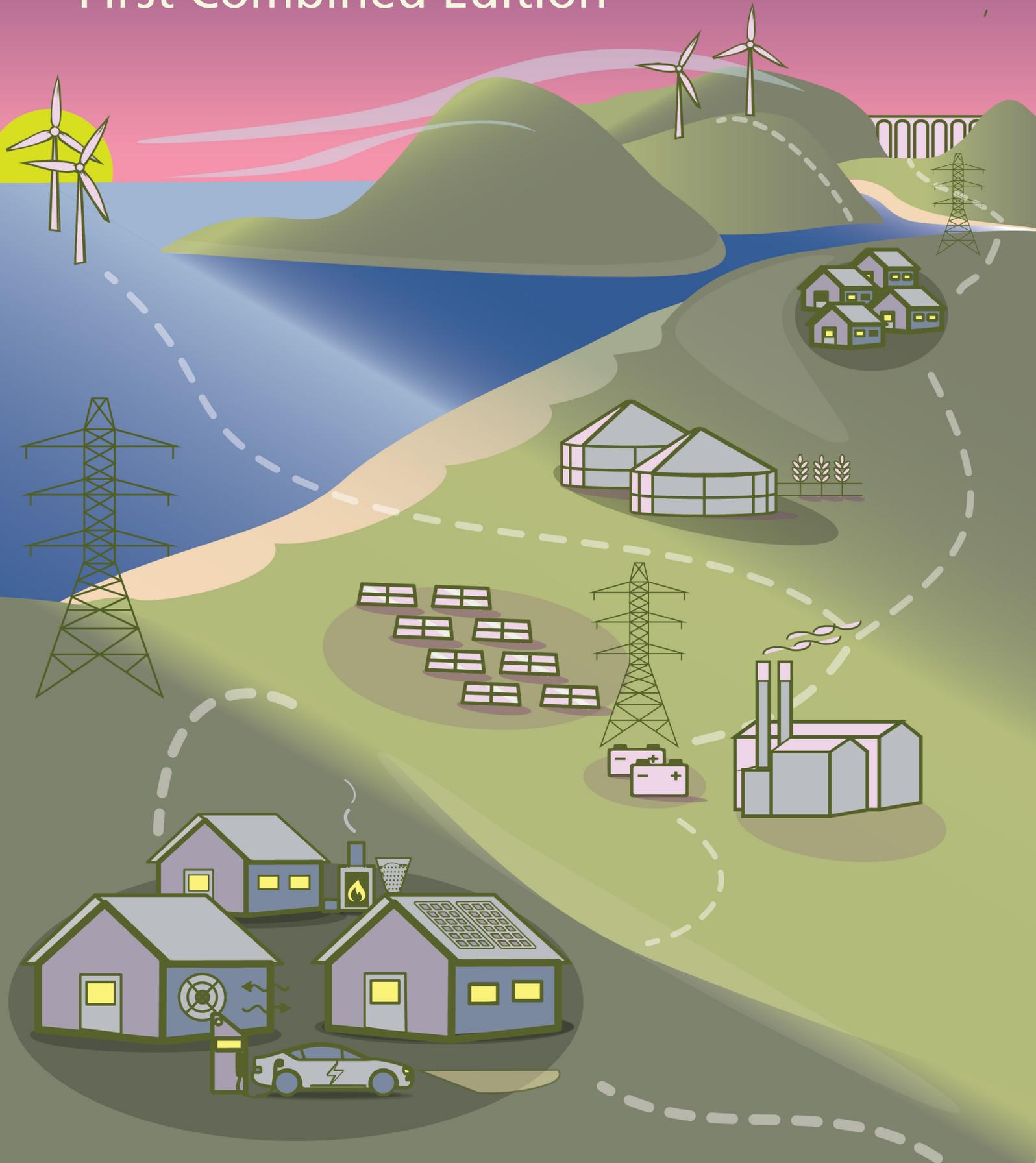




Llywodraeth Cymru
Welsh Government

Energy Generation & Use in Wales

First Combined Edition



Cover illustration: Regen

Written and produced by Regen for the Welsh Government

REGEN

Regen provides independent, evidence-led insight and advice in support of our mission to transform the UK's energy system for a net zero future. We focus on analysing the systemic challenges of decarbonising power, heat and transport. We know that a transformation of this scale will require engaging the whole of society in a just transition. For more information, visit regen.co.uk

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Ministerial foreword

Our vision is for Wales to generate sufficient renewable energy to meet our needs now and for the future. Central to this is meeting our targets for renewable energy generation and ensure that we retain as much of the benefit created by renewable energy in Wales. Wales must feel the benefit of the growth of renewable developments.



Rebecca Evans MS
Cabinet Secretary for
Economy, Energy and
Planning

We are making progress towards our renewable energy targets. In 2024, renewable electricity generation in Wales was equivalent to 54% of its electricity consumption. Our target for renewable electricity generation is to be equivalent to 70% of annual electricity consumption by 2030 and 100% by 2035.

This is a moving challenge as the use of electricity increases as transport and industry decarbonises and we must do all we can to accelerate deployment while ensuring the economic, social and community benefits are retained in Wales together with protecting our unique landscape and environment. We have already done so much to attract clean energy to Wales. We have expanded the resources available to consenting bodies and the infrastructure (Wales) Act has introduced an integrated consenting route for major infrastructure projects. We have assessed port capabilities relevant to deployment, and we are supporting companies to prepare for future opportunities. We are also working with renewable energy developers and community organisations to develop a sector deal for renewable energy to accelerate deployment.

As this report uses data from 2024 for generation and 2023 for use, Wales recent successes in the Contracts for Difference (CfD) bidding round is not fully reflected for all technologies. However, in the latest CfD allocation round 7 announced in January and February, two offshore developments, five onshore wind, twelve solar and three tidal energy projects received a contractual guarantee for the price of the electricity they generate, giving the go-ahead for work to start on the projects. Whilst not reflected in this retrospective report on progress those important results should be acknowledged and demonstrate our actions are creating the environment which attracts clean energy developments.

I am pleased with the progress being made in Wales, across all renewable energy technology developments as well as the reduction of energy generation made by fossil fuels supporting our transition to a sustainable energy system for Wales.

Executive Summary

Energy Generation and Use in Wales: First Combined Edition brings together the latest available data on how Wales generates and consumes energy, offering a whole-system view across electricity, heat, transport, and regional trends. This combined report updates the previously separate *Energy Generation in Wales* and *Energy Use in Wales* publications. It provides a comprehensive evidence base to support future national and regional policy decisions, ensuring that Wales can continue to decarbonise while maintaining energy security, supporting communities, and maximising economic benefits from the low carbon transition.

Wales's energy system: headline insights

Wales continues to be a net exporter of electricity, with installations in Wales generating 22 TWh in 2024 and consuming 13 TWh in 2023. Renewable electricity generation reached 7.9 TWh in 2024, supplying 36% of total generation. This was driven primarily by wind which accounted for nearly 70% of renewable output. Fossil fuel generation continues its long-term decline, falling to 13.8 TWh in 2024, one of the lowest levels in two decades.

Total energy use fell to 83.2 TWh in 2023, continuing a long-term downward trend of around 2% annually since 2005. Heating remains the largest end use (41%), followed by transport (around 30%). Petroleum remains the most consumed fuel overall, although demand for gas has continued to fall, especially in industry.

Progress towards Welsh Government targets

Wales aims for renewable electricity generation to meet 70% of consumption by 2030 and 100% by 2035. In 2024, renewable electricity generation in Wales was equivalent to 54% of its electricity consumption. However, electricity demand is projected to rise sharply, from 14.5 TWh in 2024 to 23.8 TWh in 2035, driven by the electrification of heat, transport, and industry. As a result, renewable generation must triple for Wales to meet its 2035 target.

Wales has an estimated 31,000 heat pumps installed to date, including a record 8,700 installations in 2024, but this represents only 5% of the 580,000 target for 2035. Locally owned renewable energy capacity reached 0.99 GW in 2024, 66% of the 2035 target of 1.5 GW, with strong growth in solar PV and some growth in onshore wind.

Regional differences

Energy use and generation vary significantly across Wales's four regions. Cardiff Capital region consumes the largest share of energy (39% of all Welsh energy) and saw approximately 4,700 new renewable installations in 2024. Swansea Bay City region generated the most renewable electricity (2.1 TWh), mainly driven by the region's strong onshore wind portfolio. Mid Wales, despite lower overall consumption, has a high reliance on petroleum for heating. North Wales recorded the highest number of new renewable installations (approximately 7,900) and remains a leading presence for both wind and hydropower generation.

Executive Summary (continued)

Technology trends

Renewable capacity reached 4.3 GW in 2024, mainly from onshore wind and solar PV. Offshore wind remains a major contributor to this total, with 726 MW already installed, and several key fixed bottom and floating offshore wind projects already advancing through planning and the securing funding through the latest Contracts for Difference round.

Low carbon heat generation continues to be dominated by biomass, although heat pump deployment is accelerating. Wales now hosts significant electricity storage assets, including 115 MW of operational battery capacity and 2.1 GW of pumped hydropower storage, with more than 2.3 GW of battery projects with planning permission granted at the time of writing.

Introduction

This report, *Energy Generation and Use in Wales*, shows how energy was generated and consumed across Wales according to the most recent data and how this has changed over time.

Previously published separately, as *Energy Generation in Wales* and *Energy Use in Wales*, this combined report aims to support the Welsh Government to develop future energy policy and help to evidence the economic, social, and environmental benefits of Welsh energy projects. The most recent datasets for the two key aspects of this report, generation and use, are available for separate years. The most up to date data for generation is the year 2024, and for use is the year 2023. When the available data does not directly meet the analysis requirements of this report, further analysis and modelling are carried out as appropriate.

This report

- Collates and analyses a diverse range of publicly available and third-party provided data sources to examine how electricity was both used and generated across Wales.
- Builds on the analysis completed in prior *Energy Generation in Wales* and *Energy Use in Wales* reports.

Energy generation

The energy generation aspects of this report:

- Assesses energy generation deployment across Wales's 22 local authority areas and four regions, enabling analysis of local factors such as natural resources, local policies, and demographic influences on technology deployment.
- Breaks down Welsh electricity generation, renewable heat generation and energy storage by technology, capacity and local authority area up to the end of 2024.
- Examines the ownership of energy generation assets, a key part of Wales's energy strategy, and measures progress towards the national target of 1.5 GW of locally owned renewable energy capacity by 2035.
- Analyses electricity generation (from both renewable and fossil fuel sources), renewable heat, and electricity storage, and assesses the development and growth potential of renewable energy technologies.

Energy use

The energy use aspects of this report:

- Examines energy consumption by end-use, sector and fuel types across the four regions of Wales up to the end of 2023.
- Provides analysis and commentary on how energy use has varied over time at both national and sub-national levels.

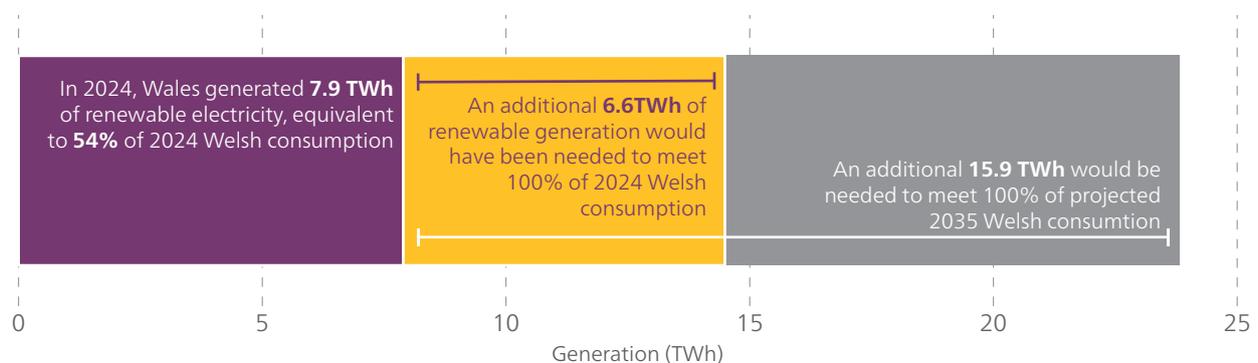
Progress towards Welsh energy targets

This report outlines the current energy consumption and generation trends and considers these within the wider context of future energy targets for Wales. The Welsh Government has set a target for domestic renewable electricity generation to be equivalent to 70% of annual electricity consumption by 2030 and 100% by 2035. In 2024, renewable electricity generation in Wales was equivalent to 54% of its electricity consumption¹.

Electricity consumption in Wales has reduced over the last two decades but it is projected to increase as Wales decarbonises. One of the key drivers for this is the anticipated shift from fossil fuels to electricity for heat, industry and transport². Whilst electrification does reduce total energy demand due to improved efficiencies, electricity demand is still expected to more than double by 2050³. Meeting this demand will require a significant increase in renewable generation to sustain progress towards Welsh targets.

In the adopted net zero pathway for Wales, Welsh electricity consumption is projected to rise rapidly by 2035: increasing from 14.5 TWh in 2024⁴ to 23.8 TWh in 2035³. Consequently, although current Welsh renewable electricity generation is equivalent to 54% of 2024's electricity consumption, that same renewable electricity generation is only equivalent to 33% of the estimated 2035 electricity consumption for Wales. Therefore, renewable electricity generation in Wales needs to triple to achieve the Welsh Government's target of meeting 100% of Welsh electricity consumption with Welsh renewable electricity generation by 2035.

Progress towards 100% Welsh electricity consumption target



Data source: (13, 16, 18, 19, 24)

¹ This figure accounts for losses. See feature box below for information on the approach to losses.

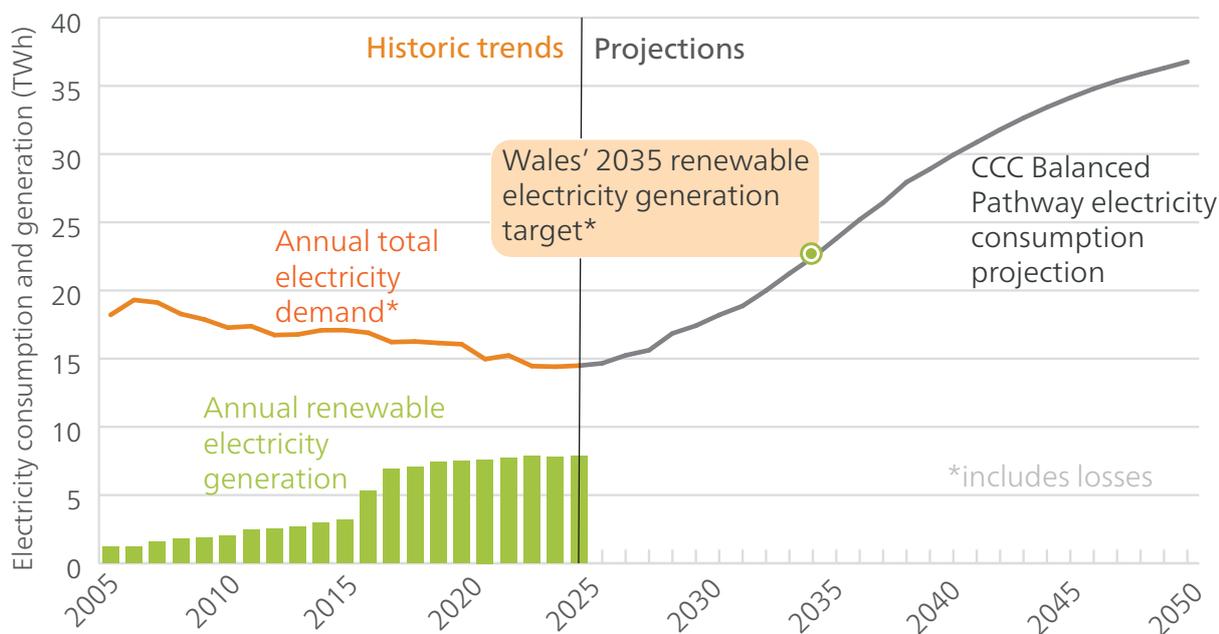
² Welsh Government, 2024. [Heat Strategy for Wales](#)

³ Climate Change Committee, 2025. [Wales' Fourth Carbon Budget](#).

⁴ DESNZ, 2025. [Sub-national electricity consumption statistics 2005 to 2023](#). Includes 9% assumed efficiency losses. Estimate of 2024 based on DESNZ energy trends.

Welsh progress towards meeting this target with domestic renewable electricity generation has increased to 33% in 2024 from 27% in 2023. However, this is largely due to the updated Climate Change Committee (CCC) projections⁵ reducing the estimated electricity consumption in 2035 from 29 TWh to 23.8 TWh⁶ and this 5.2 TWh reduction in estimated electricity consumption brings the Welsh target closer to current renewable generation.

Welsh renewable generation progress towards target



Data source: (7, 12-26, 28)

The 2035 renewable electricity target for Wales considers system operation

The Welsh Government's 2035 target aims for renewable electricity generation to meet 100% of Welsh electricity consumption, on an annual basis. The target does not seek to balance energy at less than an annual granularity, recognising that Wales is a part of an interconnected GB, UK, Ireland and European energy system. As part of this energy system, Wales can import electricity during periods of low local generation and export excess power when generation is high, helping to reduce costs and enhance system resilience.

Approximately 9% of electrical energy is lost in the transmission and distribution of electricity from where it is generated to where it is consumed. This energy is predominantly lost as heat in transformers and along cables on the lower voltage distribution network. While the previous 2030 renewable electricity target for Wales did not include losses, the 2035 target does. This adjustment reflects the additional energy required to compensate for losses, providing a more accurate representation of the total energy needed.

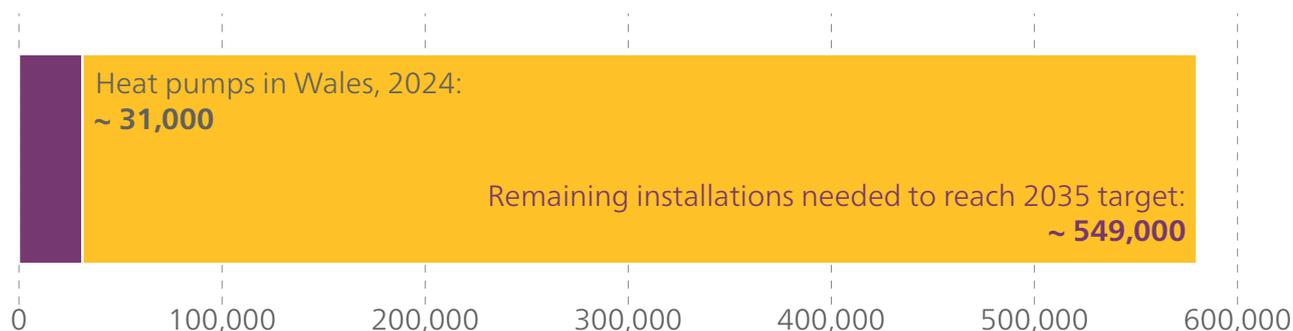
⁵ See feature box below (The Climate Change Committee: Wales' Fourth Carbon Budget) for explanation of the updated CCC Carbon Budget.

⁶ Climate Change Committee, 2025. [Wales' Fourth Carbon Budget](#).

Heat pump targets

The Welsh Government has set a target for 580,000 heat pumps to be installed in Wales by 2035. As of 2024, there are an estimated 31,000 heat pumps across Wales, with over 8,700 installed in that year alone. This is the largest number of heat pumps installed in a single year in Wales. The total number of heat pumps in Wales in 2024 represents 5% of the 2035 goal.

