020, 19% of homes in Wales were not connected to the gas grid and this rises dramatically to 55% in Powys and 74% in Ceredigion.³⁵ These areas rely on alternatives like liquified petroleum gas (LPG), heating oil, or electricity for heating. These sources are usually more expensive than gas and are subject to greater price volatility, especially where they are not covered by the Ofgem price cap in the case of oil and LPG. This contributes to greater fuel poverty in rural areas. Another challenge is the reliance on road-delivered fuels exposes communities to supply disruptions.

District Heat Networks

- 3.5.26 As established, energy policy is a complex matter in terms of Welsh Government and UK Government responsibilities. Many of the key funding mechanisms and regulatory levers for heat network infrastructure remain controlled by the UK Government. This split creates a complex landscape for project delivery and support. UK wide heat networks are expected to provide 18-20% of total heat demand. However, this is likely to be lower proportion of heat demand in Wales due to more dispersed settlement patterns.
- 3.5.27 For funding, Wales can access early-stage feasibility and development support through the UK Government's Heat Networks Delivery Unit (HNDU). However, when it comes to capital funding for construction and large-scale deployment, Wales is at a disadvantage. The Green Heat Network Fund (GHNF), which replaced the earlier Heat Networks Investment Project (HNIP), is currently only available for projects in England. As a result, Welsh local authorities and developers must rely on limited Welsh Government support, small-scale innovation funds, or private investment to progress projects beyond the feasibility stage. There is currently no dedicated, ring-fenced capital fund for heat networks in Wales, and previous access to European funding has ended with Brexit. In comparison Scotland is also further ahead with supporting the development of heat networks through funding such as the Scottish Heat Network Fund. Local Authorities are also required to develop Local Heat and Energy Efficiency Strategies where there is some funding to support their development.
- 3.5.28 Policy levers such as planning and zoning also differ from England. In England, new zoning powers are being introduced that will allow local authorities to require connections to heat networks in designated areas, helping create sufficient demand for viable schemes. In Wales, such powers do not yet exist, making it harder to secure anchor loads and guarantee customer connections, a key factor in the commercial viability of heat networks.
- 3.5.29 Future Wales: The National Plan 2040 provides a supportive planning policy framework for the development of heat networks as part of Wales's broader decarbonisation and place-making agenda. The plan explicitly encourages the exploration of heat network feasibility in Wales' most urban areas, identifying these as Priority Areas for District Heat Networks.
- 3.5.30 In 2025 the Cardiff Heat Network, Wales' first large-scale low-carbon district heating scheme, began operating, supplying heat to a range of buildings in Cardiff Bay including the Senedd, Wales

³⁵ [How are cost of living pressures affecting rural communities?](#)

Millennium Centre, Cardiff and Vale College, the Butetown Hub, Scott Harbour flats, and several Council buildings. Developed by Cardiff Council with UK and Welsh Government support, the network uses waste heat captured from the Viridor Energy Recovery Facility, which burns non-recyclable waste to generate electricity and surplus steam. This steam is now used to provide heating and hot water through a newly built energy centre and a network of insulated pipes. The scheme is estimated to save more than 10,000 tonnes of CO₂ annually, which is the equivalent to the emissions from heating 3,700 homes. With the system now operational, further connections and a potential second phase of expansion into the city centre are being explored.³⁶ A key risk for this scheme is the risk of missing once-in-a-lifetime opportunities for connection to major new or existing (which are renewing their heating systems) buildings, as the lack of statutory zoning powers in Wales means there is no national mechanism to require new buildings to connect to a network.

- 3.5.31 The absence of zoning makes it harder to guarantee sufficient demand for heat network projects in Wales and secure the critical mass of connections needed for DHNs to be commercially viable, potentially undermining their long-term success and expansion. Despite the delivery of Phase 1 of the Cardiff Heat Network, progress elsewhere in Wales has been less successful. Progress on feasibility has been made in Swansea, Bridgend and Newport, but has subsequently stalled. This indicates that Cardiff may be the exemption to the rule and capital funding for projects after feasibility has been established has been identified as a primary blocker to progress. The development of Heat Networks in Wales has relied on a patchwork of funding sources, with support drawn from both the Welsh and UK Governments, as well as previous European funding streams, rather than a dedicated, ring-fenced capital fund specifically for DHNs in Wales. This fragmented approach has created uncertainty and complexity for project delivery, with Local Authorities and developers often having to piece together multiple small-scale grants, innovation funds, and private investment to progress schemes beyond the feasibility stage.

Hydrogen Networks

- 3.5.32 Hydrogen grid development in Wales is at an early stage, with growing momentum towards establishing a dedicated hydrogen transmission and distribution network to support decarbonisation and energy security. The Welsh Government published its Hydrogen Pathway and Action Plan in 2021,³⁷ setting out a strategic framework to guide the transition to a hydrogen economy. This includes plans for both blue hydrogen (produced from natural gas with carbon capture) and green hydrogen (produced from renewable electricity), with a focus on integrating hydrogen into existing gas networks and developing new pipelines where needed. Key projects such as HyNet North West (HyNet) and initiatives being progressed by the South Wales Industrial Cluster (SWIC) are central to this effort, aiming to connect major production sites with areas of high demand, such as industrial clusters and transport hubs. The development is supported by a mix of public and private investment, with ongoing feasibility studies and planning for large-scale hydrogen pipelines and distribution networks across Wales.
- 3.5.33 HyNet is the most advanced scheme in Wales in developing hydrogen transmission and distribution infrastructure. HyNet is a large-scale, integrated project spanning northwest England and crossing into northeastern Wales. It focuses on blue hydrogen production combined with carbon capture, utilisation, and storage (CCUS). It benefits from substantial government backing, including part of the UK's £21.7 billion Track-1 cluster funding allocated over 25 years, and is moving into construction phases.

³⁶ [Low-carbon district heat network in Cardiff nears completion](#)

³⁷ [hydrogen-in-wales-consultation.pdf](#)

- 3.5.34 In contrast, the SWIC's hydrogen plans are still in earlier development stages, focusing on decarbonising heavy industry through hydrogen and CCUS but with less advanced infrastructure and funding commitments compared to HyNet. SWIC aims to build on Welsh Government support and collaboration with industry to develop hydrogen production and distribution.
- 3.5.35 HyLine Cymru is a strategic project led by Wales & West Utilities, aiming to develop a dedicated hydrogen transmission pipeline in southern Wales. The initiative would connect future hydrogen production sites, most notably Milford Haven, Port Talbot, and the Cardiff/Newport industrial area, with key demand centres, supporting the region's transition to low-carbon energy. HyLine Cymru explores the feasibility of repurposing existing natural gas infrastructure as well as building new hydrogen pipelines, with the goal of integrating hydrogen into Wales' energy system and enabling large-scale decarbonisation of industry, power, and transport. The project is supported by government funding through the Ofgem Net Zero Strategic Innovation Fund and is positioned as a critical step for Wales in establishing a hydrogen-ready network aligned with national net zero objectives. By providing a dedicated hydrogen transmission pipeline linking key production sites with major industrial demand centres, HyLine Cymru may enable the SWIC to access scalable, low-carbon hydrogen supplies more quickly and efficiently.
- 3.5.36 Despite growing momentum and several high-profile projects, stakeholder feedback highlights significant challenges facing the deployment of hydrogen in Wales. These included a lack of clear national strategy around hydrogen's long-term role in the energy mix, slow and complex planning and consenting processes, and grid and pipeline constraints that limit the ability to connect new production sites to industrial demand. Policy and regulatory uncertainty, particularly around funding mechanisms, network access, and the integration of hydrogen into existing infrastructure further complicates investment and project delivery. In addition, skills shortages, insufficient support for Welsh SMEs to participate in the hydrogen supply chain, and the absence of robust community engagement and benefit-sharing frameworks risk undermining public trust and slowing the pace of transition, while the lack of devolved powers leaves Wales reliant on UK-level decisions that may not reflect Welsh priorities or timelines.