Welsh heat pump progress towards target



Data source: (13, 16, 18, 19, 24)

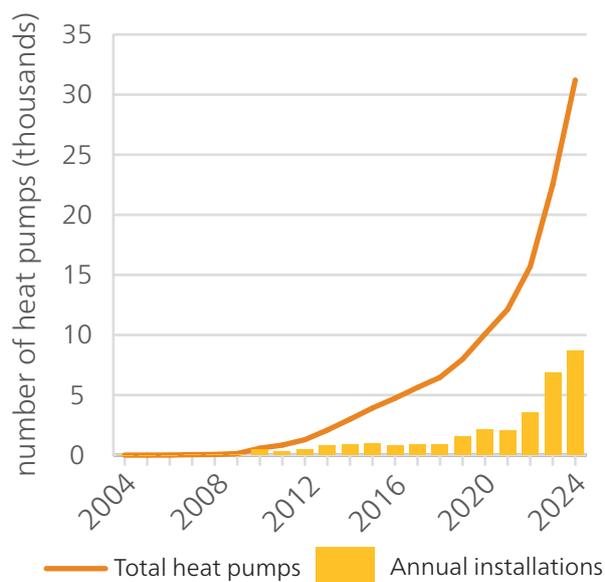
Heat pump installations in this report are estimated largely from the analysis of two key data sources, the MCS (Microgeneration Certification Scheme) data and the EPC (Energy Performance Certificate) data. These two data sources account for the majority of new installations, with MCS data largely covering retrofit installations in existing homes and businesses (including any that used government funding), and EPC data largely covering new build housing.

These figures do not account for private, non-grant funded, installations that have not been registered to the MCS and there is no public database for these types of installations. Historic heat pump estimates collate from a wider range of sources, largely government funding records. These historic records only cover installations in the years individual funding programmes are open, and records from new funding programmes are incorporated into the MCS database as a government requirement. Therefore, the figures within this report are estimates and the actual number of heat pump installations in Wales may differ.

Just under 55,000 heat pumps would need to be installed every year from 2025 to 2035 to reach this target⁷. The installation rate is heavily impacted by the replacement cycle of gas boilers, therefore an increased uptake in heat pumps is expected over time as more boilers reach the end of their lifecycle and are replaced with renewable technologies.

So, whilst 2024 marks a significant increase in uptake, with annual heat pump installations more than quadrupling since 2020, the uptake rate must continue to accelerate for Wales to achieve its targets.

Heat pump deployment in Wales



Data source: (13, 16, 18, 19, 24)

The Climate Change Committee: Wales' Fourth Carbon Budget

The Climate Change Committee (CCC) released its fourth iteration of the carbon budget for Wales in May 2025 and looks at the years 2031 to 2035, a key period in current decarbonisation targets. The CCC recommends a 73% reduction in average annual emissions compared to the 1990 baseline over the years 2031 to 2035.

The growth in renewable generation, uptake of electric vehicles, installation of heat pumps and improvement in building insulation is expected to provide the majority of emissions reduction between now and the start of the fourth carbon budget period in 2031.

Projections and data from the latest CCC release is used throughout this report to help display potential routes towards decarbonisation. Some aspects of the new CCC budget release result in a different pathway projection to the current Welsh Government targets, for example the CCC now project a quarter of Welsh homes to have heat pumps by 2033 with the Welsh Government targeting a third of Welsh homes to have a heat pump by 2035. Whilst there may be differences in the pathways and timelines, both the Welsh Government and the CCC share the same end goal of a net zero future.

⁷ This figure assumes no gradual increase, but the same number of heat pumps installed every year to meet the target.

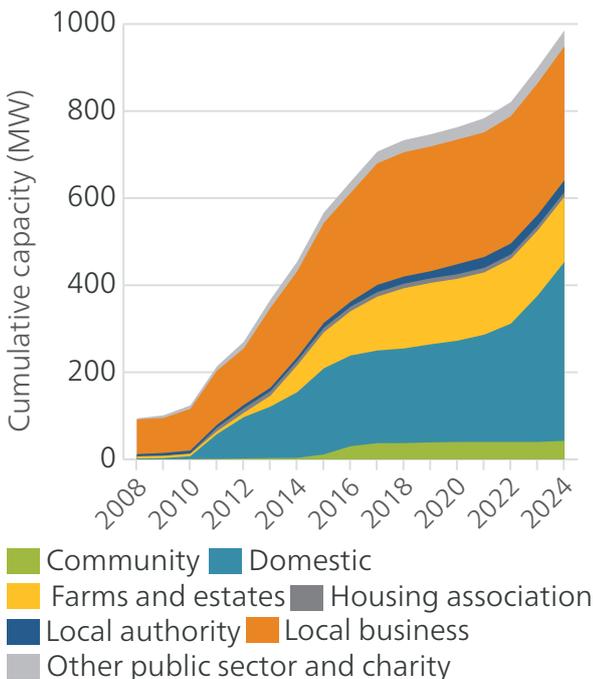
Locally owned renewable energy

In 2023 the Welsh Government raised its local ownership target for renewable energy to 1.5 GW by 2035⁸. At 0.99 GW at the end of 2024, Wales is already 66% of the way towards its target.

There was a small increase in the number of locally owned⁹ renewable energy projects installed in 2024 compared to 2023. In 2024, 86 MW of locally owned capacity was commissioned. This included 85 MW of electrical capacity – 79.5 MW from solar PV and 5.5 MW from onshore wind – as well as 1 MW of heat capacity from biomass. Nearly two-thirds of all locally owned capacity comes from electricity generation, mainly solar PV and onshore wind.

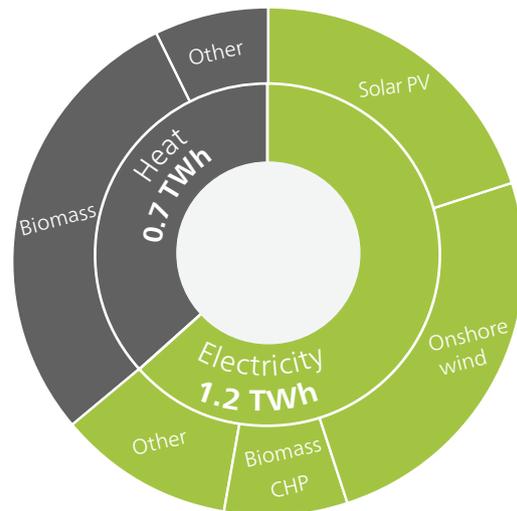
Wales is now estimated to have more than 103,800 locally owned renewable electricity and heat projects. Around 90% of these are domestic installations, typically small-scale rooftop solar PV and biomass systems, which have small individual capacities. As a result, domestic installations only account for 37% of the total locally owned capacity. The remaining 10% of installations, and consequently 63% of locally owned capacity, is divided across community, farms and estates, housing associations, local authorities, local businesses and other public sector and charity projects.

Locally owned renewable capacity by ownership type



Data source: (13, 16, 18, 19, 24)

Locally owned renewable capacity by technology (TWh)



Data source: (13, 16, 18, 19, 24)

⁸ This target does not include the installation of heat pumps, which are instead accounted for in the Welsh Government's target to install 580,000 heat pumps by 2035.

⁹ The definition of 'locally owned' is set out in the Welsh Government's policy statement on local ownership of energy generation in Wales. Due to source data limitations, the figures are likely to be underestimated. Full details can be found in the assumptions section of this report.

Case study: Ynni Cymru: capital grant funding programme

Ynni Cymru is a Welsh Government programme, established in 2023, to expand locally owned renewable energy, speed up the rollout of smart local energy systems, and support a just transition that retains benefits within Welsh communities.

In 2024, Ynni Cymru launched a £10 million capital grant scheme for community organisations, social enterprises, SMEs, and public bodies. The funding backs projects that combine local energy generation, storage, and infrastructure, helping to make energy systems more efficient while delivering real benefits to communities.

The programme aims to increase local ownership of energy assets, reduce carbon emissions, lower energy bills, and strengthen both community resilience and energy security, supporting Wales's wider net-zero goals. Ynni Cymru funded 32 projects in 2025 as part of the 2024 application round¹⁰. The grant ran again for 2025 to 2026 and is funding 47 projects with a total of £12.9 million in this time.

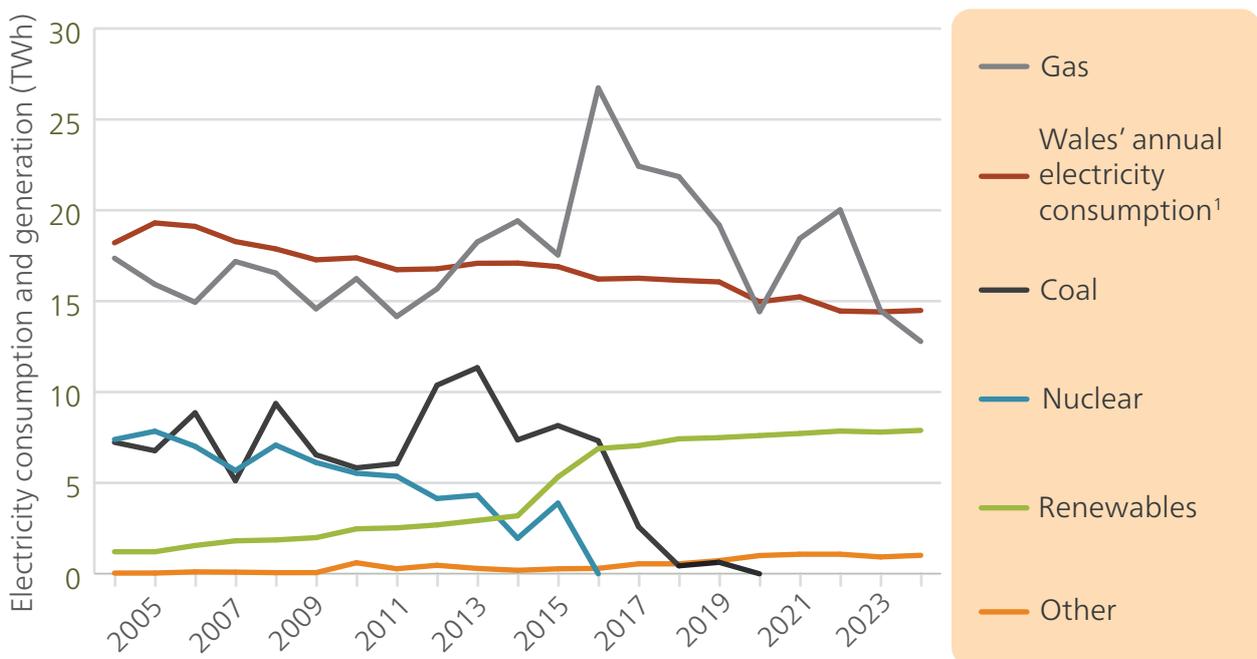
¹⁰ Local Partnerships, 2024. [Ynni Cymru](#)

Energy generation in Wales

Installations in Wales generated 22 TWh of electricity in 2024 and consumed 13 TWh in 2023¹¹. Wales is a net exporter of electricity to the rest of the UK, Ireland and the wider European electricity network.

Wales generated approximately 7.9 TWh from renewable sources and 13.8 TWh from fossil fuels in 2024, meaning fossil fuel generation makes up 64% of total Welsh electricity generation. However, fossil fuel generation has decreased sharply over the last two years (from over 21 TWh in 2022 to 15.4 TWh in 2023) and is among the lowest levels over the last two decades. Renewable electricity generation output in Wales continues to increase (from 7.8 TWh in 2023) and accounted for 36% of total Welsh electricity generation in 2024.

Electricity generation trends versus Welsh electricity consumption



Data source: (12-26, 28)

Electricity generation in Wales

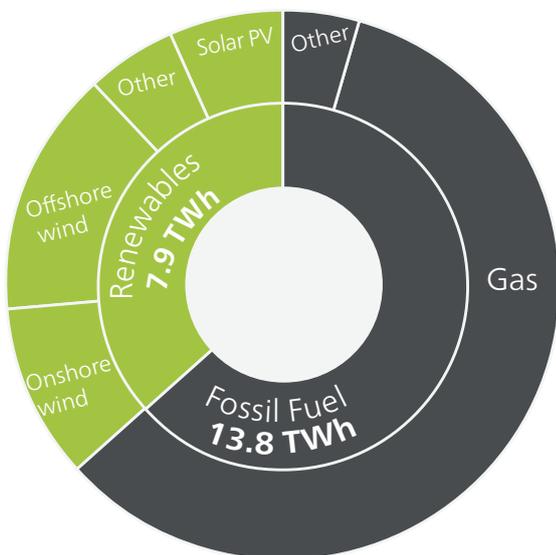
In 2024, 90% of Welsh fossil fuel generation came from gas mainly from the Pembroke and Connah's Quay gas fired power stations. The contribution from renewable sources to the total Welsh generation figure continues to increase, rising from 34% in 2023 to 36% in 2024. Wind continues to be the biggest contributor to Welsh renewable electricity generation with offshore and onshore wind producing nearly 70% of the renewables total. Wales has had no nuclear electricity generation since 2015 and no coal generation since 2019.

¹¹ The most recent data available and analysed here for energy use is 2023 and for energy generation is 2024. Therefore, direct comparisons of the same year are not possible, and the data year is indicated where relevant.

Renewable energy in Wales

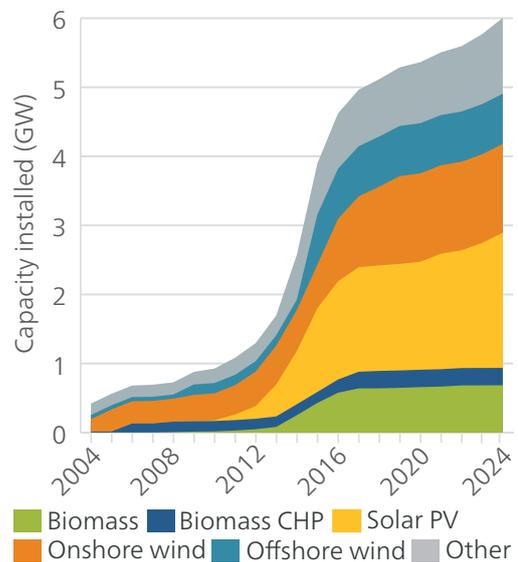
- In 2024, 4.3 GW of renewable energy capacity was installed in Wales and generated a total of just over 10 GWh of energy over the year.
- Onshore wind and solar PV make up most of the capacity of all installed renewable technologies in Wales, at nearly 60% of the total renewable capacity. There has been an increase of 692 MW of onshore wind capacity installed in the last ten years and 830 MW of solar PV installed in the same timeframe.
- There is a total of 726 MW of offshore wind capacity installed in Wales, making up nearly a fifth of total renewable capacity, with no new offshore wind installations since 2015. However, two Welsh offshore wind projects did secure contracts in the latest UK Contract for Difference auction, a floating offshore project off the coast of Pembrokeshire and an extension to fixed offshore wind generation in north Wales.

Electricity generation in Wales, 2024



Data source: (12-26, 28)

Renewable energy cumulative installed capacity



Data source: (12-26)

Electricity and heat generation in Wales key statistics, 2024

Technology	Number of projects	Electricity		Heat	
		Capacity (MW)	Estimated annual generation (GWh)	Capacity (MW)	Estimated annual generation (GWh)
Renewables	167,757	3,613	7,901	1,302	2,396
Anaerobic digestion	50	18	94	9	54
Biomass	3,595	0	-	685	1,375
Biomass electricity and CHP	96	132	692	120	663
Energy from waste (R)	1	26	134	-	-
Heat pump	31,215	0	-	421	193
Hydropower	361	170	350	-	-
Landfill gas	23	22	93	-	-
Offshore wind	3	726	2,209	-	-
Onshore wind	865	1,285	3,152	-	-
Sewage gas	4	11	40	13	78
Solar PV	127,902	1,223	1,138	-	-
Solar thermal	3,642	-	-	54	33
Fossil Fuel	102	4,344	13,800		
Coal	-	-	-		
Diesel	21	251	881		
Gas	80	4,067	12,785		
Energy from waste (FF)	1	26	134		
Storage	17	2,208	-		
Battery storage	15	120	-		
Pumped hydropower	2	2,088	-		
Hydrogen	-	-	-		

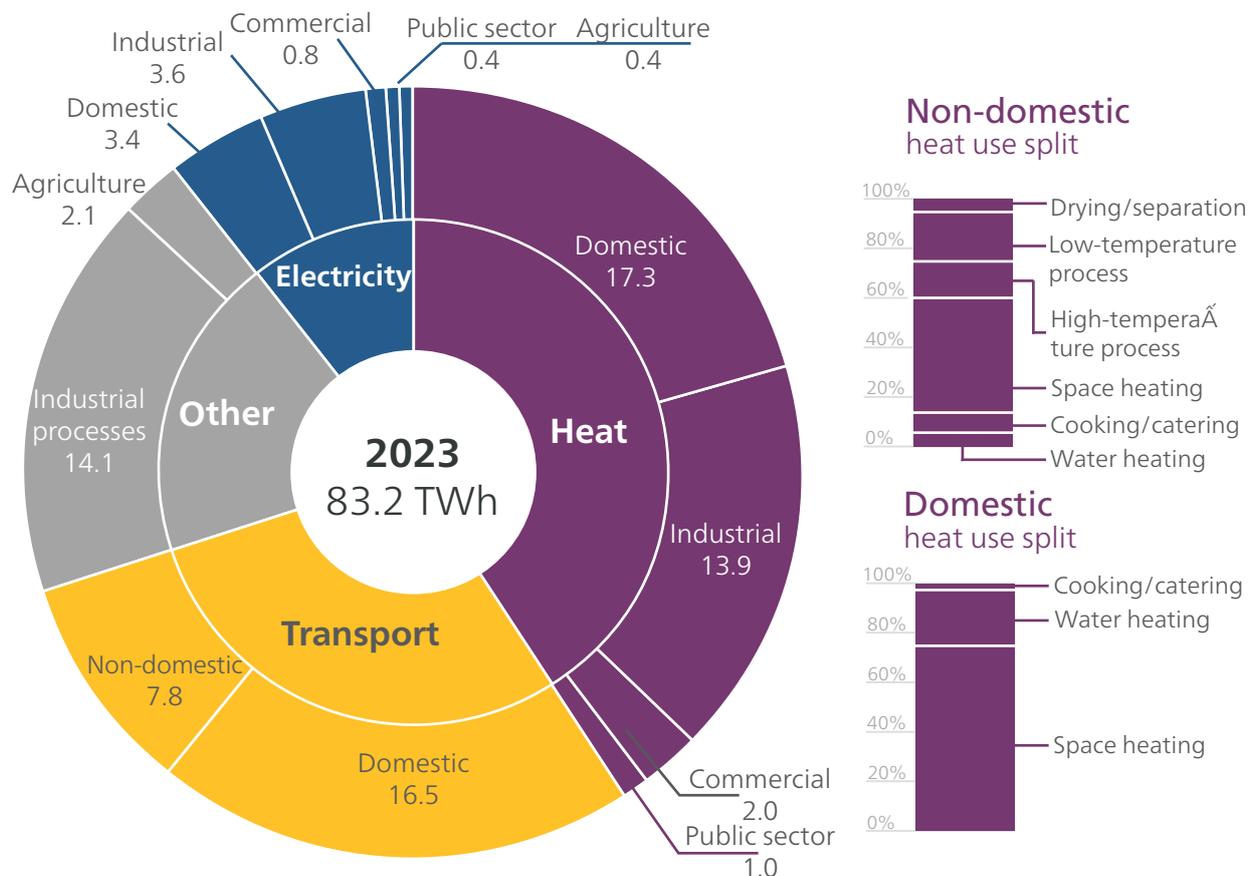
Data source: (12-26)

Energy use in Wales

Wales consumed 83.2 TWh of energy in 2023, a 2.3 TWh decrease since 2021, continuing a year-on-year decreasing trend.

On average, energy use in Wales has decreased marginally (by approximately 2%) each year since 2005, with an 8% reduction in energy use during the COVID-19 pandemic in 2019 and 2020.

Annual energy consumption in Wales broken down by use, 2023



Data source: (1, 2)

As with the previous iteration of the Energy Use in Wales report in 2021 (the third edition), this analysis breaks down energy use in Wales into four key categories: heat, transport, electricity and other.

- The highest proportion of all energy use in Wales (41% or 34.2 TWh) is for heating in homes, businesses and industry, with domestic heating accounting for the majority of this.
- The second-largest energy use is for transport which accounts for nearly a quarter (or 24.3 GWh) of all energy used in Wales in 2023.
- Electricity for non-heating uses including lighting, appliances and cooking represents just under 10% of total energy use at 8.5 GWh.
- Finally, 'other' energy consumption, mainly for industrial or agricultural processes, constitutes 19% of total energy use at 16.2 GWh.