3.6 Energy Demand

3.6.1 Figure 3.5 provides a detailed breakdown of Wales' energy consumption in 2021.

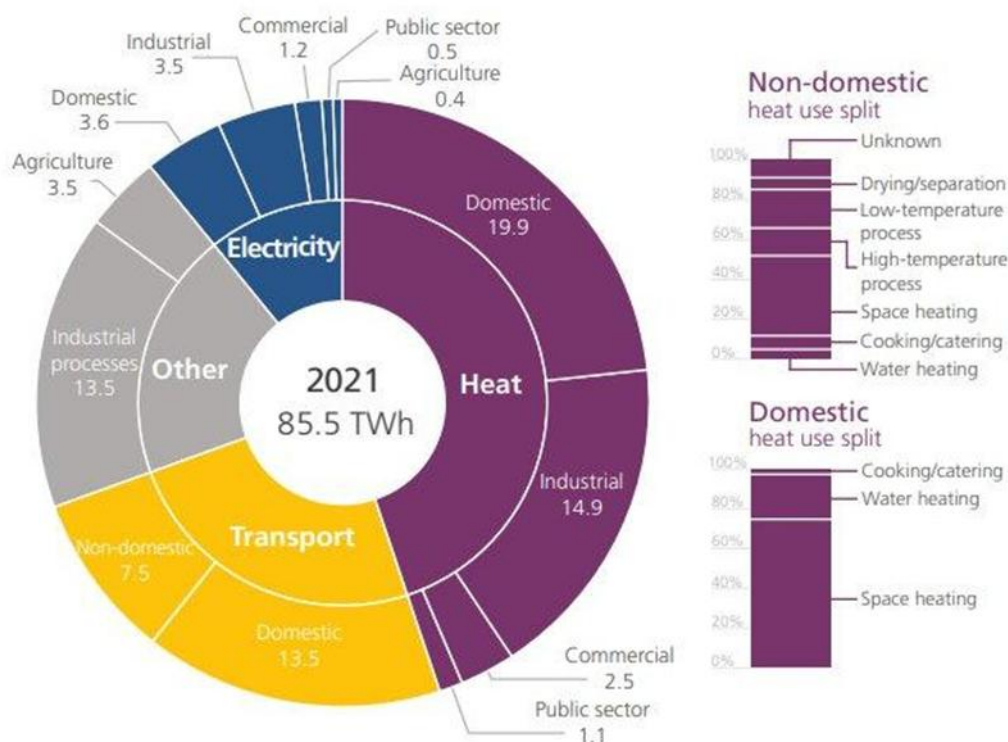


Figure 3-5: Annual Energy Consumption in Wales Broken Down by Use (2021) (TWh)³⁸

3.6.2 Figure 3.5 illustrates Wales' annual energy consumption in 2021, totalling 85.5 TWh across three main sectors with heat as the dominant sector, accounting for 44.9% (38.4 TWh) of total energy use. This significantly exceeds the shares of transport (31%, 26.7 TWh) and electricity (16%, 13.6 TWh). The breakdown highlights that heat is used extensively in both domestic (19.0 TWh) and non-domestic sectors, with industrial (14.9 TWh) and public sector (2.1 TWh) contributing notably.

Heat

3.6.3 Existing data relating to heat is primarily available as a usage figure, as derived from the Energy Use in Wales Third Edition, with only data on renewable heat generation available as a generation figure in the Energy Generation in Wales 2023 Report.

3.6.4 As set out in Figure 3.5, heat is the where the greatest energy is consumed in Wales by a significant margin. Figure 3.5 breaks down heat consumption into domestic and non-domestic. In the domestic breakdown, space heating makes up the vast majority of energy consumption, whereas in non-domestic sectors, process heating, and water heating are also significant. The scale of space heating as a consumer of heat energy suggests a critical area for energy efficiency improvements in Wales.

³⁸ See 12

- 3.6.5 Whilst planning policy recognises the energy hierarchy, current Building Regulations do not reflect its intention to enforce energy hierarchy principles, resulting in inefficient buildings and missed opportunities to minimise heat demand. This has resulted in some Local Planning Authorities, such as Monmouthshire County Council proposing standalone approaches to requiring net-zero buildings, as set out in their forthcoming Replacement Local Development Plan.³⁹ This approach, whilst delivering buildings that will inherently require less energy usage, may create a patchwork mix of requirements across Wales depending on the County, which could increase uncertainty and harm housing delivery. However, it also allows areas with higher land values to leverage those in demanding higher standards.
- 3.6.6 Evolving these policies holistically to systematically require such standards in all new and retrofit developments will be essential for long-term energy efficiency. Energy efficiency is at the top of the energy hierarchy and should be prioritised across all policy and investment decisions. By reducing demand for heat through fabric-first approaches, enhanced building standards, and targeted retrofit programmes, Wales can address multiple interlinked challenges. Improved energy efficiency directly reduces household energy bills, making a significant impact on fuel poverty and supporting greater social equality. Furthermore, the foundational economy, including local construction and manufacturing sectors, stands to benefit from the increased demand for skilled workers to deliver energy efficiency upgrades at scale. Investment in workforce training and green skills development will not only accelerate Wales' progress towards net zero heat but also create inclusive employment opportunities and strengthen economic resilience in communities across the country.
- 3.6.7 From August to November 2025, updates to Part L Building Regulations in Wales were consulted on.⁴⁰ These updates sought to introduce stricter energy efficiency and carbon reduction requirements for new buildings, including enhanced insulation, airtightness, and high-performance glazing. The proposed changes seek to require the transition from gas boilers to low-carbon heating systems such as heat pumps and district heat networks, aiming to reduce carbon emissions from new homes by 75–80% compared to previous standards. The regulations also require post-construction testing to verify airtightness and energy performance, ensuring buildings deliver real-world heat savings and lower energy use. These changes, particularly in respect of energy demand reduction, go some way to overcoming issues with the existing approach, however, they still need to be adopted and cannot fall out of the final approved document.
- 3.6.8 The Heat Strategy for Wales sets out the vision for net-zero heat in Wales by 2050. Published in 2024, this includes total heat consumption data from 2021. As of 2021, total heat energy use was around 51.9TWh, with the vast majority over 90% still derived from fossil fuels, particularly natural gas. Industrial users are the largest contributors to heat-related emissions, followed by domestic heating. The Strategy identifies heat decarbonisation as Wales' greatest challenge in achieving its legally binding net zero target by 2050, with interim targets of a 63% reduction by 2030 and 89% by 2040.
- 3.6.9 The new Ofgem heat network regulation introduces a statutory framework across Great Britain, including Wales, to protect consumers in the currently unregulated sector. This regulation, stemming from the Energy Act 2023, appoints Ofgem as the economic regulator, granting it powers to enforce fair pricing protections, set minimum service standards, and establish reliable supply requirements.

³⁹ [Draft RLDLP Document 2024](#) – See Policy NZ1 – Monmouthshire Net Zero Carbon Homes

⁴⁰ [Building Regulations Part L: 2025 review](#) | [GOV.WALES](#)

Cooling

- 3.6.10 As Wales faces rising temperatures due to climate change, electricity demand for air conditioning (historically low due to the mild climate) is expected to increase sharply. Analysis suggests that in a high emissions scenario the demand for cooling in buildings could quadruple by 2050 compared to current levels.⁴¹ Very hot weather is already causing significant peaks in electricity demand elsewhere, with a 14% peak noted during a heatwave across Europe in summer 2025. For Wales, this means significant potential future pressure on the electricity grid from cooling and highlights the need for investment in energy-efficient cooling and grid resilience to manage these emerging challenges sustainably.