Case study: Duffryn housing heat network retrofit



Duffryn housing heat network retrofit (image credit: Vital Energy)

Located in the Duffryn estate in Newport and completed in 2024, the aim of the project was to replace ageing district heating infrastructure with reliable, sustainable heating and hot water to around 1,000 homes, local schools and businesses in the community. Over 7 km of aging pipework was replaced with new district heating pipes, making it one of the largest heat network upgrades in the UK, and received a £3.7m grant from the Heat Network Efficiency Scheme (HNES).

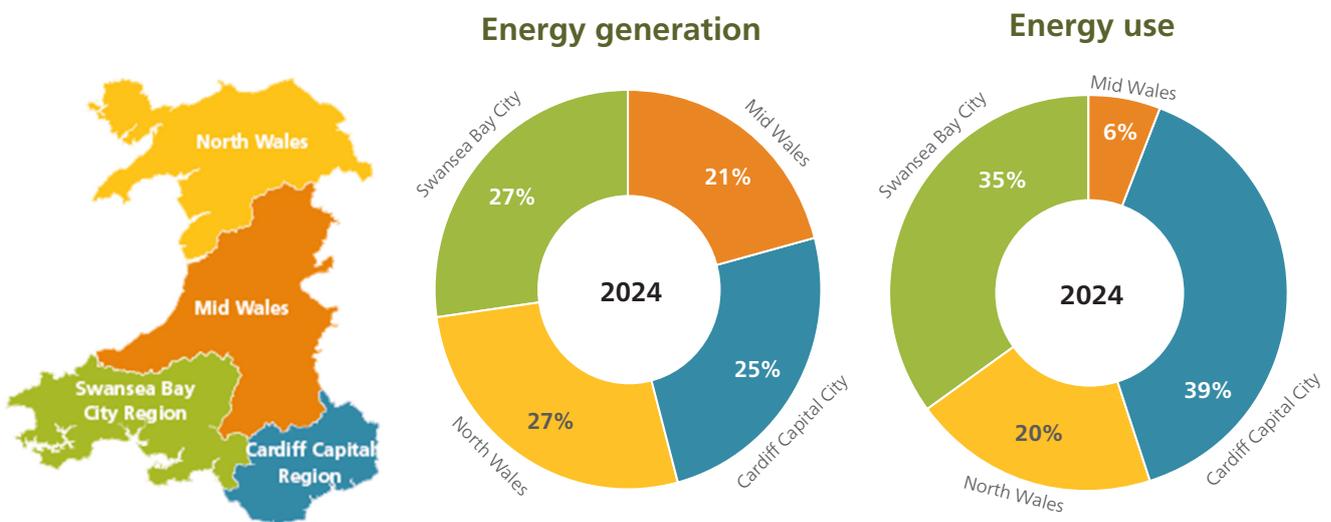
As a public housing community project, it shows how upgrading existing heat infrastructure supports equitable decarbonisation, aligning with wider efforts to modernise heat supply across Wales, contributes to local energy resilience and helps to reduce reliance on individual fossil-fuel powered boilers.

Regional energy trends

Regional context

As with the previous iterations of the Energy Use in Wales report (the third edition in 2021) and the Energy Generation in Wales report (last produced in 2023), this analysis breaks down both energy use and energy generation across Wales into the four Welsh regions: North Wales, Mid Wales, Swansea Bay City region and Cardiff Capital region. A further breakdown of energy use and generation into each of the local authority areas within each of these regions can be found in the corresponding regional chapters of this report.

Annual energy use and generation across Welsh regions



Data source: (1, 12-26)

Energy generation by region

Each of the four regions contributed very similar proportions of total Welsh energy generation. Swansea Bay City region and North Wales both contributed 27% of the total generation figure, with Cardiff Capital region contributing 25% and Mid Wales contributing 21%.

Energy use by region

In 2023, the Cardiff Capital region and Swansea Bay City region together accounted for nearly three-quarters (74%) of total energy consumption across Wales. This is a slight increase from the 71% recorded in the 2021 analysis and reflects the fact that these areas have comparably much higher concentrations of both industry and population than the other two Welsh regions. The North Wales region consumed 20% (a reduction of 3% since 2021) of the

Cardiff Capital region

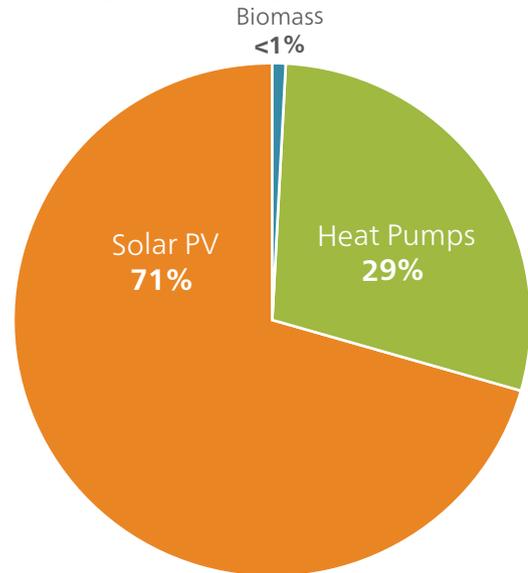
Generation and use in Cardiff

In 2024, approximately 4,700 new renewable electricity and heat projects were commissioned in the Cardiff Capital region, representing 27 MW of new capacity and an additional 187 GWh of annual generation. The majority of these projects were small-scale solar PV, largely on domestic rooftops. The rest of the new projects were likewise domestic-scale installations, made up almost entirely of heat pumps.

This brings the total renewable energy generation within Cardiff Capital region to 2 TWh and total energy generation to 3.3 TWh in 2024. Of all the local authority areas within the region, Monmouthshire saw the highest increase in renewable capacity, with just over 4 MW commissioned in 2024.

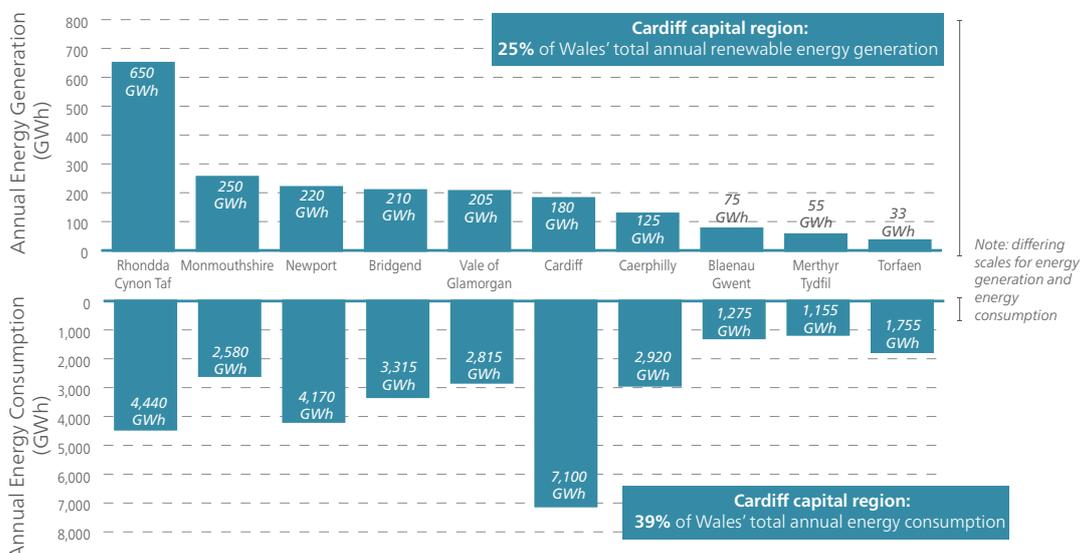
The most recent energy consumption data shows over 31.5 TWh of energy was used across Cardiff's ten local authority areas in 2023 (of which 5.7 TWh is from electricity). This is equivalent to 39% of all energy used across Wales. Cardiff consumes the largest proportion of energy in the wider Cardiff Capital region, using just over 7 TWh in 2023.

Percentage of renewable electricity and heat capacity commissioned in 2024, by technology



Data source: (12-26, 28)

Estimated annual renewable energy generation and consumption in Cardiff Capital region, 2024

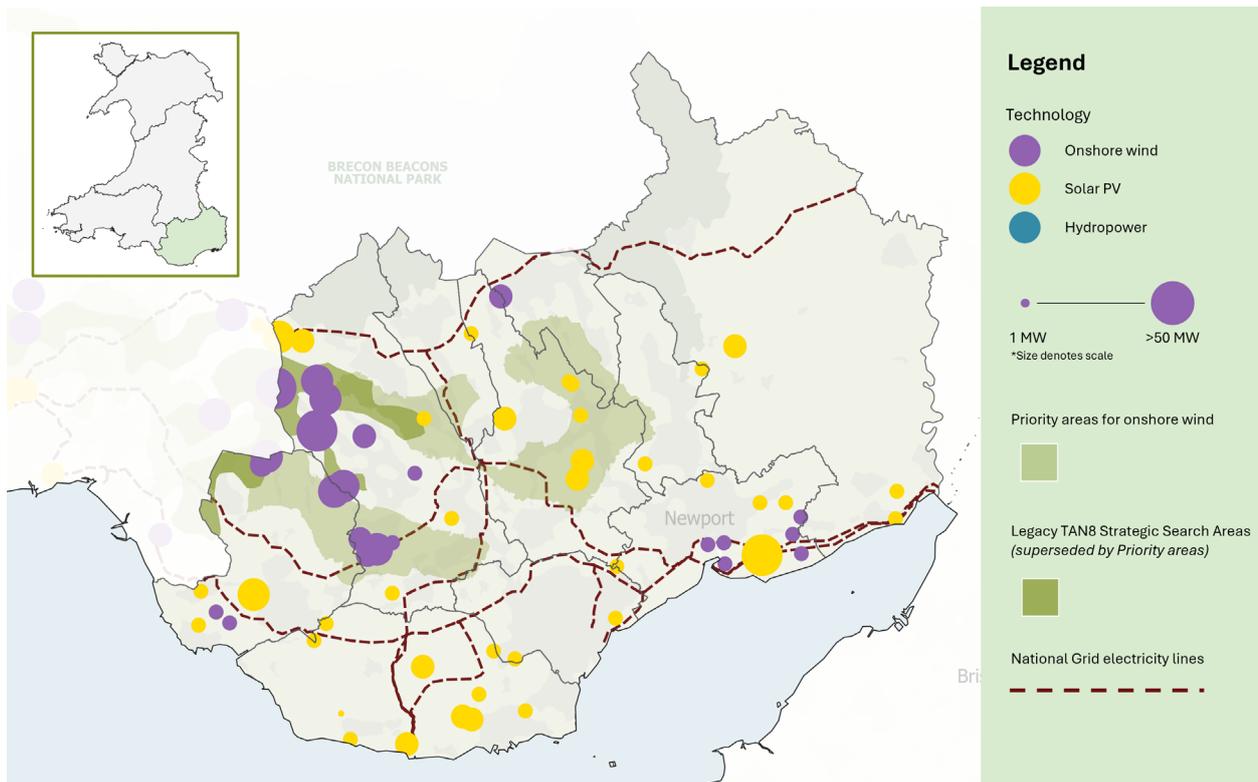


Data source: (12-26, 28)

Electricity generation across the Cardiff Capital region

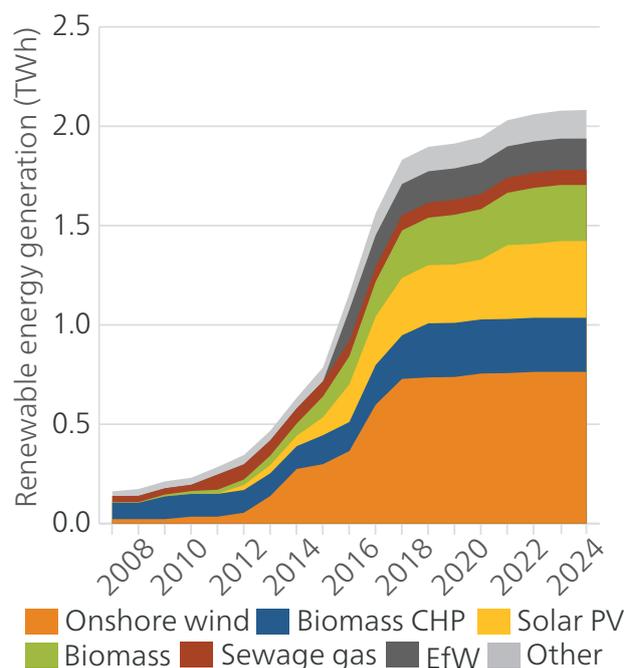
Cardiff Capital region's renewable electricity generation is largely made up of onshore wind and solar PV. Onshore wind generated over 750 GWh in 2024 and solar PV generated approximately 386 GWh in the same period. Onshore wind sites are concentrated at a larger scale in the west of the region and are mostly within the identified Pre-Assessed Areas for onshore wind. Large-scale solar PV sites are more distributed across the region and there are very few in the east of the region.

Cardiff Capital region electricity generation landscape



Renewable generation over time

In 2024, the share of total generation from each renewable technology in the Cardiff Capital region remained broadly consistent with previous years. Onshore wind accounted for the largest share at 37%, followed by solar PV at 19%, biomass heat at 14%, and biomass electricity and CHP at 13%.



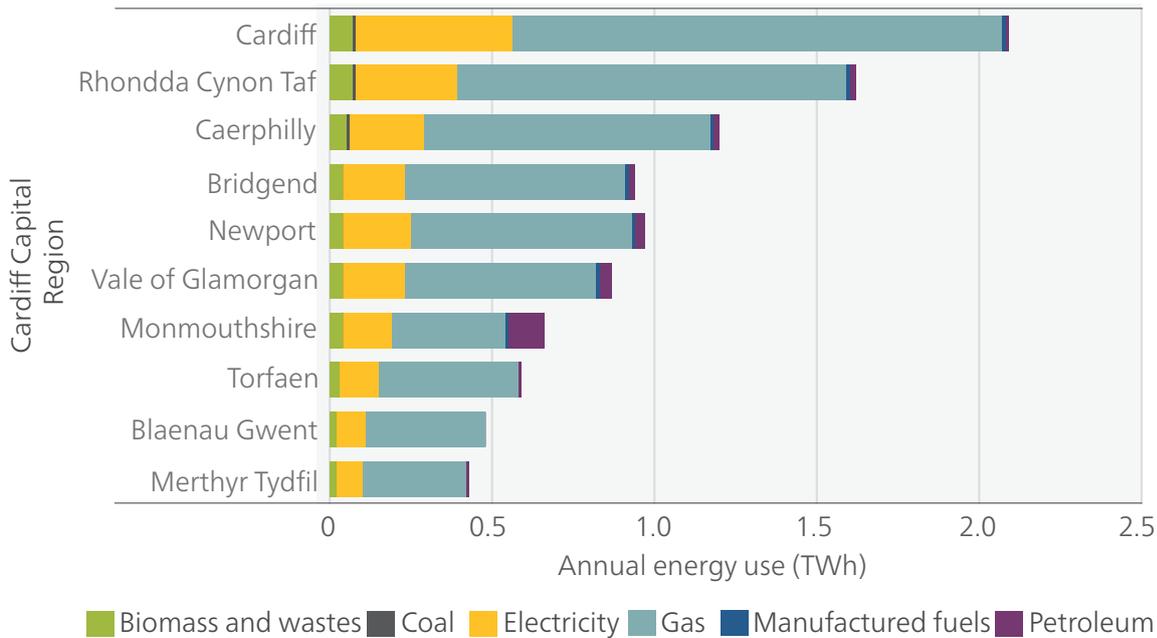
Renewable energy generation in Cardiff Capital region

Data source: (12-26, 28)

Domestic and non-domestic energy use

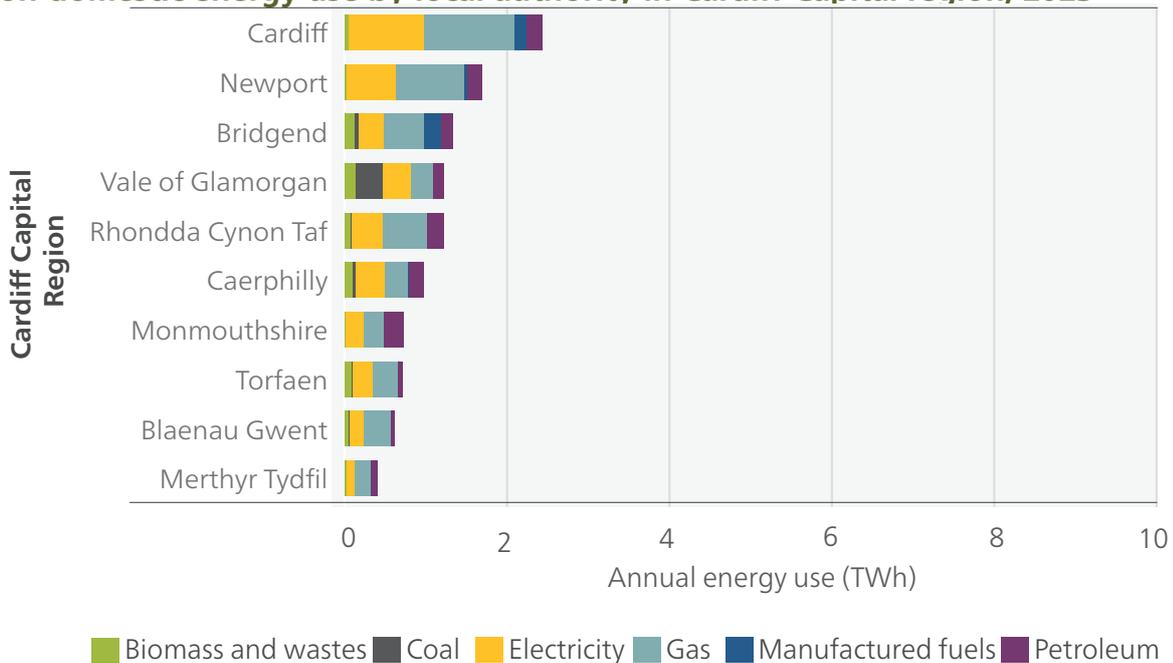
Across the Cardiff Capital region, all local authority areas use gas as the primary domestic fuel (excluding transport), followed by electricity. Monmouthshire stands out for its comparatively high use of petroleum as a domestic fuel, likely due to more limited access to the gas network. Cardiff consumes the most energy in both the domestic and non-domestic sectors, with gas also forming the largest share of non-domestic use. Notable non-domestic consumption includes the Vale of Glamorgan’s substantial use of coal in industry and Bridgend’s high use of manufactured fuels in industrial processes.

Domestic energy use by local authority in Cardiff Capital region, 2023



Data source: (1)

Non-domestic energy use by local authority in Cardiff Capital region, 2023



Data source: (1)

Case study: Coed Ely Solar Farm



Coed Ely Solar Farm (image credit: Rhondda Cynon Taf County Borough Council)

Coed Ely Solar Farm is built on a reclaimed 84 acre former colliery site near Tonyrefail, Rhondda Cynon Taf. It is estimated to generate 6 MW of renewable energy – enough to power 1,800 average Welsh homes a year. In 2024, the solar farm began supplying electricity to both the electricity grid and to the Royal Glamorgan hospital via a private-wire connection. About 1 MW of its output is dedicated to the hospital - enough to meet up to 15% of its annual demand (and 100% on peak summer days).

Coed Ely is one of Wales's largest local-authority-led solar projects and demonstrates how converting land no longer used by industry into renewable infrastructure can support the low carbon transition, create jobs and local spending, and strengthen energy resilience for both community and public services.