Renewable Heat Generation

- 3.6.11 In 2023, Wales added 67 MW of new renewable heat capacity, the highest annual increase since 2017, when 72 MW was installed.⁴² This brought the total renewable heat capacity to 869 MW, generating an estimated 2.7 TWh of heat. However, this figure represents only a small share of total heat demand in Wales. Therefore, decarbonising heat remains one of the most significant challenges in the Welsh energy system.
- 3.6.12 ASHPs will underpin the shift to renewable heat as the Grid electrifies. This will shift the proportion of sector usage from heat to electric by 2050. The Welsh Government has set an ambitious target of installing 580,000 ASHPs by 2035 as part of its strategy to decarbonise heat. As of the end of 2023, Wales had installed over 22,000 ASHPs, with a record 6,876 units added in that year alone, which is nearly double the number installed in 2022.⁴³ While this growth is promising, the total in 2023 still represents less than 4% of the 2035 target, highlighting the need for a significant acceleration in deployment. The government is addressing this through initiatives to expand the installer workforce, improve public awareness, and support innovation in ASHP technology and integration with energy efficiency measures. However, affordability remains an issue with ASHPs currently an expensive solution for many homeowners.

Fuel Poverty

- 3.6.13 The Welsh Government's Fuel Poverty Modelled Estimates for Wales: Headline Results October 2024⁴⁴ highlights the ongoing challenge of fuel poverty across the nation. Fuel poverty is defined as a household needing to spend more than 10% of its income to maintain a satisfactory heating regime, with severe fuel poverty set at over 20% and 'at risk' households falling between 8–10%. As of October 2024, an estimated 340,000 households (25%) in Wales were living in fuel poverty, with 63,000 (5%) in severe fuel poverty and 215,000 (16%) at risk. Vulnerable households, which are those with older adults, children, single young adults, or members living with long-term illness or disability, are particularly affected, with 304,000 (26%) experiencing fuel poverty.
- 3.6.14 Large parts of central Wales and rural western Wales face additional challenges where limited access to mains gas and reliance on more expensive, volatile heating fuels such as LPG, heating oil, or electricity further contribute to disproportionately high rates of fuel poverty and increase vulnerability to supply disruptions.

⁴¹ [Cooling-Systems-260225-slides.pdf](#)

⁴² See 12

⁴³ See 12

⁴⁴ [Fuel poverty modelled estimates for Wales \(headline results\): as at October 2024 \[HTML\] | GOV.WALES](#)

- 3.6.15 These figures underscore the serious impact of energy affordability on the wellbeing of Welsh communities, especially among those most susceptible to health and financial challenges. Addressing fuel poverty requires targeted interventions such as improving home energy efficiency, supporting low-income and vulnerable families, and ensuring access to affordable, reliable energy. Tackling these issues is essential for reducing inequality, enhancing living standards, and supporting broader sustainability objectives in Wales.
- 3.6.16 The Welsh Housing Quality Standard (WHQS) plays a crucial role in addressing fuel poverty in Wales by ensuring social housing is energy efficient, well insulated, and equipped with affordable heating systems. By requiring all social housing to meet higher energy performance standards, such as achieving at least an EPC rating of C by 2030, the WHQS helps reduce the energy needed to heat homes, directly lowering fuel costs for tenants and improving affordability. This is particularly important given that social housing tenants face greater risks due to income constraints. The WHQS's focus on energy efficiency and affordable warmth is therefore a key anti-poverty measure, improving tenant wellbeing by reducing the financial burden of heating homes and helping to lift households out of fuel poverty.

Electrification

- 3.6.17 As Wales accelerates its decarbonisation agenda, electricity demand is set to rise sharply, driven by new technologies and existing processes becoming electrified for example:
- The rapid adoption of electric vehicles.
 - The expansion of data centres to support the digital economy.
 - The transition to low-carbon heating in the home and for industries, underpinned by the adoption of ASHPs.
 - The development of electrolysis for the production of green hydrogen; and
 - Electrification of industrial processes, such as electric arc furnaces.
- 3.6.18 Currently, Wales has an electricity demand of approximately 14.8 TWh. If Wales is to reach net-zero by 2050, as identified above, the Climate Change Committee anticipate that this electricity demand will increase to 21.66 TWh in 2035 and to over 33 TWh by 2050, as shown in Figure 3.6. The balanced pathway represents a comprehensive route to net zero by 2050, combining widespread electrification, energy efficiency, expansion of renewables, and deployment of low-carbon technologies across all sectors to ensure emissions reductions are achieved in a cost-effective and manageable way. However, it is not known if this includes the implications of a widespread development of data centres, which consume significant amounts of electricity.
- 3.6.19 There are a range of challenges and opportunities associated with these increased demand levels, largely linked to the barriers to deploying renewable energy and grid infrastructure identified throughout this Report.

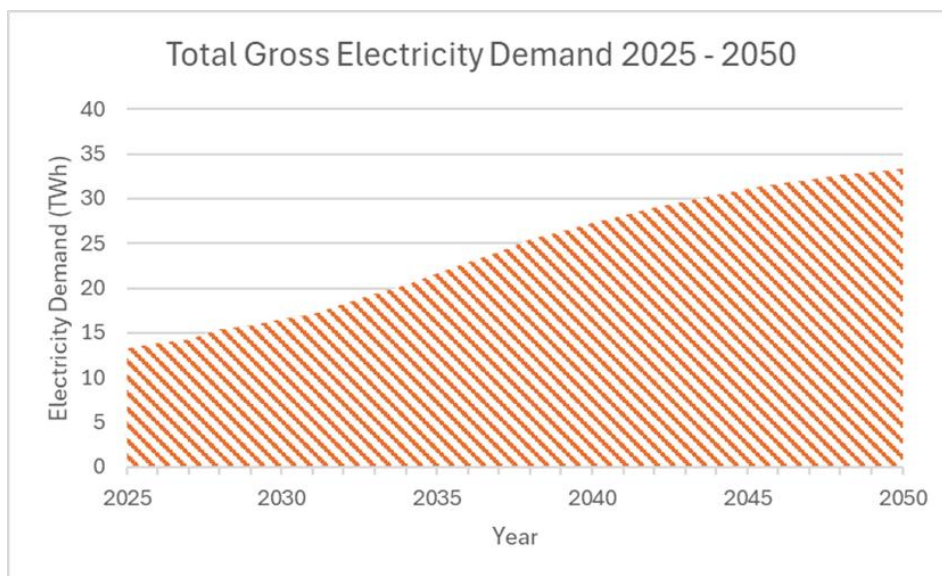


Figure 3-6 – Anticipated Electricity (TWh) in the Climate Change Committee Balanced Net Zero Pathway in Wales⁴⁵

⁴⁵ [Wales-Target-Advice-Full-Dataset.xlsx](#)

4 Future Vision

4.1.1 The following statements highlight suggested key long-term future aspirations for the energy sector in particular, reflecting the findings of this NICW research and the input of stakeholders as part of this study.

4.1.2 The vision for Energy in Wales is for a **transition to a decarbonised electricity and heat generation whilst increasing the proportion of locally owned renewable capacity and maintaining energy resilience and security**. Generation should be supported by the delivery of suitable electricity transmission and distribution network and, where appropriate, heat networks. Increases in electricity demand due to decarbonisation should be tempered by improvements in home, business and industry efficiency. Energy should be affordable to minimise fuel poverty and support business and industrial growth in Wales. This vision includes the following:

- A more **joined up approach** to energy policy. One that is integrated across wider Welsh policies including infrastructure and development planning, industrial strategy, funding, training and skills to support clean growth that is increasingly locally owned with benefits reaching across all communities in Wales.
- An integrated infrastructure **strategy to support the implementation of renewable generation technologies**, CCS infrastructure and energy carriers such as hydrogen with port development, an updated planning regime and clear investment strategy
- Implementation of policies and regulations that **supports renewable energy investment** to Wales making it an attractive place for investment, encouraging investment locally, and building confidence in long-term delivery in Wales.
- Ensuring that mechanisms are in place that that will drive the development of **locally owned renewable generation** and develop support where market failures and preventing this growth
- Supporting and facilitating a **balanced generation** with suitable energy storage and security to ensure a resilient supply
- Engage and inform the work of NESO and other electricity transmission and distribution operators **plan for renewable generation** locations and sources to achieve 100% renewable generation targets by 2035
- Development of the **heat strategy for Wales**, which delivers energy reduction initiatives and supports the implementation of heat networks, the accelerated growth of the installation of ASHPs and targets for the removal of fossil fuels for heating
- **Affordable energy pricing** to support wider need to address fuel poverty
- Wales to be a leader in growth of suitable **skills and jobs** and providing world class training and a clear destination for investors in renewable energy
- **Long-term planning and policies** to provide protection of climate and carbon reduction policies and investments from changing political priorities and enable investment in longer term proposals such as nuclear and tidal.