Swansea Bay City region

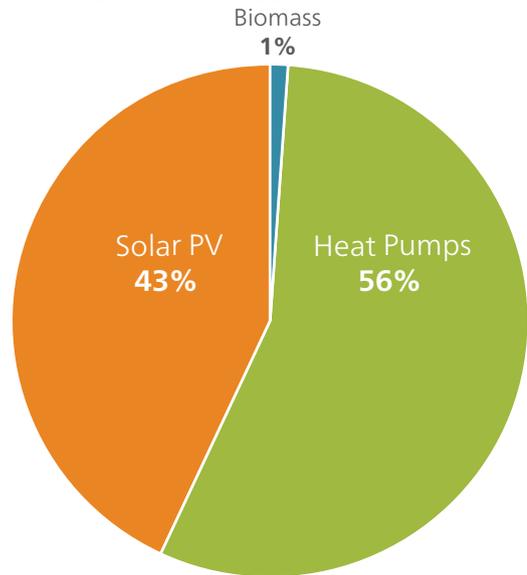
Generation and use in Swansea

In 2024, approximately 5,900 new renewable electricity and heat projects were commissioned in the Swansea Bay City region, representing 44 MW of new capacity and an additional 224 GWh of generation. Just under half of the commissioned projects were small-scale solar PV on domestic rooftops, while the remaining projects were predominantly heat pump installations which accounted for 56% of the new 2024 capacity.

This brings the total renewable energy generation within Swansea Bay City region to 2.1 TWh and total energy generation to 12.7 TWh. Of all the local authority areas, Carmarthenshire saw the highest increase in renewable capacity, with just under 18 MW commissioned in 2024.

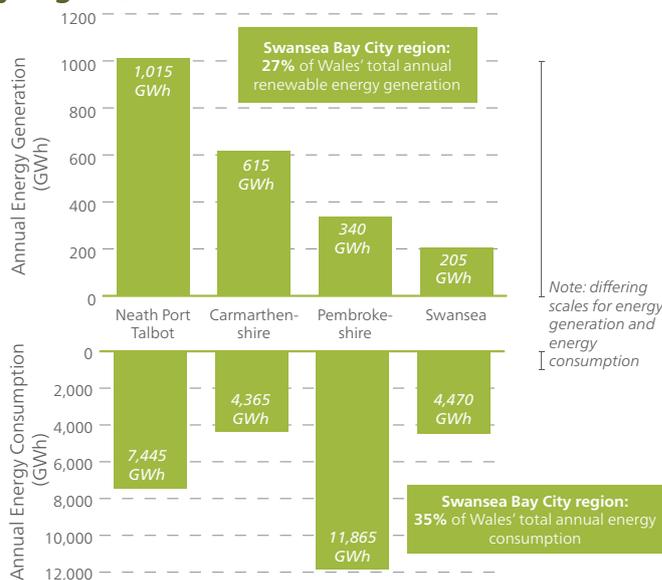
The most recent energy consumption data details over 28.1 TWh of energy used across Swansea’s four local authority areas over 2023 (of which 3.5 TWh is from electricity). This is equivalent to 35% of all energy used across Wales. Pembrokeshire consumes the largest proportion of energy in the wider Swansea Bay City region, using just under 12 TWh in 2023.

Percentage of renewable electricity and heat capacity commissioned in 2024, by technology



Data source: (12-26, 28)

Estimated annual renewable energy generation and energy consumption in Swansea Bay City region, 2024

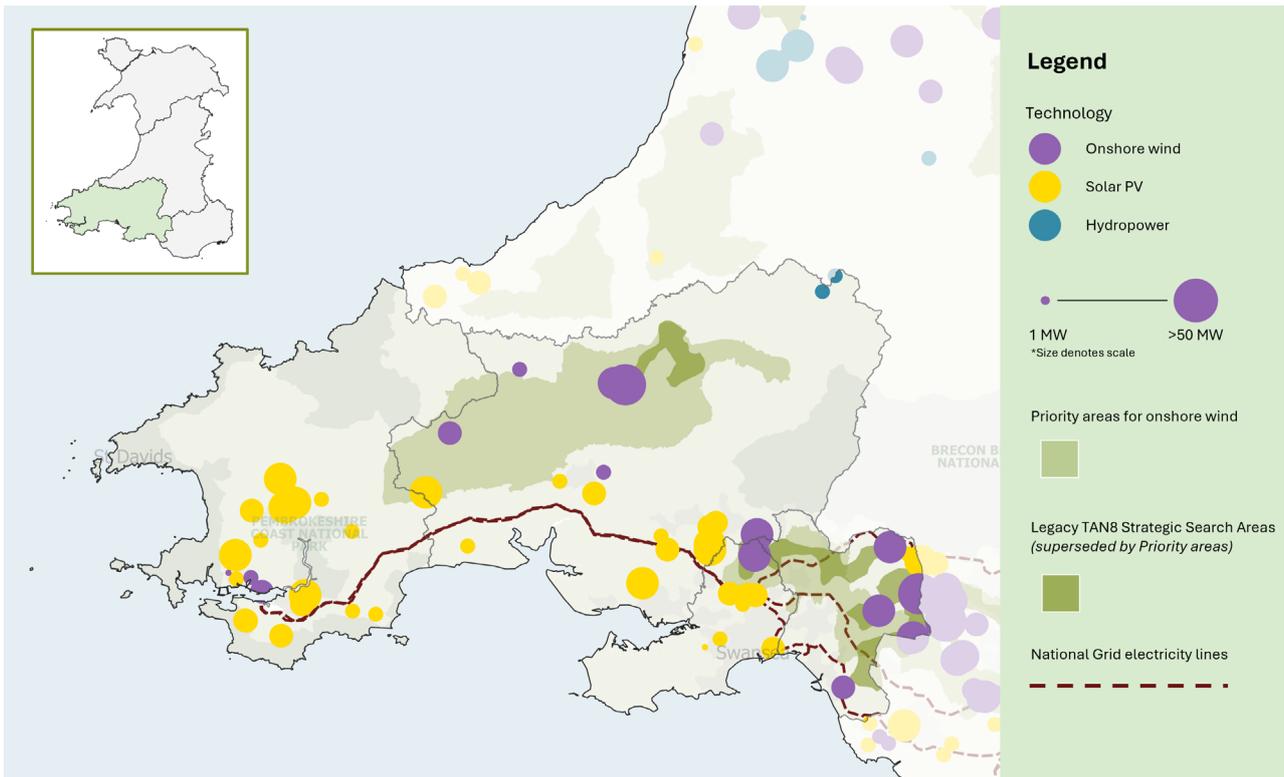


Data source: (12-26, 28)

Electricity generation across the Swansea Bay City region

The Swansea Bay City region’s renewable electricity generation landscape is largely made up of solar PV and onshore wind. Onshore wind generated over 1 TWh in 2024 and solar PV generated approximately 390 GWh in the same period. Onshore wind sites are concentrated at a larger scale in the east and north of the region; they are mostly within the identified Pre-Assessed Areas for onshore wind. Large-scale solar PV sites are more distributed across the region but largely follow along the south coast, similar to the location of the electricity transmission lines.

Swansea Bay City region electricity generation landscape

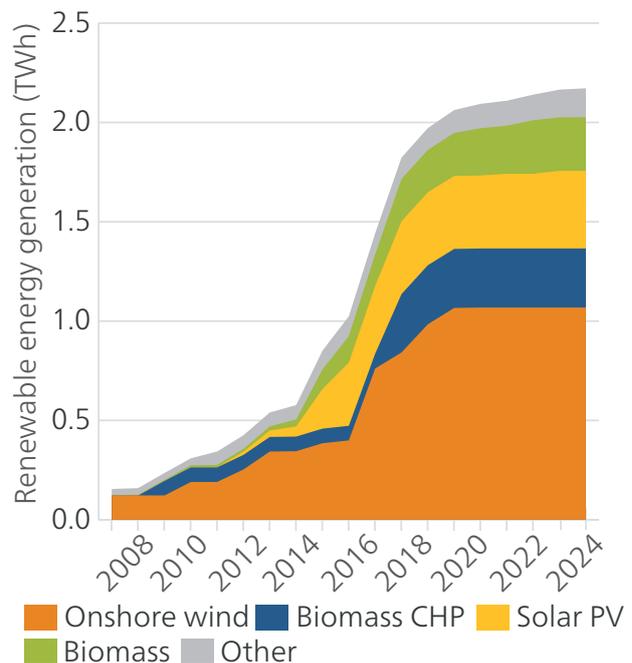


Renewable generation over time

In 2024, the proportion of total energy generation from each renewable technology in the Swansea Bay City region remained largely similar to previous years. Onshore wind is the largest contributor to total renewable generation in the region at 49%, followed by solar PV at 18%, biomass electricity and CHP at 14%, and biomass heat at 12%.

Renewable energy generation in Swansea Bay City region

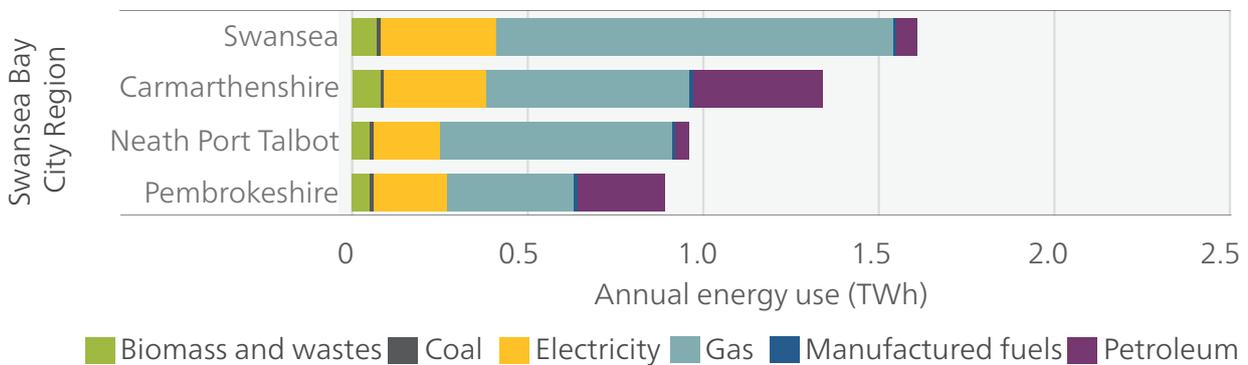
Data source: (12-26, 28)



Domestic and non-domestic energy use

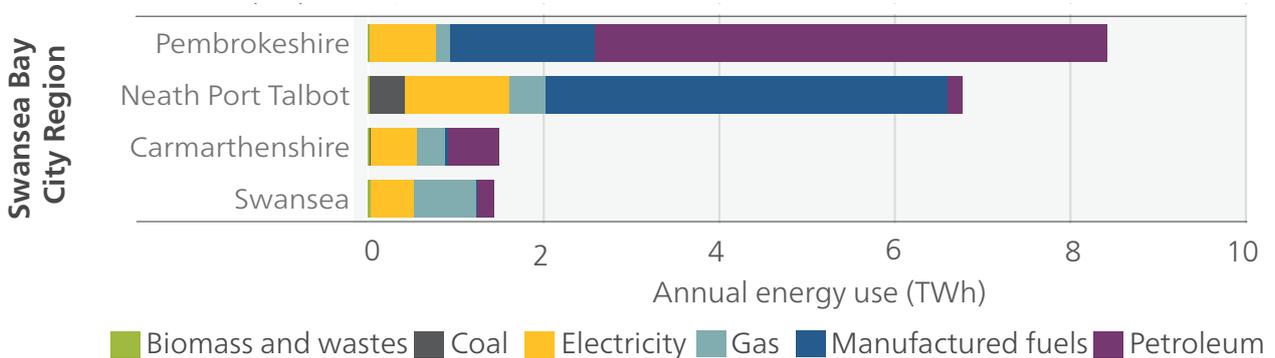
In the Swansea Bay City region, all local authority areas use gas as the primary domestic fuel (excluding transport), followed by electricity in half of the local authority areas. Pembrokeshire and Carmarthenshire both use more petroleum than electricity in the domestic sector. This reflects their largely rural character, with many homes not connected to the mains gas grid. Whilst Swansea and Carmarthenshire consume the most energy domestically, the opposite is true for non-domestic energy use, with Pembrokeshire and Neath Port Talbot consuming significantly higher amounts of energy as industrial hubs. Neath Port Talbot sees a majority use of manufactured fuels and a larger proportion of coal compared to other local authority areas. Pembrokeshire also has higher consumption of manufactured fuels compared to other areas, but petroleum remains its primary fuel source.

Domestic energy use by local authority in Swansea Bay City region, 2023



Data source: (1)

Non-domestic energy use by local authority in Swansea Bay City region, 2023



Data source: (1)

Case study: Brynrhyd solar farm



(image credit: inacio pires, Shutterstock.com)

The construction of Brynrhyd solar farm near the village of Llanedi in Carmarthenshire is nearing completion. Planning permission was granted in 2022 to the developer (Island Green Power) and it is expected to have a 30 MW capacity upon commissioning. The project offers a model for sustainable use of repurposed land.

The site lies partially on former coal mines and will allow continued use for sheep grazing as well as a protected area on the site for the rare butterflies. Brynrhyd contributes to Wales's wider push toward clean electricity generation, helping reduce reliance on fossil fuels while supporting local energy demand and emissions targets.

Local Area Energy Plans (LAEPs)

Wales is the first nation in the UK to have developed Local Area Energy Plans (LAEPs) with all of its local authorities. The plans were funded nationally but led and developed at the local level. A LAEP takes a whole systems approach to consider a local area's needs for low carbon heat, transport and power.

They set out the nature, scale, rate, and timings of the changes that need to be made to transition to a net zero energy system. They provide stakeholders with an understanding of the actions an area needs to take to reach its energy and climate goals, providing an insight into high priority projects such as installing heat pumps, rooftop solar PV, energy efficiency measures, and electric vehicle charging infrastructure.

Now the LAEPs have been created, Wales moves towards strategic delivery of the plans. Each of the four regions in Wales have energy teams in place to support local stakeholders unlock place-based decarbonisation.

Mid Wales

Generation and use in Mid Wales

In 2024, approximately 4,100 new renewable electricity and heat projects were commissioned in the Mid Wales region, representing 32 MW of new capacity and an additional 147 GWh of generation. Slightly under 40% of the commissioned projects were small-scale solar PV on domestic rooftops, while the remaining projects were predominantly heat pump installations which accounted for 61% of the new 2024 capacity.

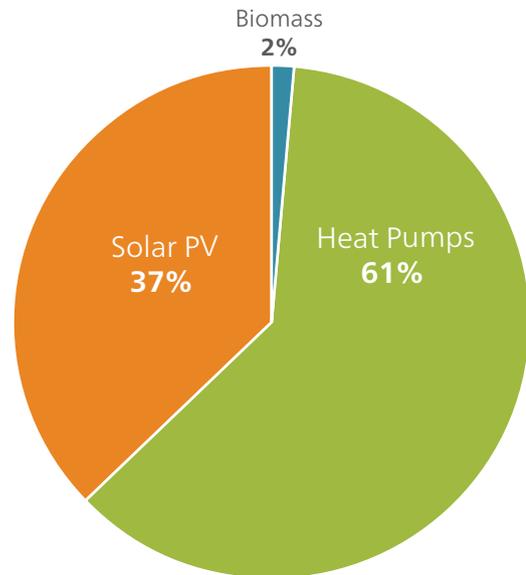
This brings the total renewable energy generation within Mid Wales region to 0.9 TWh and total energy generation to 1.7 TWh. Of all the region's local authority areas Powys saw the highest increase in renewable capacity, with just under 20 MW commissioned in 2024.

The most recent energy consumption data shows that approximately 4.6 TWh of energy was used across both of Mid Wales' local authority areas in 2023 (of which 0.9 TWh came from electricity). This is equivalent to 6% of all energy used across Wales. Powys consumes the largest proportion of energy in the Mid Wales region, using just over 3.1 TWh in 2023.

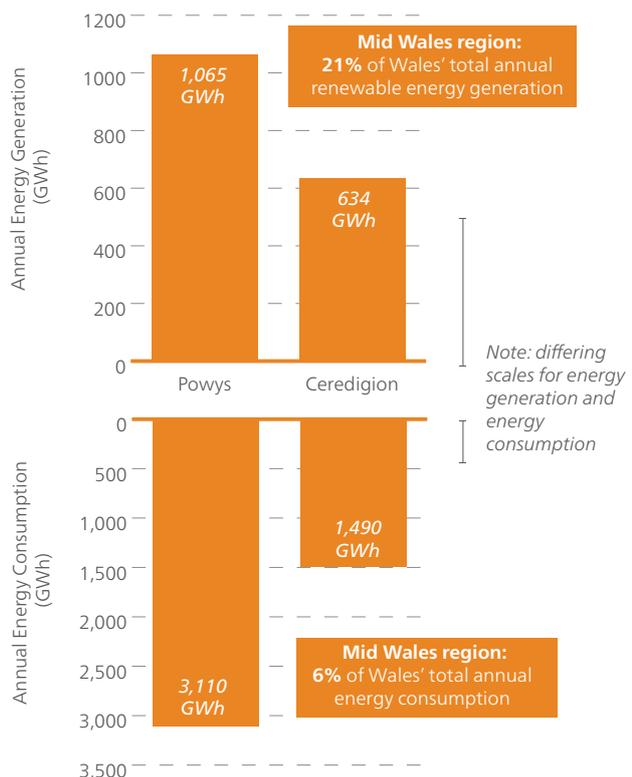
Estimated annual renewable energy generation and energy consumption in Mid Wales region, 2024

Data source: (12-26, 28)

Percentage of renewable electricity and heat capacity commissioned in 2024, by technology



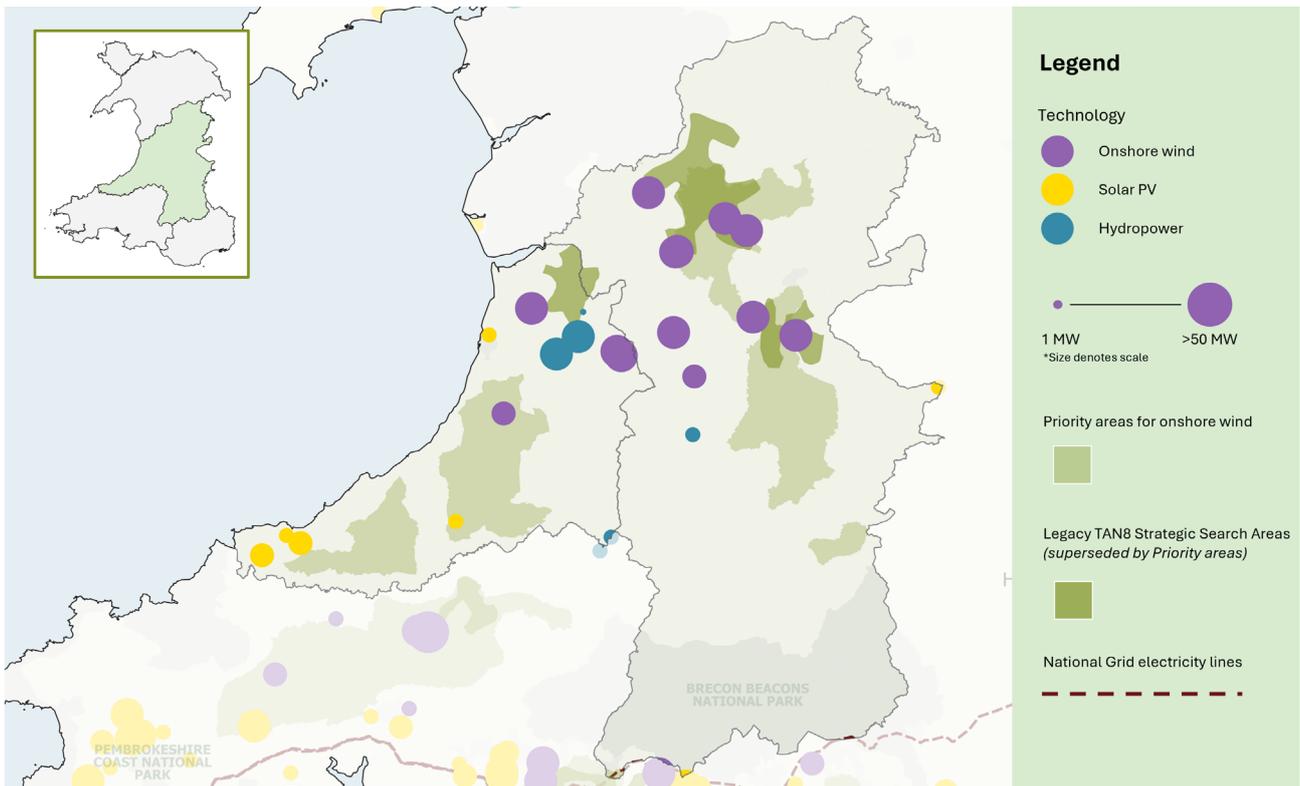
Data source: (12-26, 28)



Electricity generation across the Mid Wales region

The Mid Wales region's renewable electricity generation landscape is largely made up of onshore wind and hydropower. Onshore wind generated over 730 GWh in 2024 and hydropower generated approximately 125 GWh in the same period. Onshore wind sites are largely concentrated in the north of the region and are mostly within the identified Pre-Assessed Areas for onshore wind. The two largest hydropower sites are located in the north of Ceredigion and there are a few large-scale solar PV generation sites distributed in the west of the region.