5 Future Challenges – Short Term

- 5.1.1 This section considers the likely challenges and risks across the industry in the next 10-15 years including meeting energy and carbon targets and ambitions by 2035.

5.2 Integrated policy and strategy

- 5.2.1 A key challenge in the short term is that **energy policy in Wales needs to be further integrated** within other policy and strategy areas. Energy policy drives and is linked to a range of other policy areas and strategic outcomes for Wales such as industrial and economic development, fuel poverty and health goals alongside infrastructure and development planning/consenting. There are also a number of policy areas that are governed by UK regulations and therefore the Welsh Government does not have full autonomy and control. Feedback in the development of this report has highlighted that energy policy in Wales is not sufficiently joined up with UK policy and with wider Welsh policy areas and as such policies may be contradictory or not aligned to meet the wider strategic priorities and renewable energy and carbon targets.
- 5.2.2 A further challenge is the **skills capacity available to the Welsh Government and Local Government** to help develop and implement policy. Experienced public sector staff are being recruited into the private sector, which also finds a challenge to recruit in this sector, by improved wages and opportunities, which exasperates the already limited capacity for policy development across Wales. This lack of capacity and constant attrition of individual knowledge delays policy development and limits the ability for strategic and joined up policy making.
- 5.2.3 To deliver on strategic outcomes and targets, areas such as **energy policy need to be consistent, coherent and cohesive** with other policy areas. For example: to drive and attract industrial and economic development there is a need for improve electricity grid capacity, support grid decarbonisation and enable lower energy prices. It is also important to ensure alignment with nature and biodiversity policies, so that energy infrastructure development supports habitat restoration, nature recovery, and contributes to wider environmental objectives. However, currently this is contradicted by the policy drive for energy intensive sectors like new data centres that will add the grid capacity constraints and significantly increase energy demand. Clarity is needed on how these decisions will be integrated with renewable energy and net zero commitments.
- 5.2.4 Delivering on these challenges will require a **joined-up strategy across Wales**, accounting for UK policy elements as well as agencies such as NESO alongside the private sector to strategically drive and prioritise investment and development in Wales. Although a number of policy areas are governed by the UK Government, a cohesive strategy is still needed from the Welsh Government that takes accounts of these interfaces whilst setting a national prioritised strategy that takes account of generation, distribution and demand in order to meet energy and carbon targets and to support wider economic and social goals.
- 5.2.5 A strategic plan would inform funding and investment priorities in the short-term. This requires **enhanced visibility and integration with economic and industrial strategy** and clear messaging to industry where Wales will support. It is critical to provide a clear approach to support the prioritisation of resources and funding for investment such as decarbonisation of existing industry, investment in new low-carbon technologies, and supporting enabling infrastructure such as ports to align with energy generation and distribution.

- 5.2.6 One area where there could be short term action is for the Welsh Government to support **the publication, integration and implementation of Local Area Energy Plans (LAEPs)**. These collaborative energy roadmaps have been developed for each Welsh Local Authority to guide their transition to a net-zero energy system. These Plans provide a technical roadmap that can be built-on and delivered across Wales. Whilst the responsibility sits with each Local Authority to publish and set out next steps for these plans, the Welsh Government should push for these to be published and help drive the next steps across Local Authorities and identify strategic national implications where the Welsh Government can support.
- 5.2.7 Building on the LAEPs, the Welsh Government could provide further direction and obligations on local authorities from Wales. Although funding and resources are limited at the local level, providing consistent and clear obligations that are aligned with national strategies would be welcomed. This could involve a similar approach as to develop Local Heat and Energy Efficiency Strategies as is required for Scottish local authorities.
- 5.2.8 Further investment is needed to **build resources for policy making** in Wales to help with Welsh Government energy policy development, local policy development, UK policy and integration across the wider policy landscape. Measures should be looked at to retain staff who are looking to move the private sector.

5.3 Power Generation, Distribution and Demand

- 5.3.1 Wales has committed to renewable targets by 2035, and over this period electricity demand is predicted to at least double due to the electrification of heat and transport. **Wales is not currently on track to meet its 2030 target of generating 70% of its electricity from renewables and its 2035 target of 100%.**
- 5.3.2 A challenge for Wales will be to support the growth of the renewable technology sector, especially for emerging technologies such as tidal power, floating offshore wind and hydrogen and an energy vector to maximise the benefit of low-carbon generation.
- 5.3.3 Short term challenges identified in Preparing Wales for Renewable Energy 2050 report (and supported by feedback during the development of the study) relate to grid infrastructure and the impact on capacity of the grid which lead to long timescales for connections. It is now typical for energy developers to face a four to five year wait for a grid connection. There are also challenges around the practical implications for developers on queuing connection reforms from NESO.
- 5.3.4 A challenge in Wales is that the planning and consenting system is seen to be acting as a barrier to energy developments and detracting investment. A recent reduction in renewable energy schemes being consented has been identified as a major contributor to Wales not being on track to meet renewable targets.
- 5.3.5 The planning system is currently creating uncertainty for energy developers, including renewable developers and those promoting enabling transmission and distribution infrastructure. Energy developers are facing challenges in gaining planning permissions for projects of all scales including those being consented by local authorities, the Welsh Government and UK Government. The challenges that are and will continue to be faced by energy developers in the planning process include:

- The rising cost of preparing and applying for an application for consent
- Welsh policy not being as clear or supportive of renewable schemes as policy for other parts of the UK
- Planning for the designation of newly protected areas such as new National Parks
- Difficulties getting sufficient land access for pre-application surveys
- Resources available to the local authorities and other statutory bodies such as NRW to engage with and provide advice to large energy projects, particularly in the pre-application stages. Current lack of engagement is missing an opportunity to positively shape projects and delivery local benefits.

5.3.6 *Preparing Wales for Renewable Energy 2050* provided two near-term recommendations to support planning and consenting

- Recommendation 6 “By 2025, where renewable energy planning applications (and associated regulatory regimes) have a mandated, statutory time allocation, decisions should default to a positive if the time allocation elapses with no response (‘positive silence approach’)”.
- Recommendation 7 “By 2025, a pooled planning resource for energy should be created, to share expertise and technical skills for articulating planning policies, engaging with the public and considering planning applications”.

5.3.7 These reforms haven’t been implemented. However, they are much needed. In addition, it is recommended that to improve the planning and consenting process, The Welsh Government needs to publish an **energy planning framework** aligning all guidance in one place, setting clear priorities indicating what takes precedent and setting out how it interacts with UK planning guidance. This should provide practical guidance on how to positively and efficiently delivery energy schemes and draw on good practice.

5.3.8 It is recommended that the Government adopts the positive silence approach already suggested by NICW but widened to include enabling energy infrastructure so that the supporting industry can develop to support the renewable project.

5.3.9 To promote consistency across local authorities and statutory consultees it is recommended that **further training** is provided for planners handling energy infrastructure schemes. The development of Corporate Joint Committees (CJCs) will play a role to enable technical expertise to be shared among Local Authorities but could also be involved in up-skilling of Local Authority teams. Increasing funding to local authorities and statutory consultees will also be beneficial to help increase resource and help with easing consenting backlog

5.3.10 The Welsh Government also needs to ensure it engages and drives the work being undertaken by NESO to support a **strategy for the future electricity grid**. The Government needs to feed into both NESO’s strategic Spatial Energy Plan (SSEP) which is a three-year plan mapping the optimal locations for generation, storage, and transmission infrastructure, and RESPs. Welsh policy needs to drive these activities and be consistent with their emerging and final outcomes.