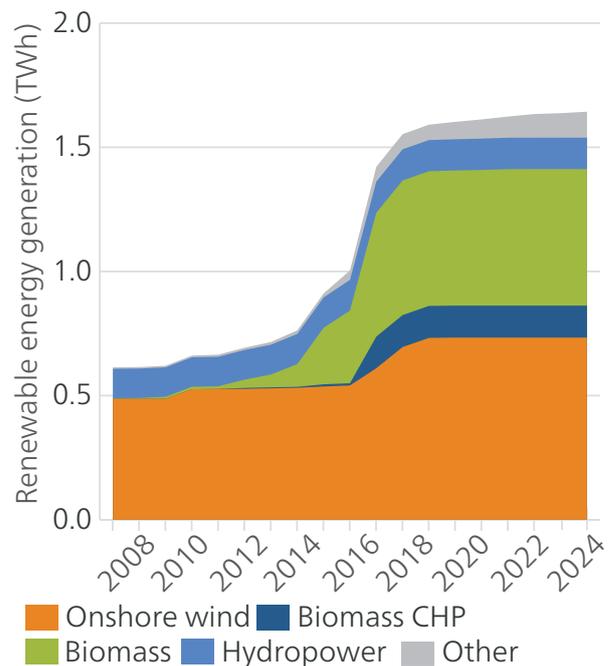
Mid Wales region electricity generation landscape



Renewable generation over time

In 2024, the proportion of total generation from each renewable technology in the Mid Wales region remained largely similar to previous years.

Onshore wind remains the largest contributor to total renewable generation in the region at 45%, followed by biomass heat at 33%, biomass electricity and CHP at 8%, and hydropower at 8%.



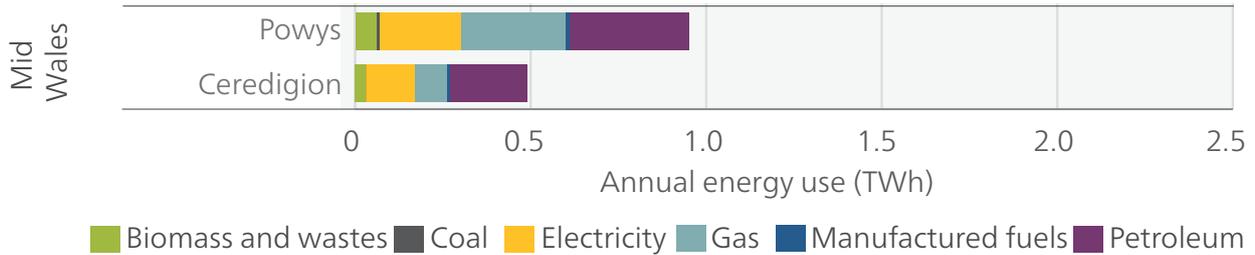
Renewable energy generation in Mid Wales region

Data source: (12-26, 28)

Domestic and non-domestic energy use

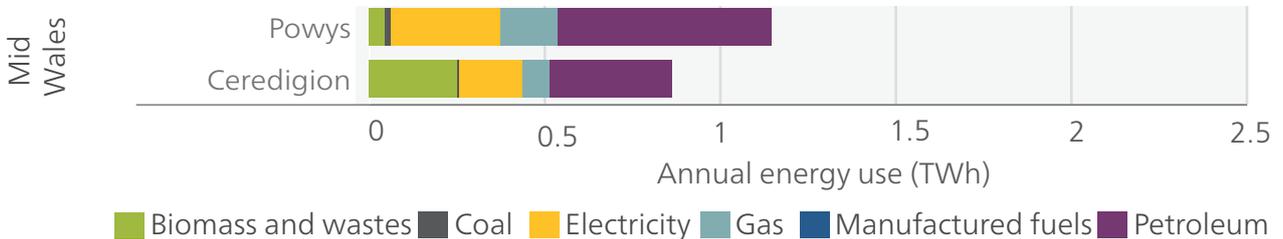
In the Mid Wales region, both local authority areas see petroleum as the primary domestic fuel (excluding transport), followed by electricity in Ceredigion and gas in Powys. This corresponds to the region as a predominantly rural area, with many homes not connected to the mains gas grid. Both local authority areas consume a much smaller amount of non-domestic energy when compared to the other Welsh regions, with petroleum the most common non-domestic fuel across Mid Wales.

Domestic energy use by local authority in Mid Wales region, 2023



Data source: (1)

Non-domestic energy use by local authority in Mid Wales region, 2023



Data source: (1)

Case study: Rheidol Hydropower Station



Cwm Rheidol Dam (image credit: Statkraft)

Rheidol Hydropower Station is a 49 MW hydropower plant located in the Cwm Rheidol valley near the town of Aberystwyth in Ceredigion and celebrated its 60th anniversary in 2024.

The hydropower scheme is made up of an interconnecting group of reservoirs, dams, pipelines, aqueducts and power stations, and covers a total area of 162 square kilometres. It produces around 93 GWh of electricity annually, enough to power an equivalent of 35,000 average Welsh homes and is the largest hydropower scheme of its type in England and Wales.

Its ongoing successful operation demonstrates the enduring value of hydropower in Wales's clean energy mix.

North Wales

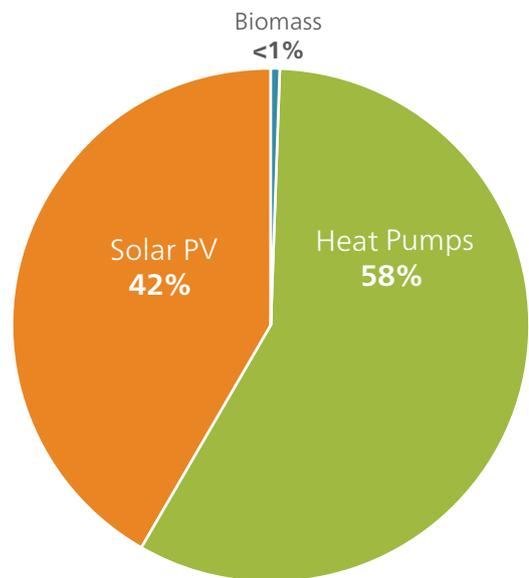
Generation and Use in North Wales

In 2024, approximately 7,900 new renewable electricity and heat projects were commissioned in the North Wales region, representing 57 MW of new capacity and an additional 223 GWh of generation. The North Wales region saw the highest number of new projects in 2024 than any other region. Slightly over 40% of the commissioned projects were small-scale solar PV on domestic rooftops, while the remaining projects were predominantly heat pump installations which accounted for 58% of the new 2024 capacity.

This brings the total renewable energy generation within the North Wales region to 1.3 TWh and total energy generation to 4 TWh. Of all the local authority areas in the region, Gwynedd saw the highest increase in renewable capacity, with just under 14 MW commissioned in 2024.

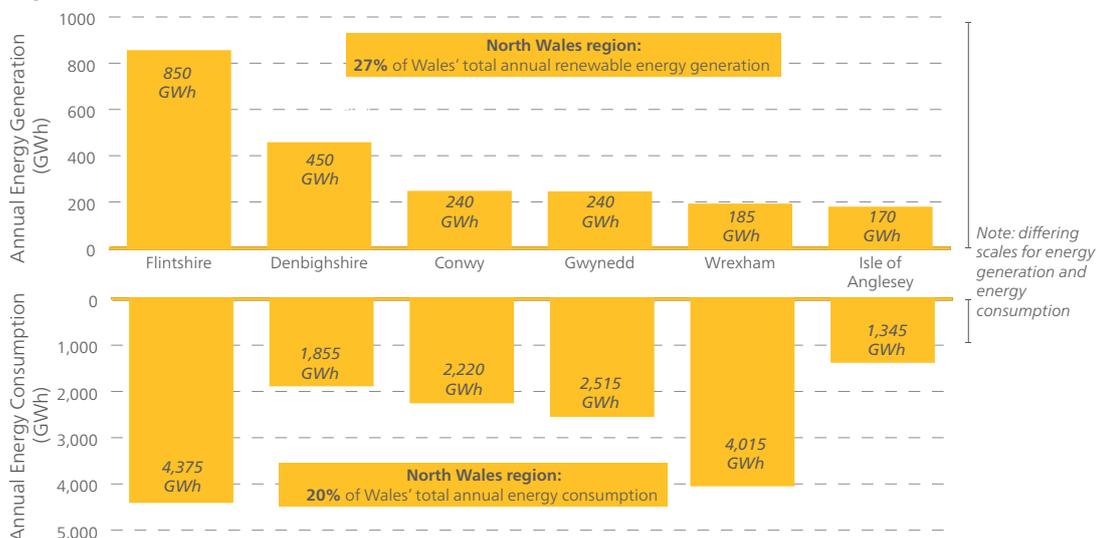
The most recent energy consumption data details over 16.3 TWh of energy used across North Wales' six local authority areas over 2023 (of which 3 TWh is from electricity). This is equivalent to 20% of all energy used across Wales. Flintshire consumes the largest proportion of energy in the wider North Wales region, using just over 4 TWh in 2023.

Percentage of renewable electricity and heat capacity commissioned in 2024, by technology



Data source: (12-26, 28)

Estimated annual renewable energy generation and consumption in North Wales region, 2024

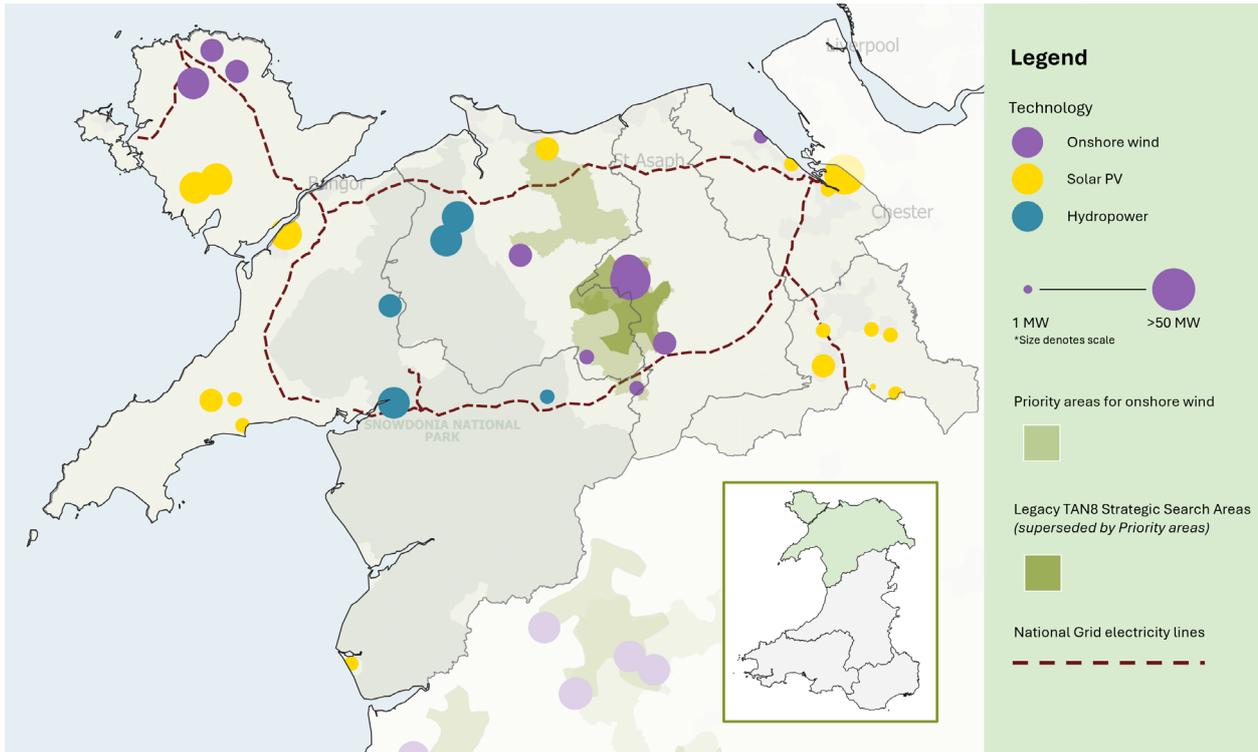


Data source: (12-26, 28)

Electricity generation across the North Wales region

The North Wales region renewable electricity generation landscape is made up of a mixture of biomass, onshore wind, hydropower and solar PV. Onshore wind generated over 580 GWh in 2024, solar PV generated approximately 230 GWh and hydropower generated just over 200 GWh in the same period. Onshore wind sites are concentrated in two locations, the north of Anglesey and centrally within the region, corresponding to the Pre-Assessed Areas identified for onshore wind. Hydropower sites are found largely within Eryri National Park. Large-scale solar PV is more distributed along the east and west sides of the region.

North Wales region electricity generation landscape

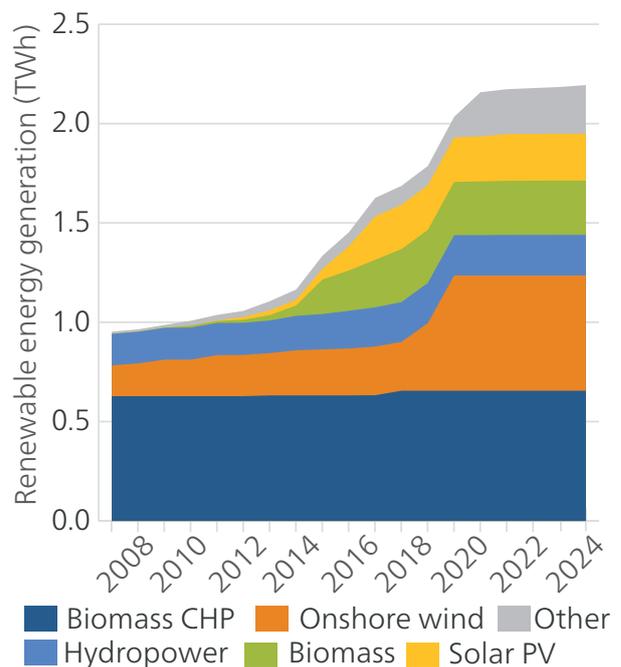


Renewable generation over time

In 2024, the proportion of total generation from each renewable technology in the North Wales region remained largely similar to previous years. Biomass electricity and CHP remains the largest contributor to total renewable generation in the region at 30%, followed by onshore wind at 26%, biomass heat at 12%, solar PV at 11% and hydropower at 9%.

Renewable energy generation in North Wales region

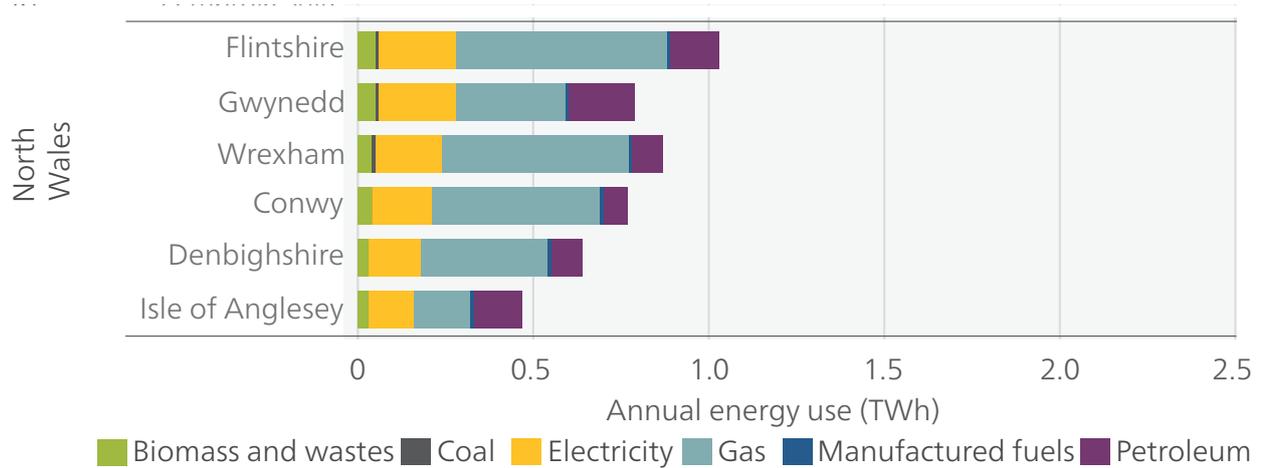
Data source: (12-26, 28)



Domestic and non-domestic energy use

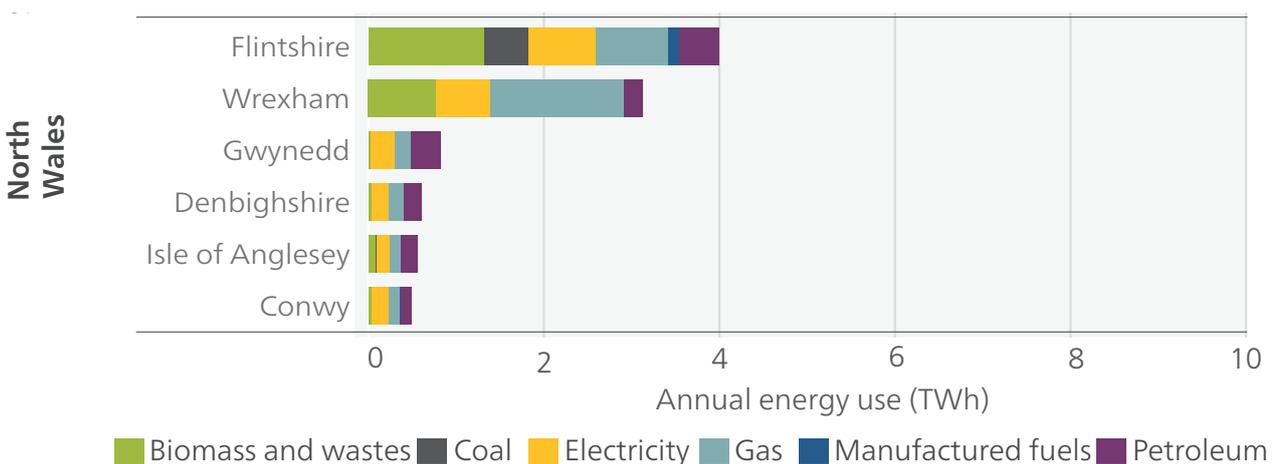
In the North Wales region, all local authority areas see gas as the primary domestic fuel (excluding transport), followed by electricity. Within the region, Gwynedd sees a larger proportion of petroleum as a domestic fuel source, and consequently a smaller proportion of gas. Flintshire and Wrexham consume the most non-domestic energy by a significant margin when compared to the other four regions. Flintshire uses a range of fuels for non-domestic energy, including a large amount of coal comparative to other areas as well as a large amount of biomass and waste. In Wrexham, non-domestic energy use is dominated by gas, followed by biomass and waste.

Domestic energy use by local authority in North Wales region, 2023



Data source: (1)

Non-domestic energy use by local authority in North Wales region, 2023



Data source: (1)

Case study: Museum Wales retrofit



National Slate Museum (image credit: Museum Wales)

In 2024, Museum Wales secured over £1 million through the Welsh Government Energy Service's Public Sector Low Carbon Heat Grant. The grant will support low-carbon heating upgrades and insulation improvements across four of its seven heritage sites:

- National Slate Museum (Llanberis, Gwynedd): a gas oil boiler replaced with an 18 kW air source heat pump.
- St Fagans National Museum of History (Cardiff): four gas boilers replaced with 210 kW air source heat pumps.
- National Wool Museum (Drefach-Felindre, Carmarthenshire): two LPG boilers replaced with 153 kW air source heat pumps.
- Big Pit National Coal Museum (Blaenafon, Torfaen): replaced a gas boiler with a 64 kW air source heat pump.

The switch is projected to save nearly 50 tonnes of CO₂ per year across the four sites. Beyond emission reductions, the project removes dependence on oil, LPG, and gas deliveries (especially important for remote sites) whilst improving energy security.

By updating historic and cultural buildings with modern low-carbon heating, Museum Wales sets a leading example for public-sector decarbonisation to preserve and operate Wales's cultural heritage sites sustainably. This helps safeguard Welsh heritage while supporting national net-zero ambitions, showing how historic estates and public institutions can contribute to a low-carbon future.

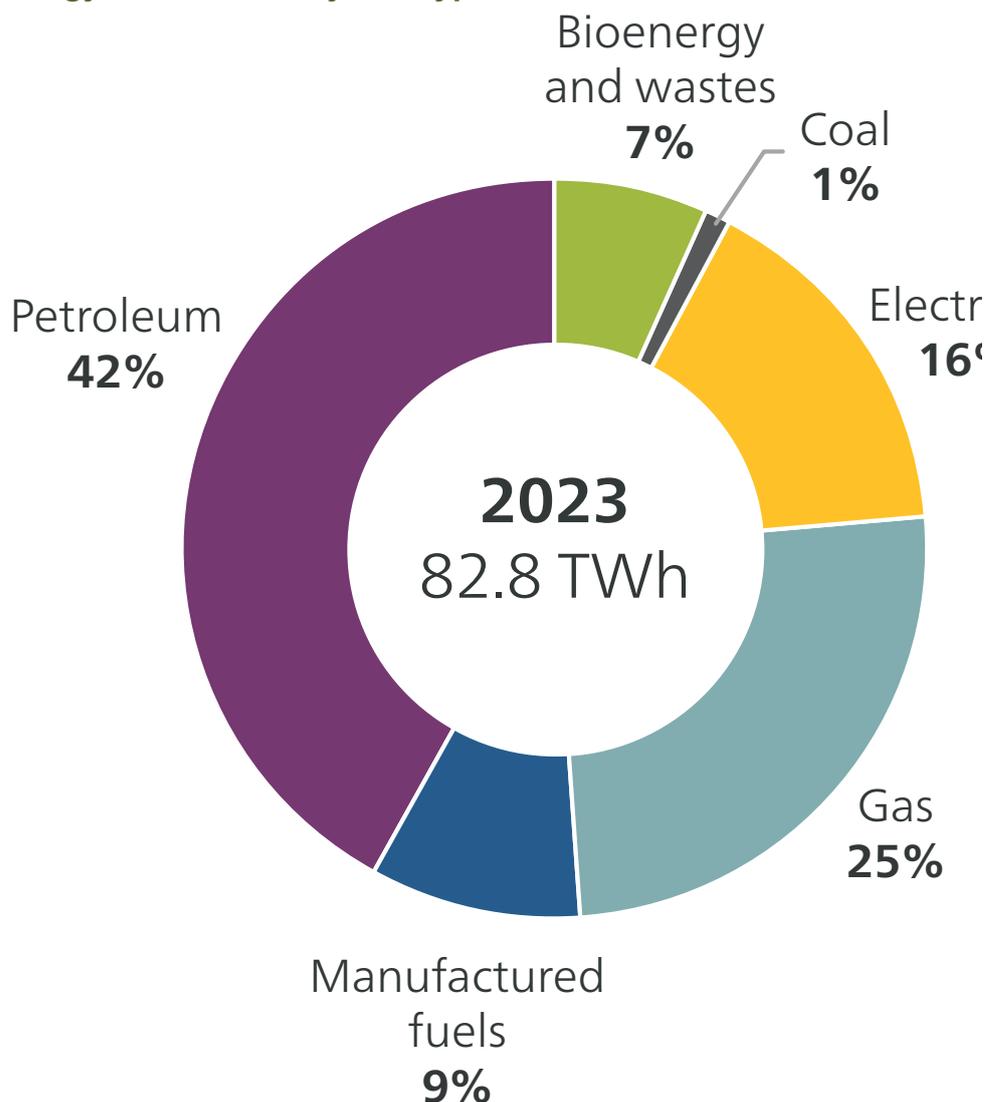
Energy consumption trends

Energy consumption by fuel

Nearly 70% of Welsh energy use comes from petroleum and gas. Petroleum is still the most consumed fuel, accounting for 43% of total energy consumption, and is primarily used for transportation.

Gas is still the second most-used fuel across Wales, although its use has decreased by 3% since 2021. It now makes up 25% of total energy consumed in Wales. Gas is widely used for heating, industrial processes and gas-fired power generation. Electricity use as a fuel source has stayed stable since 2021 and continues to represent 16% of the total. It is used largely in industry for processes such as heating, motor power, refrigeration, and lighting. The remaining energy comes from manufactured fuels (like coke), bioenergy (such as biodiesel), waste fuels, and coal.

Total energy use in Wales by fuel type



Data source: (1)

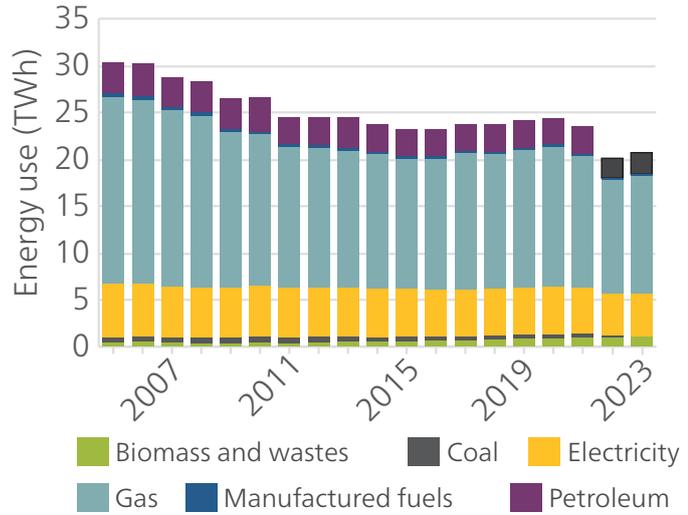
Domestic and non-domestic energy consumption by fuel type

Domestic

Domestic energy consumption rose slightly over the last year, increasing from 20.0 TWh in 2022 to 20.7 TWh in 2023. Despite this small uptick, the longer-term trend continues to decline.

Domestic energy use by fuel type

Data source: (1)

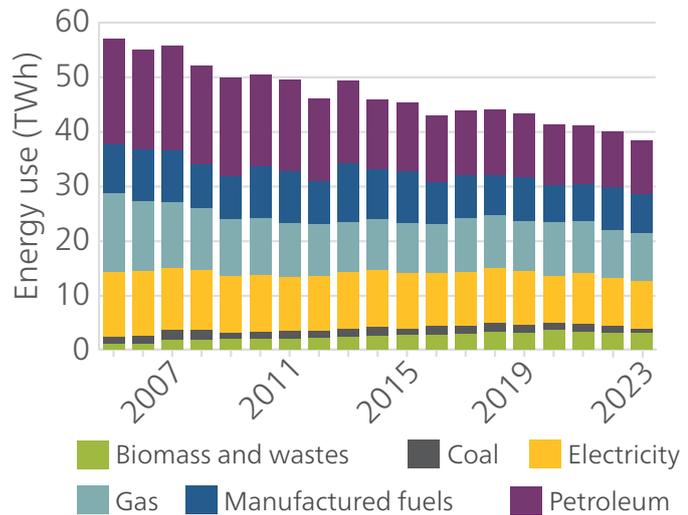


Non-domestic

Non-domestic energy consumption fell by 1.5 TWh in the last year, dropping from 39.8 TWh in 2022 to 38.3 TWh in 2023. The historic trend for non-domestic energy use has seen a steeper decline than for domestic consumption.

Non-domestic energy use by fuel type

Data source: (1)



Fossil gas

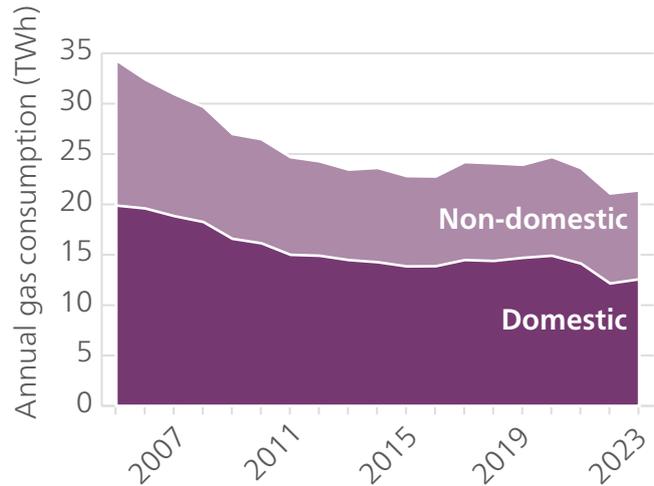
Gas consumption in Wales

Total gas consumption in 2023 was 21.4 TWh, an increase of 0.3 TWh from the previous year. Of this, 12.5 TWh was used in the domestic sector and 8.8 TWh in non-domestic settings.

Domestic gas use (mainly for heating, cooking, and hot water) rose by 0.4 TWh in the last year and now makes up nearly 60% of all gas consumption. Conversely, non-domestic gas use fell by 0.1 TWh in the same period and represents just over 40% of the total.

Over the past 15 years, Welsh gas consumption has fallen by 5.6 TWh and 40% of this reduction has occurred in the last two years alone driven by the gas price crisis (since the previous Energy Use in Wales analysis was completed in 2021). This long-term decline is largely driven by improvements in domestic energy and heating efficiency, the uptake of heat pumps (replacing gas boilers) and a reduced industrial demand for gas.

Gas consumption in Wales, 2005 – 2023



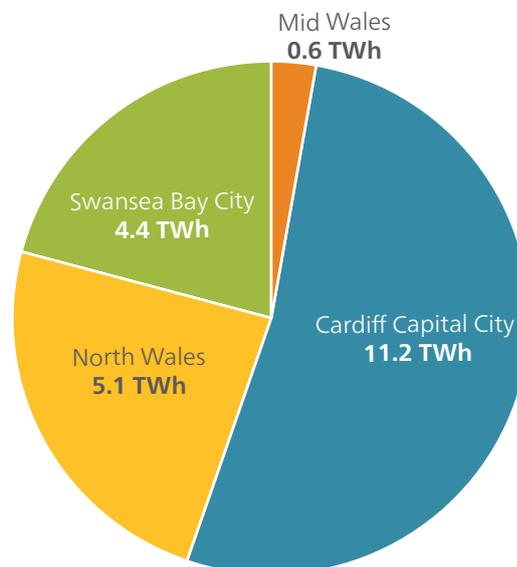
Data source: (8)

Regional gas consumption

In 2023, the Cardiff Capital region consumed the most gas of all the Welsh regions, using 11.2 TWh (around 53%) of Wales' total. This level has remained unchanged since 2021 and reflects the fact that nearly half of the Welsh population live in this area.

Mid Wales consumed the least gas at 0.6 TWh (3% of the total), also unchanged from 2021. This low level is likely due to a smaller population residing in the region (around 7% of the Welsh total) as well as limited connectivity to the gas grid.

Proportion of annual gas consumption by region 2023



Data source: (8)

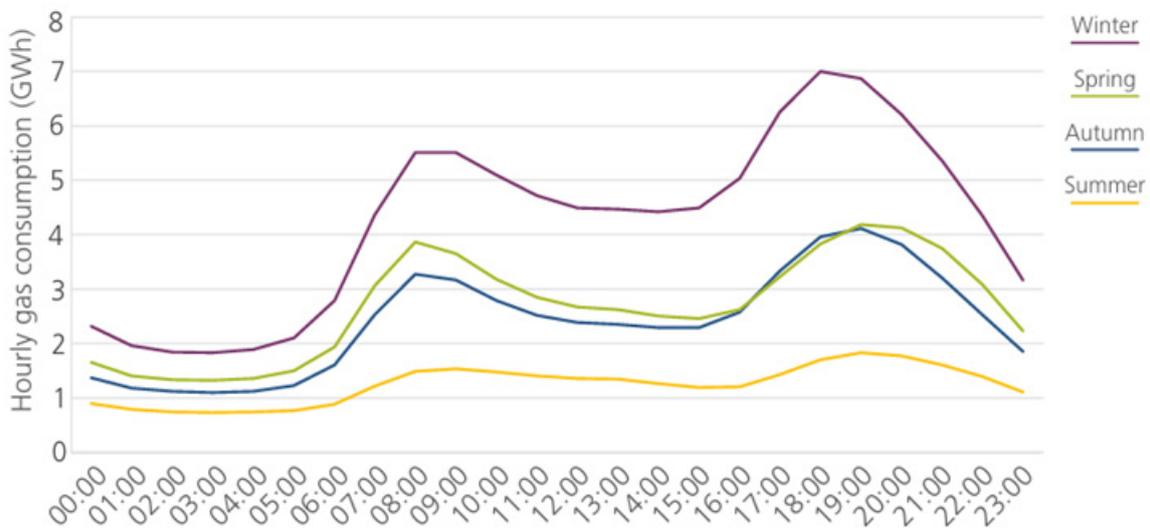
The share of homes connected to the gas network in Wales closely reflects how urban or rural an area is. The gas grid is most developed in densely populated local authority areas, especially within the Cardiff Capital region and the more industrial areas of northeast Wales. As a result, gas consumption is higher in urban areas and significantly lower in rural areas, where fewer homes are connected.

Gas consumption patterns

Gas consumption data from Wales and West Utilities is reported for two customer types: daily metered customers, typically large industrial sites whose gas use is recorded every day and non-daily metered customers, made up of domestic households and commercial premises.

Daily metered gas consumption is relatively steady throughout the year, making up around 2% of total monthly gas use, whereas non-daily metered consumption shows strong seasonal variation. In line with the need for more space heating in winter the demand rises sharply during the colder months, with nearly two-thirds of annual usage occurring in this period. Conversely, during the warmer period from June to September, non-daily metered consumption only accounts for just over 10% of the yearly total.

Typical variation in daily gas consumption by season in Wales



Data source: (29)

In addition to seasonal changes, gas demand also varies noticeably throughout the day. Daily use typically follows two clear peaks driven by heating, hot water, and cooking: a morning peak between 7am and 9am, when most people begin their day, and an evening peak from 5pm to 9pm, when most people are likely to be cooking and heating their homes. Demand is lowest overnight, when household and commercial activity is minimal. This daily pattern is particularly prevalent during winter but is visible year-round because the need for hot water and cooking continues in the summer when heating demand is low.

Electricity

Electricity consumption in Wales

Total electricity consumption in Wales fell slightly in 2023 to 13.1 TWh (and has reduced by 2.6 TWh over the past 15 years.) Of the 2023 electricity consumption, 34% was used in homes, a small increase from the previous year, while 66% was used in non-domestic settings, a corresponding slight decrease.

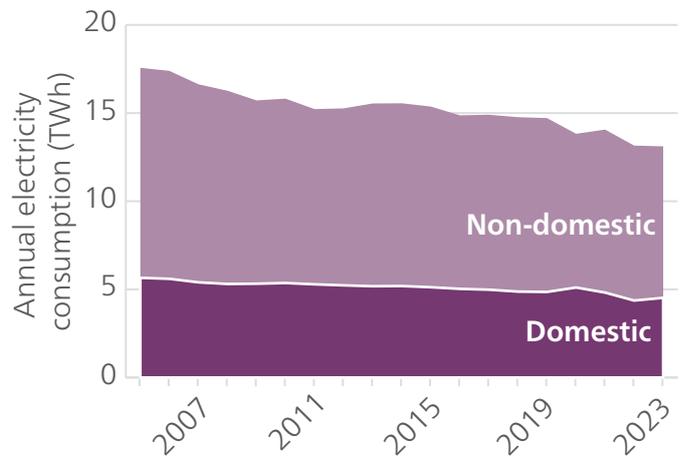
These changes are likely influenced by shifting work and leisure patterns as a consequence of the COVID-19 pandemic and the growing adoption of electrification technologies, such as heat pumps and electric vehicles.

Regional electricity consumption

The proportion of annual electricity consumption for each of the four Welsh regions has not changed significantly since 2021, with only minor variations in usage seen.

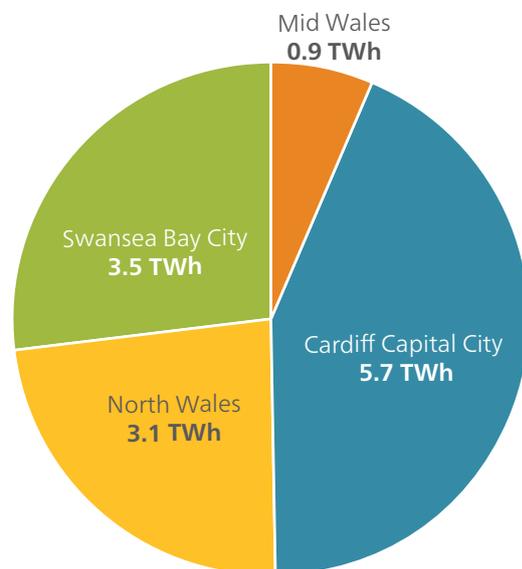
The Cardiff Capital region continues to use more than any other region, at 43% (an increase of 2% from 2021) and is likely due to the region being home to nearly half of the Welsh population. Swansea Bay City region has seen a 2% reduction in its share of electricity consumption; North Wales has increased its share by 1% whilst Mid Wales has remained the same at 6%.

Electricity consumption in Wales, 2005 – 2023



Data source: (9)

Proportion of annual electricity consumption by region 2023



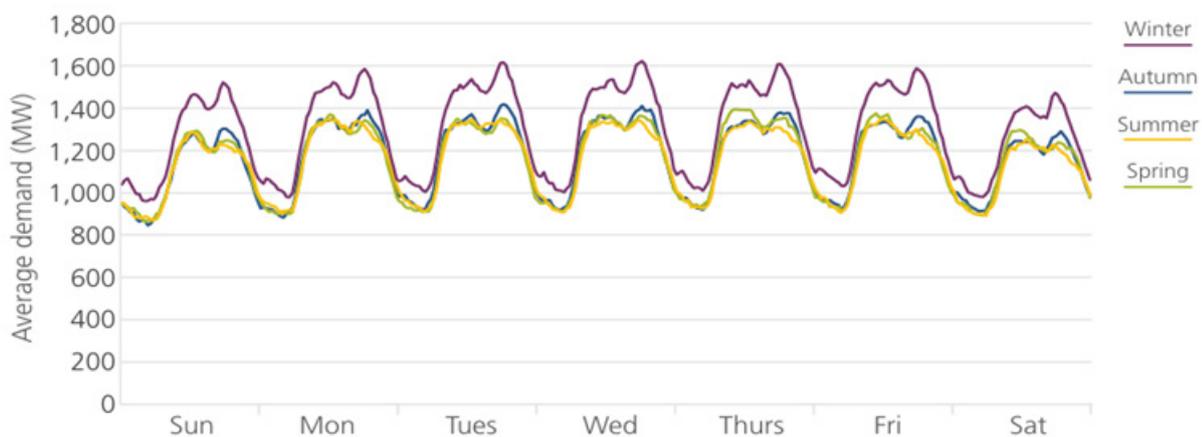
Data source: (9)

Electricity consumption patterns

On a per-household or per-capita basis, electricity consumption is higher in rural areas, where more homes and businesses rely on electricity for space heating.