5.3.11 The Welsh Government needs to provide clear strategic guidance on grid transmission and distribution infrastructure until NESO reports back towards the end of 2027. Without this guidance, the risk exists of a policy vacuum and DNO and IDNOs will make decisions that will impact on the future viability and community reputation of renewable energy projects in Wales.

- 5.3.12 In the short term, NESO queuing and connection reforms need clarity to support connections to the grid where developers have uncertainty. The Welsh Government can help drive this in Wales and support NESO on developing clear guidance.

5.4 Heat Generation, Distribution and Demand

- 5.4.1 Heat for homes, businesses and industry is the dominant sector in Wales, with over 50% of the energy demand. The generation of low-carbon heat is still relatively low in Wales. Therefore, the generation and delivery of decarbonised heat whilst improving efficiency and reducing demand in homes, business and industry is a key short-term challenge for the Welsh Government.
- 5.4.2 As heat policy is intertwined with electricity generation and demand, there is a challenge to join up these policy areas to address identified challenges to deliver renewable power generation.
- 5.4.3 The distribution of heat through heat networks is a key challenge that requires policy and funding clarification to support investor confidence and grow the market. The Welsh Government considers heat networks to be a reliable and efficient provider of low-carbon heat in suitable areas across Wales. However, Wales is falling behind the rest of the UK in policy and regulation development and funding schemes in this area.
- 5.4.4 With Ofgem becoming the regulator of heat networks from January 2026 there is a challenge to support existing heat network operators and suppliers, especially in the public sector to meet the future technical standards and requirements.
- 5.4.5 Wales has provided good support, such as the Warm Homes Nest Scheme, to help improve the efficiency of existing homes and minimise energy demand. However significant further investment is required across both public and private sectors to drive change in this sector. Reducing demand is important to help meet carbon targets but will also address challenge associated with fuel poverty.
- 5.4.6 In the short to medium term, prioritising energy efficiency will help Wales accelerate decarbonisation, tackle fuel poverty, and support more equitable energy outcomes. Expanding efficiency initiatives can create local jobs and drive skills development, especially in retrofit and energy management. Coordinated investment and collaboration with industry will be key to ensuring all communities benefit from the transition to net zero heat.
- 5.4.7 There are challenges around skills, resources and funding to meet Welsh Government ambition to install 580,00 ASHPs by 2035. This technology is key to the decarbonisation of heat, especially in the domestic sector. The challenge of electrification of heat will be that it could increase the cost of heat compared to current gas or off-grid fuels, even with improved efficiencies with ASHPs.
- 5.4.8 New build planning policy is not sufficiently robust in Wales to drive energy efficient homes, drive heat decarbonisation and maximise the introduction of renewable generation technologies combined with battery storage. Wales is falling behind other UK regions, such as in England, which is due to introduce the Future Homes Standard to drive these efficiency standards.
- 5.4.9 The Welsh Government needs to **develop a heat networks strategy that sets out a clear position and intention on heat networks to provide signals and support from industry**. Stakeholders highlighted that Wales offers the same opportunities and challenges for heat networks as other areas across the UK, what is different is policy development and funding support. Policy clarity is needed on heat networks

in Wales, such as whether Wales intends to introduce heat zoning like in England and how Wales supports the feasibility, development and funding of new and existing heat networks. This needs to be aligned with whether funding can be allocated from Welsh resources.

- 5.4.10 Support should be provided by the Welsh Government, for operators and suppliers of heat, especially in the public sector, to meet the technical requirements that will be required to meet as part of Ofgem becoming the Regulator in this sector from January 2026. Investment and support will be needed over the short term to bring inefficient systems up to required quality criteria (when these are finalised).
- 5.4.11 The Welsh Government needs to provide further **support to increase the update and installation of ASHP in homes and businesses**. Further initiatives are needed to expand the installer workforce, improve public awareness, and support innovation in ASHP technology and integration with energy efficiency measures. Until ASHPs are deployed on mass, heat will continue to comprise a significant proportion of energy use in Wales.
- 5.4.12 **Planning policy and Building Regulations in Wales need to be refreshed** to drive the highest standards of energy efficiency and embed the energy hierarchy for all new and retrofit developments to minimise energy demand, mitigate energy price fluctuations and support the introduction of low-carbon heating technologies and on-site renewable generation. These policies should seek to follow the ambitious net-zero policies emerging in England, where possible. This should be undertaken in conjunction with local industry to help bring forward new building approaches and skills in the market. An opportunity exists here to create a workforce that is highly skilled in constructing energy efficient buildings.
- 5.4.13 The Welsh Government need to **actively address the issue of potential increased energy costs** with electrification of heat, the potential impact on fuel poverty and business competition and the impact on energy intensive industry. Lobbying the UK Government for market reform is important. As raised in the Heat Strategy for Wales a key change involves decoupling electricity pricing from gas markets, thereby ensuring that customer tariffs are determined by the true cost of generating electricity.

5.5 End Users, Community Ownership, and Education

- 5.5.1 Wales has seen a worsening public perception of renewable energy infrastructure. There is a challenge to **improve engagement and to educate the public** about the implications of climate change, and the benefits of renewable energy including community benefit schemes and shared ownership opportunities. Greater emphasis should also be placed on the benefits of a clean energy system which are not often highlighted, such as long-term price stability from reduced exposure to volatile oil and gas markets, improved energy security and reduced energy costs. Displaying these benefits may help people better understand the advantages of supporting renewable energy development in their local area.
- 5.5.2 Wales has set a challenging short-term target of 1.5 GW by 2035 of locally owned renewable energy capacity by 2035. An initial target of 1 GW by 2030 has already been achieved,⁴⁶ so the learning from this achievement should be replicated and upscaled to ensure that more community owned energy schemes come forward and that the 2035 target is achieved. An issue highlighted by stakeholders surrounding community ownership of energy is also the absence of a clear definition of what community ownership is as a process at a UK level. This lack of definition hinders separation of truly

⁴⁶ **Make our communities the new power hubs, says Future Generations Commissioner, as he urges Wales to double ambition for community energy - Future Generations Wales**

community owned schemes from the wider market, which means it is harder to target support specifically at these projects. The Welsh Government should lobby for a UK. wide definition of community energy.

- 5.5.3 Wales needs to develop further public stakeholder engagement training on the benefits of renewable infrastructure development to improve public acceptance. To minimise Government investment this could be done in conjunction with renewable developers as part of their planning and consenting obligations. This needs to accompany awareness raising of tangible community benefits such as lower energy prices, improved community infrastructure, and other forms of community benefits, such as ringfencing funding for community energy schemes. These community benefits only come forward as a result of investment and development of renewable energy infrastructure.
- 5.5.4 The Government should celebrate and publicise the success of domestic renewable energy programmes such as Solar Together that has installed nearly 1MW of rooftop solar in southeastern Wales.
- 5.5.5 The UK Government recently dropped proposals for geographic zoning of wholesale electricity pricing. Under these proposals different regional zones would have a different wholesale electricity price, determined by the local balance of supply and demand and the ease of transmission into and out of that zone. In reality, areas with a surplus of cheap electricity (often from renewable technologies) where there are transmission constraints, would see lower prices and areas of high demand and limited local generation, high prices. This could have been a key incentive to attract energy intensive business and support wider community benefits in Wales. The Welsh Government should determine how they can attract business to develop in Wales and lobby for lower industrial energy prices to assist with this, to reflect Wales's status as an energy exporter.
- 5.5.6 A clear plan is needed to increase Welsh investment in renewable technologies and infrastructure and mechanisms for local ownership. There is not a clear strategy on how the local ownership targets will be achieved and without Government intervention these are likely to be missed.
- 5.5.7 Welsh Government should **look at success of public owned schemes** such as the heat network Cardiff Heat Network Ltd, which owns the heat network in Cardiff, and is a wholly owned subsidiary of Cardiff City Council (CCC). By owning the network, the Council is able to have an element of control over the network and the customers it serves to ensure the benefits are provided to the community. Projects such as this should be used as templates across Wales with training and support provided to interested local authorities or organisations like Health Boards. Where new major public sector projects are proposed, which could act as heat anchors, they should always consider the potential for the development of a heat network and assess the availability of nearby heat producers.

5.6 Market Skills and Supply Chain

- 5.6.1 A challenge faced by Wales and the wider UK is to **ensure that sufficient skills exist to support the needs of a low-carbon transition**. This includes skills across the industry including for the development of renewable technologies, low-carbon building construction, ASHP installers and enabling technologies. Availability of a skilled work force including contracts has been outlined as a key challenge for Wales and potential reason for workers being brought in from outside the country. There is a pipeline of grid and generation projects in place in Wales and these should be encouraged to deliver skills and apprenticeship programmes.

- 5.6.2 Wales published Net Zero Skills Action Plan in 2023 that sets out 36 actions across seven priority areas. The action plan was set for delivery over three years which will shortly be coming to end. A review of progress and success of this Plan should be undertaken and support the development of a longer-term plan to ensure sufficient skill base in Wales to meet the challenges in the next 10-15 years.
- 5.6.3 The update of the Net Zero Skills Plan should include a comprehensive review of skills, identify supply chains needed across the industry in Wales in the short to long-term, identify key strengths and gaps and update technology (such as hydrogen, floating offshore, tidal and SMR requirements) and sector specific plans to ensure the industry is fully supported in the short to long-term and can maximise the potential opportunities.
- 5.6.4 Support should be provided to local businesses and supply chains to feed large low-carbon infrastructure projects to ensure the economic benefits of the growing industry are share across Welsh businesses and communities.

6 Future Challenges – Medium to Long-term

- 6.1.1 In the medium to long-term there are a number of additional challenges to overcome in order for Wales to become an attractive location for renewable energy investment to maximise the potential of the natural resources on and offshore and ensuring the benefits from decarbonisation are distributed through to Welsh industry, business and communities.
- 6.1.2 In the medium to long-term the electricity grid should be almost fully decarbonised, and Wales should be seen as a global leader in traditional renewable generation technologies as well as tidal, floating offshore wind and SMRs.
- 6.1.3 As outlined above, electricity demand is set to increase significantly. The Welsh Government will work with NESO and the power sector to drive the investment in the grid to support additional renewable generation. An improvement of consenting process will help alleviate grid capacity issues and provide a more attractive location for renewable energy investment.
- 6.1.4 A decarbonised power generation system will increasingly be decentralised, with more installations located close to or within communities. Challenges to gain public acceptance and support will exist, however, this proximity increases opportunities for community ownership. In the long-term new and re-powered wind and solar farms could significantly uplift their proportion of community ownership. As knowledge and capacity is built through achieving the 1.5GW of community owned power, this can act as a catalyst for this becoming a key element of the Welsh renewable energy generation.
- 6.1.5 Wales will have developed a clear heat decarbonisation strategy, with an approach to delivering heat networks where appropriate and decarbonisation of homes whilst reducing fuel poverty.
- 6.1.6 The future should see both new and existing domestic and commercial properties with significantly reduced energy demand, decarbonised heating and additional on-site renewable energy generation and storage technologies. This would allow buildings to operate as power stations.
- 6.1.7 Assuming the above changes and improvements take place, the key risks and challenges identified for Wales in the medium to long-term are outlined below.

6.2 Social Licence for Energy Infrastructures

- 6.2.1 The social and political consensus on renewables and climate change, built up over decades, is at risk of collapsing. This consensus has facilitated policy coming forward that promotes net zero, combatting climate change and delivering energy infrastructure (particularly renewables). However, as with many forms of development, this has been challenged locally when proposals come forward, particularly for wind farms. The need for a broad consensus on the need for achieving net zero and deploying renewable energy as a result has been apparent.⁴⁷
- 6.2.2 Increasingly, renewable energy projects are being questioned in principle, due to an apparent growth in public scepticism and backlash against the pace and impacts of the energy transition. This questioning is underpinned by declining trust in governments and corporations, the spread of

⁴⁷ Appreciating that specific policy, for example onshore wind in England, has not always had a positive policy context.

misinformation, and concerns over human rights and environmental impacts, all of which challenge the legitimacy and acceptance of renewable energy developments.

- 6.2.3 Influential actors including politicians, media outlets, and industry-linked commentators play a significant role in shaping and amplifying climate scepticism. Through coordinated messaging and platforms, they often question the costs, feasibility, and impacts of renewable energy and net-zero policies, which contributes to public doubt and undermines broad support for the energy transition.
- 6.2.4 If these issues are not proactively addressed, they threaten to stall the deployment of critical infrastructure needed to meet the Wales' climate commitments. The erosion of consensus could undermine investor confidence and complicate policy implementation, especially if it influences political decision making. This is likely the greatest threat to achieving the scale and speed of renewable energy expansion required, as this challenges the very principle of the energy transition.
- 6.2.5 Maintaining and strengthening support for renewables requires not only genuine, inclusive community engagement and equitable sharing of benefits but also delivering tangible local economic advantages. When energy is produced locally, meaningful returns and ownership opportunities should follow, fostering a stronger sense of partnership and shared prosperity. Opportunities to ensure that industrial and commercial energy users near renewable energy production sites benefit from lower energy prices, which can attract jobs and investment to the area, should also be explored. This approach helps counter misinformation by demonstrating clear, direct benefits to the community, thereby enhancing acceptance and support for renewable energy developments.

6.3 Climate Change

- 6.3.1 The impacts of climate change will be felt more strongly with hotter summers and warmer, wetter winters alongside increased risk of storms and adverse weather events. Climate related events may impact renewable generation. Already, winter storms are damaging solar farms as was seen at the Porth Wen solar farm in December 2024. Hotter summers could lead to increased cooling demand and further pressure on the electricity grid.
- 6.3.2 **Welsh climate adaptation and resilience policy and strategy will need to be integrated** with future climate related impacts on the power sector.

6.4 Investing in Zero Carbon Growth

- 6.4.1 Planning and consenting challenges will continue into the medium to long-term. The planning and consenting regime will need to respond quickly to emerging opportunities and technologies in energy generation. For example, Wales holds significant **tidal energy** consents, representing a significant growth opportunity if lessons learnt, skills and intellectual property can be captured. Work needs to take place over this time period to consent and deliver schemes that take advantage of this natural phenomenon that Wales benefits from.
- 6.4.2 Planning and consenting challenges are likely to be exacerbated by the fact that a large proportion of existing energy infrastructure will reach the end of its life and will need to circle back through the planning process. Potentially, there could be a number of concurrent applications as renewable installations reach the **end of their asset lives** at the same time. The planning system will need to be prepared for an influx of applications associated with this.

- 6.4.3 A large increase in **energy storage technologies** and potentially **hydrogen production** will be required to support intermittent renewable generation. Welsh energy policy should prepare for these future challenges and make sure that the phasing out of gas-fired power plants does not create resilience risk for meeting energy demand.
- 6.4.4 There is a risk that future Welsh Government short term policy objectives may cause issues for future repowering applications. Welsh Government could consider developing a policy for ensuring applications to repower existing generating stations are fast tracked and **secure from political short termism**, to ensure that Wales remains on track to meet its climate objectives. This could include the potential lowering of thresholds or different mechanism for refreshing and/ or re-powering renewable energy planning applications.
- 6.4.5 In the medium to long-term the **opportunities associated with the Welsh tidal range, particularly in the Severn Estuary, should be realised**. This is a globally unique natural resource that could provide significant reliable renewable energy and position Wales at the forefront of tidal energy.
- 6.4.6 The electricity grid and supporting infrastructure for **renewables, hydrogen production and CCS**, will continue to need investment and enforcement. The Welsh Government should ensure that investment is made available for these technologies and improvements. For example, the proposed south to north transmission grid connection from Dinorwig to Swansea North is due for development post 2031. This will be critical to exporting renewable energy to where it is used.
- 6.4.7 Assuming renewable energy generation targets are met by 2035, **decarbonisation of heat**, especially in off-grid hard to reach homes will become a policy priority in this period. Bringing in wider investment to support energy demand reduction, implementation of heat networks and widespread roll-out of ASHPs will require increasing focus and coordination.