Analysis of half-hourly electricity demand typically shows two clear 'peaks' during the daytime across the year: a morning peak around 8am and an evening peak between 5pm and 9pm. These peaks are more pronounced in colder months because of an increased need for heating, with a higher overnight demand in winter likely linked to night storage heating. Increasing overnight demand all year round may be seen from EV charging. Weekend consumption throughout the year is slightly lower likely due to a proportion of businesses either closing or reducing their demand. Seasonal variations in electricity use are less pronounced than for gas, as a smaller proportion of electricity is used for heating.

Typical average half-hourly electricity demand by day and season within the South Wales licence area



Data source: (29)

As Wales moves towards net zero, electricity use for both heating and transport is expected to rise due to a projected increase in the uptake of heat pumps and electric vehicles. This will alter seasonal and daily consumption patterns and likely require measures such as network investment, new market arrangements, as well as storage and flexibility measures to prepare for this.

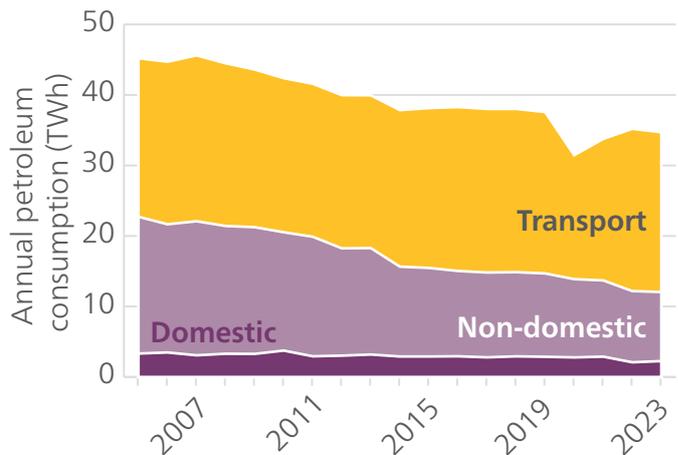
Petroleum

Petroleum consumption in Wales

Total petroleum consumption in 2023 was 34.7 TWh, a decrease of nearly 0.5 TWh since 2022. Of this, 65% was used for transportation, 28% in non-domestic settings and 7% in homes for heating.

There was a sharp decrease in petroleum consumption between 2019 and 2020, from 38 TWh to 31 TWh, due to reduced road transport activity resulting from COVID-19 restrictions and subsequent changes in behaviour.

Petroleum consumption in Wales, 2005 – 2023



Data source: (1)

Regional petroleum consumption

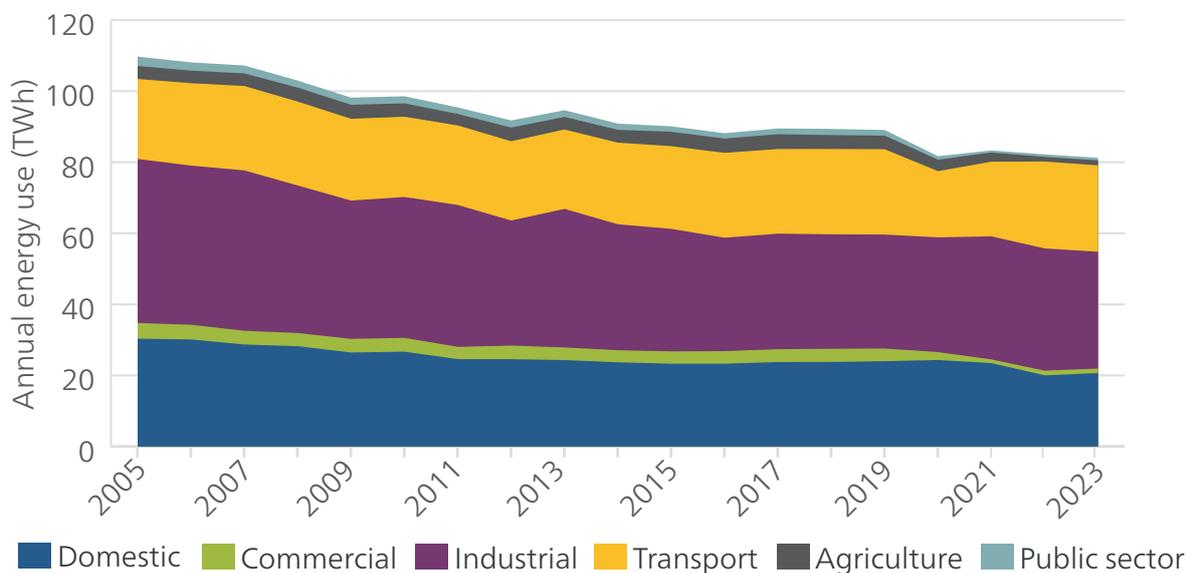
In terms of mileage relative to population, there are high levels of vehicle mileage in local authority areas containing major strategic roads, with Monmouthshire having the highest proportion of vehicle miles per person in 2023. This is compared to the more rural and sparsely populated local authority areas. Caerphilly and Blaenau Gwent, have the lowest proportion of vehicle miles per person in 2023.

Energy consumption by sector

The energy used by different sectors in Wales continued the previous downward trend, with the exception of transport.

The industrial sector remains the largest energy consumer, accounting for 40% of total energy consumed, a slight increase over the past year. This is followed by the transport sector at 30%, which has also risen slightly, and the domestic sector at 25% which has remained unchanged.

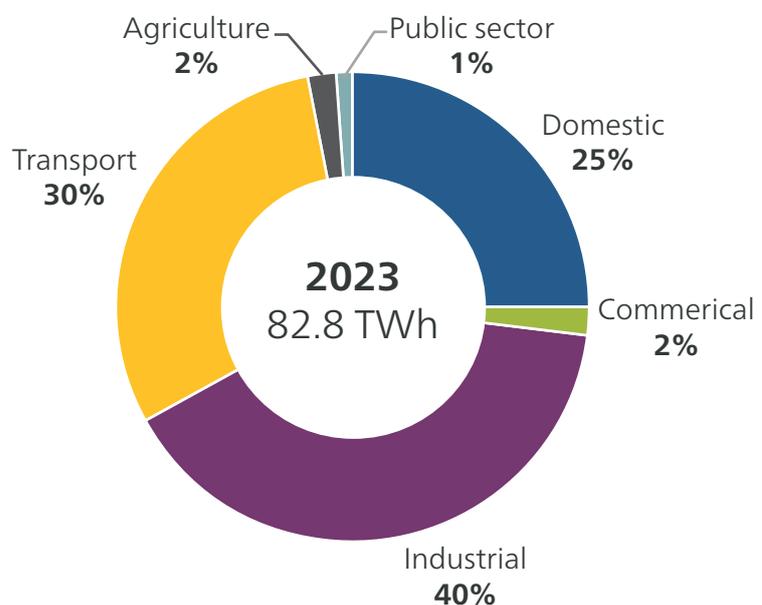
Energy use by sector, 2005 – 2023



Data source: (1, 4, 6, 27)

Energy consumption in Wales in 2023

Over the last ten years, energy use has decreased across almost all sectors with the exception of transport which has seen a 2 TWh increase. In the last ten years, the industrial sector has seen the largest decrease in overall energy use at just over 6 TWh.



Data source: (1, 4, 6, 27)

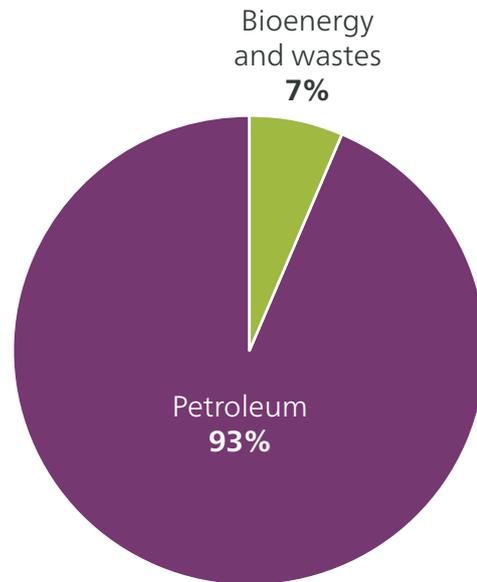
Transport

Over the past ten years, around 23 TWh has been used by transport annually. In 2023, this figure was slightly higher at 24.3 TWh and accounted for 30% of all energy consumed in Wales which is broadly consistent with the UK average. Notably, energy consumption for transport fell sharply to 18.6 TWh in 2020 (the lowest in a decade), due to reduced travel during the COVID-19 pandemic.

The Department for Energy Security and Net Zero (DESNZ) energy consumption data does not currently include electricity use from electric vehicles in its transport sector data reporting.

However, assuming Wales's 32,168 battery electric cars in 2024 each travel 8,500 miles per year with an average efficiency of 3 miles per kWh, their total electricity use is around 0.09 TWh annually which is less than 1% of the total transport energy consumption¹². The upcoming ban in the sale of new petrol and diesel cars may see an increased uptake in EVs in the future, which could influence energy consumption trends.

Transport consumption by fuel, 2023



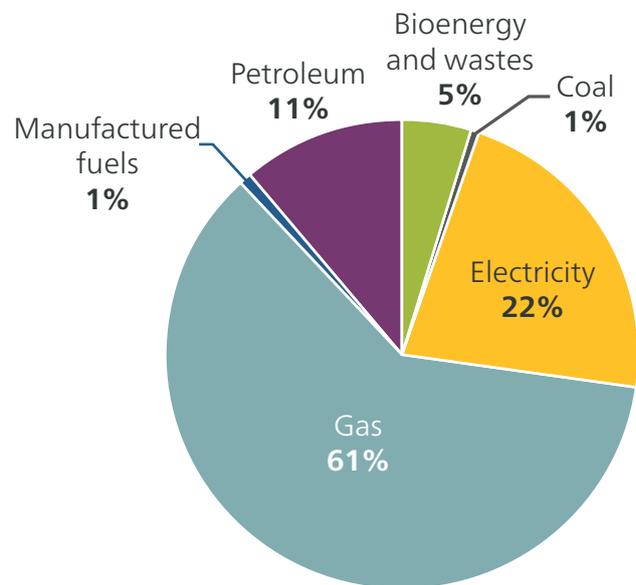
Data source: (1)

Domestic

Domestic energy consumption in Wales has reduced by over 3.5 TWh in the last decade and decreased by over 0.5 TWh in the last year alone. In 2023, the domestic sector used 20.6 TWh of energy, representing 25% of total Welsh energy consumption.

The majority of domestic energy consumption comes from fossil fuels with gas continuing to be the primary fuel consumed in domestic buildings. Improvements in energy and heating efficiency have helped to reduce overall domestic energy demand. The share of Welsh homes rated EPC band C or above has steadily increased from 26% in 2013 to 41% in 2023 with urban areas typically having higher average EPC ratings than rural areas.

Domestic consumption by fuel, 2023



Data source: (9)

¹² DfT and DVLA, 2026. [Vehicle licensing statistics data tables](#).

Case study: EV Rally Cymru

Launched in 2021 during COP26 in Glasgow, EV Rally Cymru is a national electric-vehicle showcase across Wales part-funded by Welsh Government & Climate Action Wales. The 2024 edition was a two-day, 500-mile journey beginning in Wrexham and finishing at Newport Stadium. Over 25 electric vehicles from 13 teams took part, including EVs from private companies, fleets, and public-sector organisations. The rally's aim is to challenge scepticism over EV range and charging availability and to showcase the growing public charging infrastructure across Wales as well as supporting Wales's broader decarbonisation and clean-mobility goals.

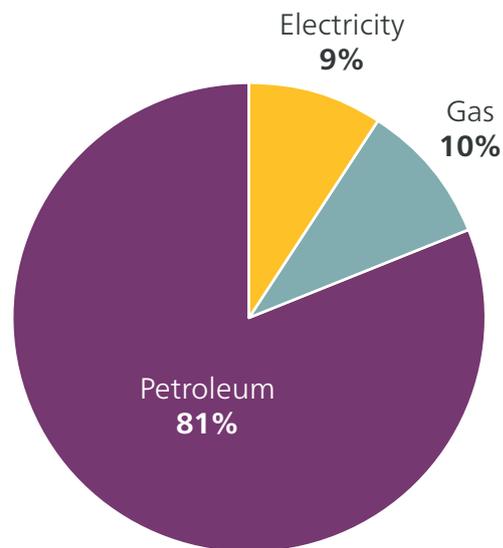


EV Rally Cymru route (image credit: EV Rally)

Agriculture

The agriculture sector consumed 1.4 TWh of energy in 2023, one of its lowest figures since 2005. The vast majority of this is petroleum which fuels both mobile agricultural machinery and stationary combustion. Over the last ten years, the sector has averaged 3.1 TWh of energy consumption annually. The highest agricultural energy use is found in Powys, Carmarthenshire and Pembrokeshire, reflecting the concentration of farming activity in these areas.

Agriculture consumption by fuel, 2023

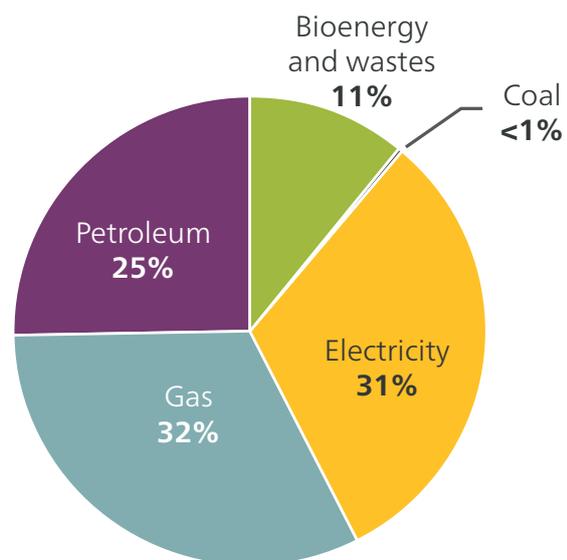


Data source: (1)

Commercial

Commercial energy use covers private-sector activities outside of industry, such as offices and retail. Over the past decade, commercial consumption has averaged 2.8 TWh per year, but since the COVID-19 pandemic it has fallen sharply and now stands at 1.3 TWh in 2023. This decline is likely due to a combination of several factors including energy-efficiency improvements as well as the rise of home and hybrid working. Commercial energy has typically been highest in Wales' most urban areas, including Cardiff, Swansea, and Wrexham.

Commercial consumption by fuel, 2023



Data source: (9)

Gas and electricity remain the most used fuel in the commercial sector – making up 32% and 31% of the fuel mix respectively. Bioenergy and waste have remained steady at 16% since 2021, but this is a sharp increase from the 4% share in 2005.

Petroleum use makes up 25% of the commercial fuel mix in 2023 with 3.5 TWh consumed. This is a marked difference from the 2021 Energy Use in Wales report, when it was recorded at less than 1%. However, this is due to a significant methodology and calculation change in the source data which is published by DESNZ . Applying the updated methodology to backdated historic data shows that petroleum use in the commercial sector for 2021 would have been 3.8 TWh, indicating a decrease compared to the previous analysis period.

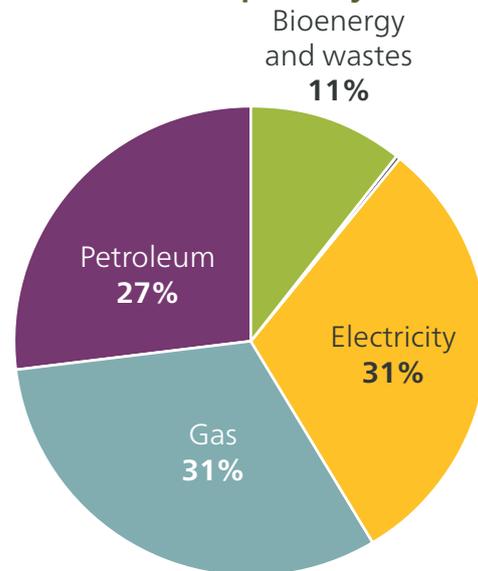
¹³ Methodology and guidance for DESNZ datasets can be found on its [website](#).

Public Sector

The public sector has consistently been the lowest energy-consuming sector in Wales since 2005. In 2023 it used 0.7 TWh, matching the 2021 figure, and over the past decade has averaged 1.33 TWh annually. Gas, electricity and bioenergy and waste consumption have all fallen since 2021.

Petroleum stands at 27% of total public sector energy use with a total of 2.1 TWh consumed – again, this is a marked difference from the 2021 Energy Use in Wales report, when it did not appear in the fuel mix of this sector.

Public sector consumption by fuel, 2023



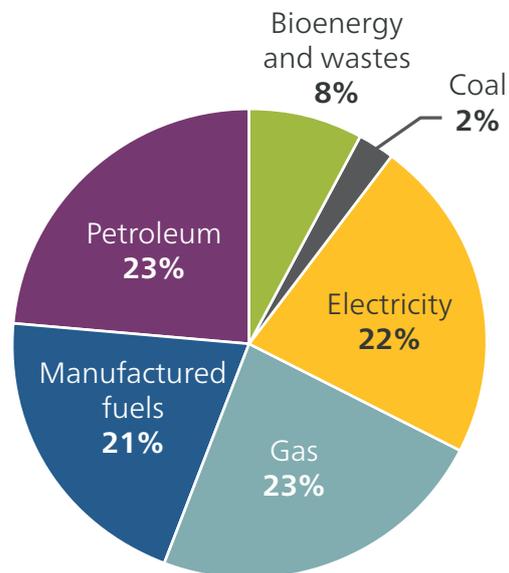
Data source: (1)

This is due to the same source data discrepancy seen in commercial sector energy consumption above and is due to a significant methodology and calculation change in the source data (published by DESNZ)¹⁴. Applying the updated methodology to backdated data shows that petroleum use in the public sector for 2021 would have been 2.7 TWh, confirming that this sector also experienced a reduction compared to the previous analysis period.

Industrial

The industrial sector has experienced the largest reduction in energy consumption of any sector over the past decade, with usage totalling nearly 33 TWh in 2023, a reduction of over 6% over the last ten years. This decline is driven by several factors, including a reduction in energy-intensive activities such as steel production, changes in the industrial fuel mix, and improvements in energy efficiency and a decrease in industrial employment opportunities. Pembrokeshire accounts for almost a quarter of Wales's industrial energy use, largely due to the presence of a major oil refinery.

Industrial consumption by fuel, 2023



Data source: (9)

Petroleum use in industry has halved since 2005 and now accounts for 23% of industrial consumption, down 4% since 2021. Other fossil fuel trends include a 3% reduction in coal use and a corresponding 3% rise in gas. Manufactured fuel use has remained stable, electricity consumption has increased slightly, and bioenergy and waste use has grown by 1%.

¹⁴ Methodology and guidance for DESNZ datasets can be found on its [website](#).