6.5 Positioning Wales for Emerging Technologies

- 6.5.1 There is an ongoing debate about the role that emerging technologies such as nuclear, hydrogen, and CCS will play in the medium to long-term. Nuclear power represents an established, though expensive, option for low-carbon energy generation, while hydrogen, CCS and SMRs are still at an early stage of development, with significant questions remaining around their technical and economic viability.
- 6.5.2 Given this context, it is important that Wales does not become overly reliant on these industries from the offset but instead remains agile and well positioned to adopt them if and when they become commercially viable. As evidence about the benefits, feasibility, and applicability of these technologies becomes clearer, funding and policy support can be directed towards those that demonstrate real potential to deliver technical or economic advantages. In this regard, the emergence of small modular reactors and potential for these to be sited at Wylfa could put that technology ahead of hydrogen and CCS currently. If it becomes apparent that particular technologies are unsuitable or offer limited benefit, transparent, evidence-based decisions should be made to redirect resources elsewhere.
- 6.5.3 Maintaining a flexible approach, with a focus on continuous learning from progress elsewhere in the UK and internationally, will be key. This will ensure that Wales can capitalise on new opportunities as they arise, without being locked into unproven solutions at the expense of other priorities. To support transparent and evidence-based decision making, the Welsh Government should create and regularly publish a readiness tracker for nuclear, hydrogen, and CCS technologies. This tool would help

monitor technical, commercial, and policy developments, allowing stakeholders to assess progress and inform timely decisions about future investment and support.

7 Key Challenges and Next Steps

- 7.1.1 Energy is fundamental to Wales's economy, environment, and communities, underpinning daily life for homes, businesses, and industry across the nation. As the largest sector of overall energy demand, heat in particular presents both significant challenges and opportunities for decarbonisation, energy security, and affordability. The transition to cleaner, more efficient energy systems is vital for meeting Wales's climate targets, addressing fuel poverty, and supporting economic resilience. Strategic investment in renewable generation, energy efficiency, and innovative technologies will ensure Wales remains competitive, sustainable, and able to deliver positive outcomes for all.
- 7.1.2 Table 7.1 provides a summary of the most significant challenges or priority issues facing the energy sector. For each issue, it outlines pathways for Welsh Government to explore further or progress, including areas for research, policy development, and collaborative action. These pathways are designed to inform evidence-based decision-making and support the creation of a resilient, energy sector in Wales.
- 7.1.3 The issues shown in Table 7.1 were assessed using a prioritisation framework which considered:
- Cross sector benefits – this considered the extent to which tackling the issue would benefit the Water, Digital, Transport, or Circular Economy infrastructure sectors also considered by this review.
 - Relevance to NICW remit – in particular looking at whether the issue identified fits within NICW's remit to consider long-term issues, and whether NICW could be able to add value/influence.
 - Contribution to/alignment with the 7 Well Being goals.
 - Stakeholder acceptability, and whether the issue correlates well with feedback from stakeholders.
 - Deliverability, considering whether the issue is realistically deliverable.
 - Cost and benefit.
- 7.1.4 The issues which ranked the highest in this prioritisation exercise are shown as first part of Table 7.1. Whilst all the issues identified in this review are important it is recommended that Welsh Government consider acting on these top priorities.
- 7.1.5 An assessment of the priorities identified in Table 7.1 and the wider issues highlighted in this report against the NICW framework is presented in Appendix B. This shows strong alignment between the findings of this report and the remit and focus of NICW.

Table 7-1 – Priority Issues

Priority Issue	Pathway	Timeline	Headline data against which to measure progress
Top Priorities			
There is a lack of a clear integrated national policy and strategy for Wales which erodes investor confidence in renewable energy development.	– The Welsh Government should support the publication, integration and implementation of Local Area Energy Plans (LAEPs).	Short term (and medium to long-term)	Both are qualitative requirements but the number of new renewable energy schemes that are approved can be monitored.
There is an absence of consideration of circular economy and planning policy support for when existing renewable assets reach the end of their life.	– The Welsh Government should strengthen the support given in principle to the deployment of renewable energy infrastructure, including grid upgrades. – Strong support should be put in place in planning policy for the repowering of existing renewable assets, and the need to do this should be protected from political short termism – Opportunities for the reuse or repurposing of outdated assets should be explored by Welsh businesses.		Likewise, the success rate of repowering applications can be monitored.
Building regulations do not reflect policy intentions around energy and do not encourage fabric-first approaches or demand reduction, resulting in inefficient buildings and missed opportunities.	– Planning policy and Building Regulations need to be refreshed to drive the highest standards of energy efficiency and embed the energy hierarchy for all new and retrofit developments to minimise energy demand, mitigate energy price fluctuations and support the introduction of low-carbon heating technologies and on-site renewable generation. New planning policy should seek to require net-zero buildings, where evidenced as viable, in lieu of lagging Building Regulations.	Short term	Qualitative only. Success can be measured through planning and building control policy being amended to ensure new development aligns with the Energy Hierarchy.

Priority Issue	Pathway	Timeline	Headline data against which to measure progress
	– The recommendations for changes to Part L, as consulted on between August and November 2025, need to be carried forward into the finalised Part L updates.		
Shortage of key market skills and supply chain challenges leading to delays in construction of energy schemes enabling Wales to become a world leader in the low-carbon energy	– The Welsh Government should monitor the areas of action identified as part of their Net Zero Skills Action Plan.	Short term and medium to long-term	N/A the monitoring targets are set out in the pathway.
Challenges with the planning and consenting process limiting and delaying the consent for new renewable energy schemes and enabling transmission and distribution infrastructure.	– The Welsh Government should publish an energy planning framework aligning all guidance in one place, setting clear priorities indicating what takes precedent and setting out how it interacts with UK planning guidance (in the case of NSIPs). This should provide good practice guidance. – The Welsh Government should adopt the positive silence approach already recommended by NICW. This should be widened from the original recommendation to include enabling energy infrastructure in additional to renewable energy generation schemes. – The Welsh Government should promote consistency in decision making across local authorities and statutory consultees. This could be done by providing training for planners handling energy infrastructure schemes.	Short term and medium to long-term	Qualitative and linked to progress on the deployment of renewable energy.

Priority Issue	Pathway	Timeline	Headline data against which to measure progress
Other Priorities			
Lack of grid capacity limiting and delaying the introduction of new renewable energy schemes.	The Welsh Government needs to proactively engage with the work undertaken by NESO to support a strategy for future electricity grid improvements. These schemes need to be supported, and policy needs to be aligned to prioritise their delivery. This should entail in principle support in planning policy.	Short term	Once in place, delivery should be judged against the findings of the RESP.
There is a need to increase community ownership of renewable energy schemes to meet the Welsh Government's target to have 1.5 GW of renewable energy capacity locally owned by 2035. Currently, communities do not know how to engage and feel limited in their agency.	- To increase the number of community ownership of renewable energy schemes, the Welsh Government should enhance public awareness through early engagement and communication campaigns and offer practical enabling support to community schemes. - These interventions should show communities how they can become involved and the support that can be put in place. This should involve guidance on securing funding and technical assistance.	Short term	900MW of Community owned renewable energy as of 2023. Target of 1.5GW by 2035.
The means of deploying emerging technologies associated with hydrogen, CCS and tidal is not apparent, despite them being anticipated to play key roles in decarbonisation efforts. In a UK Government administered system, Wales is in competition for investment into these sectors (and all others mentioned) with the rest of the UK.	- Wales specific strategy, guidance and support are required for hydrogen, CCS and tidal in order for these projects to come online in Wales. - Consideration is needed to understand how support and funding for these types of projects can ensure projects come forward in Wales. - The recommendations made by the Severn Estuary Commission, relating to tidal energy, need to be acted upon. Where the Welsh Government does not have	Short and medium term	Performance can be monitored through delivering against the pathways. Focus needs to be on leveraging more funding.

Priority Issue	Pathway	Timeline	Headline data against which to measure progress
Wales is not taking advantage of the energy generation potential of its globally unique tidal range.	powers relating to these recommendations, they need to lobby for action on them.		
There is a need to increase the provision of affordable low-carbon heat to homes. The Welsh Government considers heat networks to be a reliable and efficient way to provide low-carbon heat in densely populated areas across Wales. However, Wales is falling behind the rest of the UK with regards to policy and funding for heat networks.	– The Welsh Government should develop a heat networks strategy that sets out a clear position and intention on heat networks. Establishing clear funding mechanisms for delivering will be essential to this and may require fair funding from the U.K Government. This should learn from experience in Cardiff and processes in place in England. – Urgent work is required to understand how the deployment of ASHPs can be expedited.	Short term	As of the end of 2023, Wales had installed over 22,000 ASHPs compared to a target of 580,000 by 2035. As of October 2024, an estimated 340,000 households (25%) in Wales were living in fuel poverty, with 63,000 (5%) in severe fuel poverty and 215,000 (16%) at risk.
The means of deploying emerging technologies associated with hydrogen, CCS and nuclear is not apparent, despite their anticipated roles in decarbonisation. There is also a need for greater transparency and evidence-based decision-making.	- The Welsh Government should create and regularly publish a readiness tracker for nuclear, hydrogen, and CCS technologies. This will provide transparency on progress, inform funding decisions, and help stakeholders assess when these options may become viable for Wales.	Short medium and long-term	Performance can be monitored through delivering against the pathway.

7.2 Cross Cutting Themes

7.2.1 A number of the issues identified in this energy sector review are relevant to the other infrastructure sectors being considered as part of this wider study. Including:

- Transport Sector – The transition to ultra-low emission vehicles (ULEVs) places significant demands on electricity generation and grid capacity. Coordinated planning between transport and energy sectors is essential to ensure infrastructure keeps pace with ULEV adoption, avoiding constraints that could slow progress.
- Digital Sector – Advances in digital connectivity will require greater electricity consumption, particularly as Data Centres become more common. There are also opportunities for aligning digital connectivity developments with grid along key utility highways and using technologies to monitor the network.
- Water Sector – Water utilities are significant energy consumers, particularly in the abstraction, treatment, and distribution of water and wastewater, while energy generation, especially hydropower, is dependent on water resources. Both sectors face common challenges in achieving decarbonisation, improving efficiency, and adapting to climate change, making integrated planning and innovation essential.
- Circular Economy Sector – The energy transition itself and improving energy efficiency reduces reliance on finite resources and supports circular principles, such as designing out waste and maximising the value of materials. Energy recovery from waste, such as through anaerobic digestion or waste-to-energy plants, further integrates circular economy thinking into energy systems, helping to decarbonise local communities and strengthen resource resilience.

8 Monitoring Progress

8.1.1 Going forward it will be important to monitor the status of the energy sector in Wales. Table 8.1 presents a summary of currently available datasets relevant to the Welsh transport sector, offering a snapshot of existing information across different modes.

Table 8-1 – Existing Data

Issue/indicator	Why important	Who collects this data?	How often is this published	Is this data publicly available?
Electricity generation trends/key statistics	– To understand electricity generation types Wales is dependent on. – To monitor general trends (increases/decreases) in generation by different technology types.	Welsh Government (Energy Generation in Wales Reports)	Annually	Yes
Welsh electricity consumption	– To understand Wales' electricity consumption over time.	Welsh Government (Energy Generation in Wales Reports)	Annually	Yes
Installed capacity of renewable energy	– To understand the rate renewable energy is being installed each year and how that compares to peak installation in 2015. – To monitor progress against Welsh Government renewable energy generation targets.	Welsh Government (Energy Generation in Wales Reports)	Annually	Yes
Annual rate of heat pump installations	– To monitor progress against a national target of the Welsh Government for this to be 5.5GW by 2035.	Welsh Government (Energy Generation in Wales Reports)	Annually	Yes
TWh of locally owned renewable energy capacity.	– National target Welsh Government aim for this to be 1.5GW by 2035.	Welsh Government (Energy Generation in Wales Reports)	Annually	Yes

8.1.2 Table 8.2 outlines key data gaps within the transport sector which could enhance our understanding of its current state and inform strategic recommendations for its future development.

Table 8-2 – Data Gaps

Indicator/data needed to demonstrate state of the energy sector	Who should collect this data in future	How often should this data be published / updated
Planning application data for all energy schemes: – Number of applications made by type – Decision (approval v rejected) – Decision timelines – Built versus approved	Welsh Government	Every year
Grid connection data including: Timeline from grid connection offer to grid connection	NESO, NGET, SPEN	Every year
Proportion of heat demand and generation from decarbonised sources - no clear data on heat decarbonisation	Welsh Government	Every year
Number of Heat Networks in Wales and % of heat from heat networks to Understand delivery of heat networks and proportion of overall heat generation	Welsh Government	Every year
Private and public investment in renewable technologies infrastructure / enabling infrastructure	Welsh government	Every year
Public opinion polls to gauge attitudes in relation to: – Climate change – Renewable energy – Grid connection – Local ownership This should help to guide Welsh policy updates.	Welsh Government	Every year
Number of off-grid homes in fuel poverty.	Welsh Government	Every year

Appendix A - Alignment of Identified Issues Against the NICW framework

The issues and challenges identified in this report and highlighted for further consideration in Table 7.1 have been assessed, in qualitative high-level terms, against the NICW framework and remit, which includes:

- The Well-being of Future Generations Goals
- The Nature Emergency
- The Climate Emergency
- The Socio-Economic Duty
- Long-term considerations.

NICW Framework element	Assessment
Goal – Prosperous Wales	The issues and challenges identified for further consideration include the need for a stronger and more positive position on renewable energy, and energy generating technologies, which are essential for the future prosperity of Wales, especially as electricity demand increases.
Goal – Resilient Wales	This report recognises the need for a resilient energy system. In particular, a network that can deal with the characteristics of the future energy network. The reinforcement of this network will ensure Wales is resilient and responsive to future challenges.
Goal – More equal Wales	Fuel poverty has been highlighted as an issue throughout, and this is a significant problem in Wales. This has equality implications as the most poor in society pay the greatest proportion of their income on energy. There are health implications as people cannot warm their home to healthy temperatures throughout the year. This report recommends measures are put in place to promote a transition toward more energy efficient homes.
Goal – Healthier Wales	
Goal – Wales of Cohesive Communities	This report highlights the importance of community owned energy and schemes and advises more engagement, and public awareness is required on what they are and how communities can become involved. .
Goal – Wales of vibrant culture and thriving Welsh language	Locally owned renewable energy can promote community cohesion
Goal – Globally responsible Wales	Wales needs to transition to a low-carbon economy and achieve net-zero in order to contribute to mitigating climate change. The steps set out in this report promote what is required to ensure these commitments are met.
Nature Emergency	The nature emergency in Wales is closely linked to energy policy, as decisions on energy generation, infrastructure, and efficiency directly impact biodiversity, ecosystems, and the resilience of natural resources. The energy industry needs to ensure it does not harm nature and responds appropriately to the strong policy in place.

NICW Framework element	Assessment
Climate Emergency	Decarbonising the energy sector is integral to addressing the climate emergency. Without this, Wales will not achieve its net-zero commitments and will not combat the climate emergency.
Socio-Economic Duty	The socio-economic duty requires public bodies to ensure equality of outcome, rather than just equality of opportunity. We believe that our recommendations are linked to supporting this duty, through our support for community energy and the training employment benefits of expanding the Welsh energy industry.
Long-term considerations	This report focuses on long-term considerations. Across this timeframe a range of issues have been identified that will cause risks to achieving net-zero and attracting employment and investment into Wales. The recommendations reflect priorities that need to be addressed across the short medium and long-term.

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