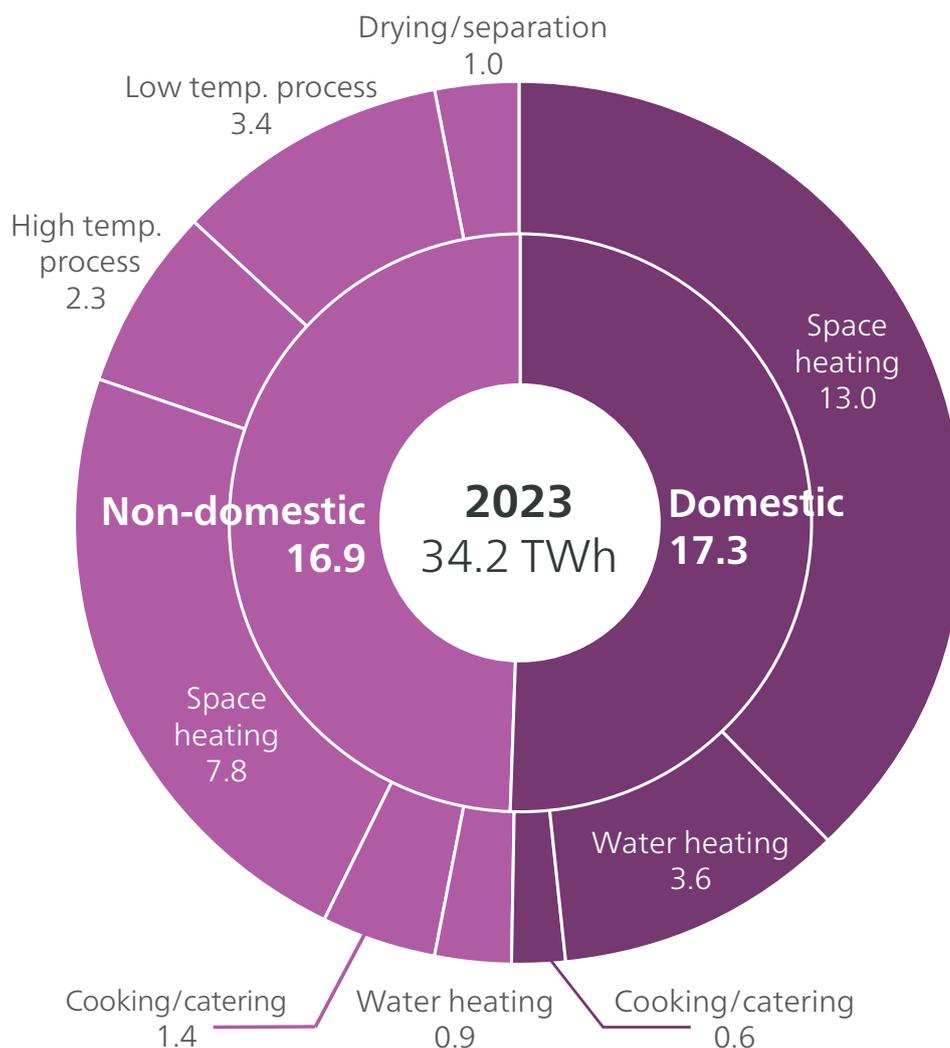
Energy consumption for heating

Energy consumption for homes, businesses and industrial heating in Wales totalled just over 34 TWh in 2023, a slight reduction of under 5% since 2021.

Energy used for heating (including electricity used for heating) can be grouped into two main categories: non-domestic (commercial, industrial, and public-sector buildings) and domestic (homes). In 2023, demand was split almost equally between these categories.

- Non-domestic heating is dominated by industrial sites, with space heating as the main use. Energy consumption in this category has fallen by 1 TWh since 2021.
- Domestic heating is also primarily for space heating with a 2.6 TWh reduction since 2021.

Annual energy consumption in Wales for heat, 2023



Data source: (1, 2)

Case study: Ammanford mine water heat pump



Heat exchangers at the Lindsay mine water treatment site (image credit: UK government)

Wales's first commercial mine water heat scheme was commissioned in 2025 at the Lindsay mine water treatment site near Ammanford, Carmarthenshire. The Heat Strategy for Wales has recognised the potential of mine water heat as being particularly relevant for Wales given its industrial heritage and coal mining past. The Mining Remediation Authority identified the Lindsay treatment scheme as a potential opportunity and the project secured funding through Innovate UK in collaboration with Welsh-based Thermal Earth Ltd¹⁵.

The project installed submerged heat exchangers in a settlement pond to extract heat from the geothermally warmed mine water and this heat is then supplied to a nearby industrial unit to supply low-carbon heating and hot water.

The scheme demonstrates how Wales's mining legacy can be repurposed into a renewable resource, turning former coal infrastructure into a clean-energy asset. This scheme alone is expected to cut around 17.5 tonnes of CO₂ annually, showing the potential for mine-water heating to support local decarbonisation. As the first commercial installation of its kind in Wales, it acts as a proving ground for wider rollout across communities with retired coalfields, strengthening energy security and supporting the national transition to low-carbon heat.

¹⁵ Mining Remediation Authority, 2025. [Landmark mine water heat scheme goes live in Wales.](#)

Energy generation trends

Low carbon electricity

Across Wales there is approximately 3.6 GW of low carbon electricity capacity, generating around 7.9 TWh of electricity in 2024. Onshore wind is the biggest contributor of both generation and capacity, with 3.1 TWh of generation in 2024.

Neath Port Talbot is home to the largest capacity of low carbon electricity projects, totalling 331 MW, with the majority of these being onshore wind. Each of the four local authority areas in the Swansea Bay City region have over 100 MW of low carbon electricity capacity installed, with the region holding 927 MW in total (or 33% of all Welsh low carbon electricity capacity).

Mid Wales generates the smallest proportion of Welsh low carbon electricity compared with the other regions, at just 15% or 434 MW. Torfaen, in the Cardiff Capital region and one of the smallest local authority areas in Wales, has the lowest low-carbon electricity capacity at 15 MW, almost all of which (14.7 MW) comes from solar PV.

Hydropower

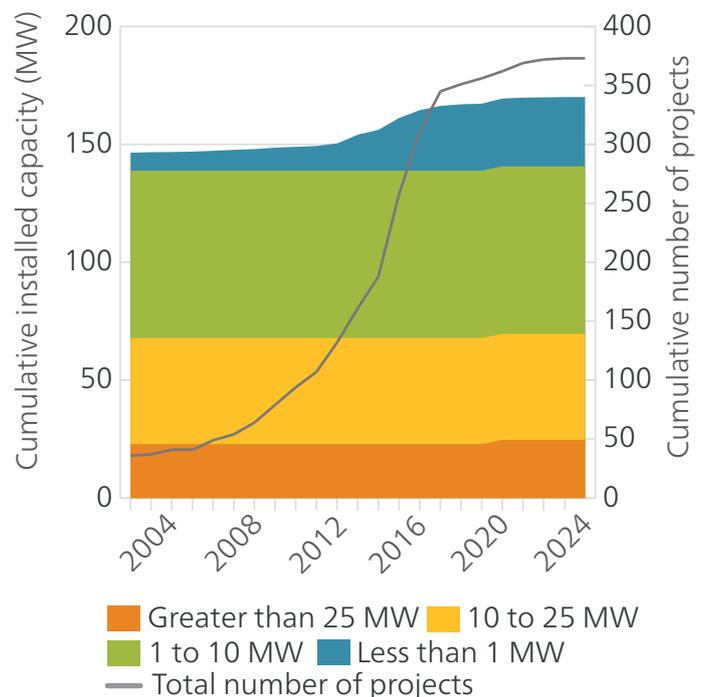
There were no new hydropower projects commissioned in Wales in 2024. Wales' total hydropower capacity remains at 170 MW, across 361 sites, generating an estimated 350 GWh in 2024.

The majority of hydropower capacity comes from large scale hydropower projects, with 116 MW of capacity coming from installations exceeding 10 MW in size. The distribution of hydropower projects across Wales sees the most capacity in North Wales at 97 MW, followed by Mid Wales at 64 MW.

Gwynedd sees both the highest capacity and highest number of projects out of all of the local authority areas, with 60 MW across 154 sites, the majority of which are small scale hydropower projects. Next

is Ceredigion, with 56 MW of hydropower capacity across 26 sites, the majority of which (54 MW) comes from two large-scale installations (one 41 MW and one 13 MW). These areas encompass Eryri National Park and the Cambrian Mountains, which both feature key characteristics required for successful hydropower projects and explain why many existing projects are situated here.

Deployment of hydropower in Wales by scale



Data source: (12-26)

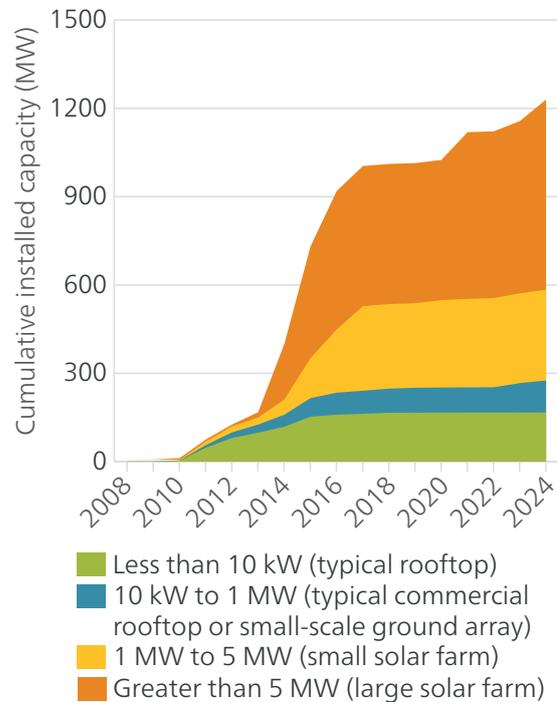
Solar PV

In 2024, 147 MW of new solar PV capacity was installed in Wales across just under 14,200 projects. This brings the Welsh total solar PV capacity to just over 1.2 GW, generating approximately 1.1 TWh in 2024.

The largest capacity increases came from solar PV sites larger than 5 MW, with over 61 MW added in 2024. This growth was driven by two solar farms in Carmarthenshire, with capacities of 30 MW and 31 MW.

However, the biggest proportion of new projects comes from small-scale (typically domestic rooftop) solar PV. There was a 73.5 MW increase of small-scale solar PV across Wales, comprising of over 14,100 individual installations, more than 99.6% of new solar PV projects. Powys saw the most installations in 2024, with around 1,320 solar PV projects installed.

Deployment of solar PV in Wales by scale



Data source: (12-26)

Case study: Bluestone National Park Resort solar farm



Bluestone National Park Resort (image credit: Bluestone)

Bluestone National Park Resort, in Pembrokeshire, successfully commissioned its 3.2 MW on-site solar farm in 2024. Built over 3 hectares and comprising 6,200 solar panels, the solar farm is expected to generate roughly 3,000 MWh of electricity annually.

The solar farm is projected to supply about one third of the resort's annual electricity demand and is a key part of Bluestone's wider sustainability strategy to reduce and eliminate the resort's reliance on fossil fuels.

Onshore wind

There was one new onshore wind site commissioned in Wales in 2024, consisting of two wind turbines in Rhondda Cynon Taf with a capacity of 5.5 MW.

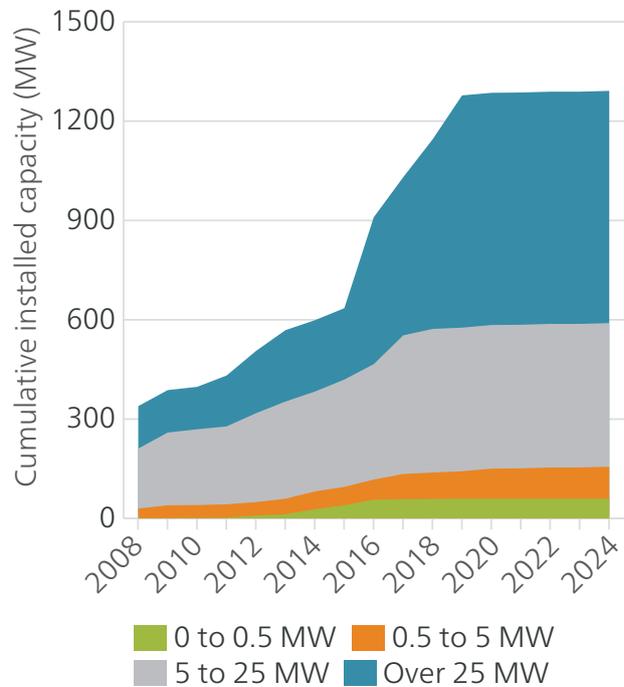
The addition of the Llwynceilyn Farm wind turbines brings the total onshore wind capacity in Wales to 1,285 MW, across 865 projects, generating over 3.1 TWh in 2024. Three local authority areas lead the way in onshore wind capacity with Neath Port Talbot home to 230 MW, Rhondda Cynon Taf with 204 MW and Powys with 200 MW.

Despite lower installation rates over the last few years there has been an uptake in the number of onshore wind sites in the planning process, with 23 sites currently either granted planning permission, under construction or awaiting construction. DESNZ has identified that there is a potential 580 MW of additional capacity that could be developed¹⁶.

The establishment of the Welsh Government's publicly owned developer, Trydan Gwyrdd Cymru, in 2024 supports a future in which more onshore wind is developed and owned by Wales.

The Trydan Gwyrdd Cymru team are working to assess potential sites for new onshore wind developments. They have so far identified three potential projects, located within the Welsh Government's woodland estate, with an indicative installed capacity of 400 MW, and whose proposals are at the start of their development pathway¹⁷.

Deployment of onshore wind in Wales, by scale



Data source: (12-26)

¹⁶ Sourced from the [Renewable Energy Planning Database: April 2025](#)

¹⁷ Trydan Gwyrdd Cymru, 2025. [Trydan powers ahead with first onshore wind projects](#)

Case study: Llwynceilyn Farm wind turbines

In 2024, two wind turbines with a combined capacity of 5.5 MW were commissioned at Llwynceilyn Farm, located northeast of Porth in Rhondda Cynon Taf, South Wales. Developed as part of a farm-diversification strategy, the project is designed to help the farm achieve its goals of carbon neutrality. The electricity generated is expected to meet nearly all the domestic demand of households in Porth and their output contributes local clean power to the grid.

The Llwynceilyn Farm project illustrates how rural areas can contribute to Wales's wider energy transition and supports national ambitions for renewable growth and net-zero emissions. As a small-scale, community-focused development, the Llwynceilyn Farm turbines highlight how agricultural land can be used to support renewable energy generation. By integrating wind power into the farm's operations, the project demonstrates a practical model for agricultural diversification, combining traditional farming with low-carbon technology as well as making productive use of available land.



Llwynceilyn Farm wind turbines (image credit: Cenin)

Offshore Wind

In 2024, offshore wind accounted for 21% of Wales' renewable electricity generation. With 726 MW of fixed offshore wind in operation, a further 2 GW consented and 3.3 GW of floating offshore wind projects also in development, Wales is expected to see an expansion in its offshore capacity over the coming decade.

Offshore wind in Wales generated approximately 2.2 TWh of electricity in 2024, from three main sites off the coast of North Wales, all began operation between 2003 and 2015. The largest, Gwynt y Môr has a capacity of 576 MW, followed by the Rhyl Flats at 90 MW and North Hoyle at 60 MW. There have been no new offshore wind projects that have connected to the electricity grid in Wales over the last decade.

However, there has been development activity for potential new fixed-bottom projects over the last year. There have recently been extensive onshore and offshore ground investigations for the Awel y Môr project off the coast of North Wales, which gained its consent in 2025 and was awarded a Contracts for Difference (CfD) in the Allocation Round 7 (AR7) announced in January 2026¹⁸. The Mona offshore wind project (off the North Wales coast) received its consent in 2025¹⁹.

Existing offshore wind projects, or those in development, that could contribute to Welsh renewable electricity generation

Wind farm	Foundation	Status	Actual or expected commissioning date	Installed or expected capacity (MW)
North Hoyle	Fixed	Operational	2003	60
Rhyl Flats	Fixed	Operational	2009	90
Gwynt y Môr	Fixed	Operational	2015	576
Mona	Fixed	Consented	2029	1,500
Awel y Môr	Fixed	Consented	2030	576
Erebus	Floating	Consented	TBC	100
Llŷr 1	Floating	In planning	TBC	100
Llŷr 2	Floating	Pre-planning	TBC	100
Gwynt Glas	Floating	In development	TBC	1,500
Ocean Winds	Floating	In development	TBC	1,500

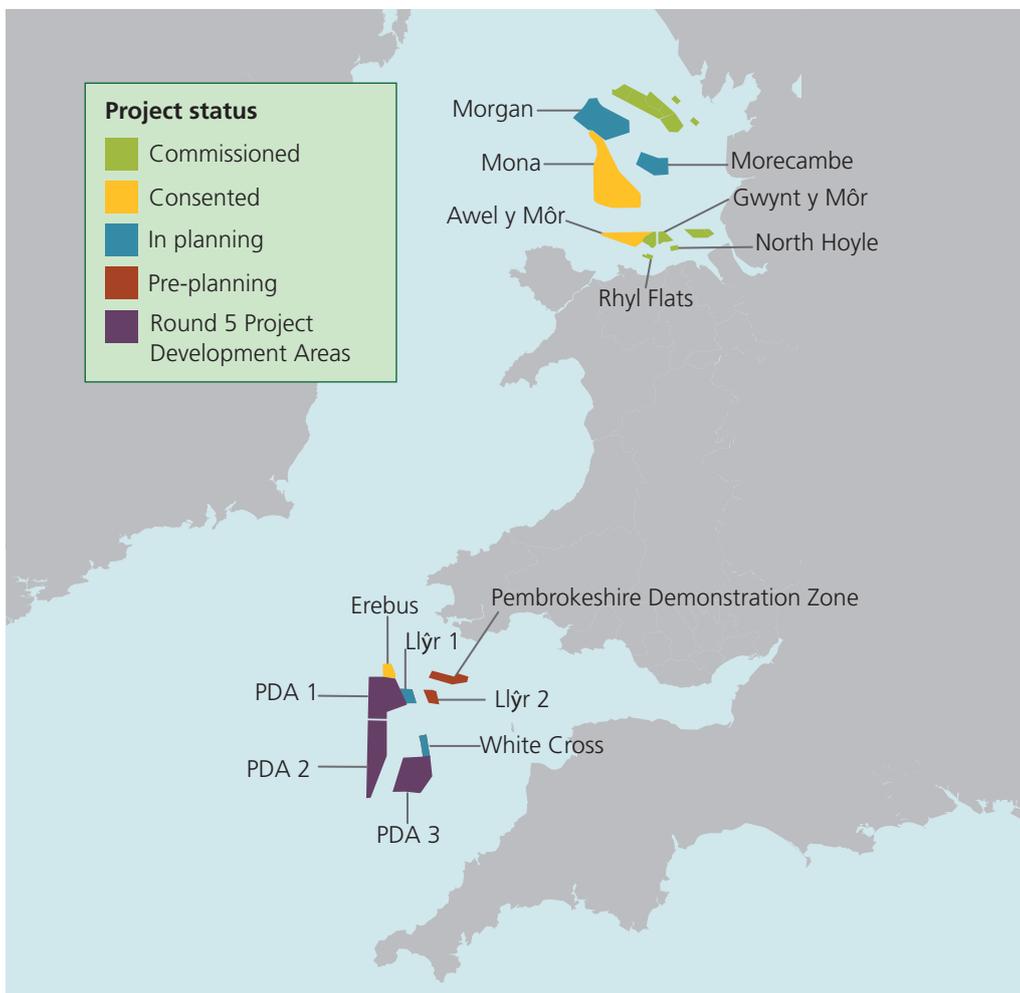
¹⁸ DESNZ, 2026. [Contracts for Difference Allocation Round 7 results.](#)

¹⁹ DESNZ, 2025. [Mona Offshore Wind Farm development consent decision announced](#)

Floating offshore wind has also advanced rapidly in the last year, with around 300 MW of test and demonstration capacity expected to connect to the Welsh electricity grid by the end of the decade. The 100 MW Erebus project off the Pembrokeshire coast is currently the most advanced project in terms of planning – it has already secured its key licences and secured a CfD in January 2026²⁰. Another 100 MW project, Llŷr 1 (also sited off the Pembrokeshire coast), completed a public consultation in early 2024 to inform its ongoing development.

Supporting initiatives - such as the nearly £5 million awarded through The Crown Estate’s Supply Chain Accelerator Fund in 2024 to build floating offshore wind supply chain capability, the launch of the Fit 4 Offshore Renewables programme in Wales, and progress on the Future Port Talbot project - are strengthening supply chains and skills, further positioning Wales as a growing hub for offshore wind.

Location of offshore wind projects



Note: The offshore wind map is accurate as to January 2026. Updates may have occurred since then.

²⁰ Blue Gem Wind, n.d. [Erebus](#)

Marine

There has been steady progress in the Welsh marine sector in 2024. A further 10 MW of tidal stream generation received a CfD in late 2024 and three projects benefited from the Welsh Government's Tidal Lagoon Challenge Fund in March 2024.

In 2024, Inyanga Marine Energy Group secured another 10 MW contract for its HydroWing tidal stream project, marking the largest allocation for any tidal stream scheme in the CfD Allocation Round 6²¹. Located just off the west coast of Anglesey, the Morlais tidal stream array demonstration site now has 38 MW of CfD-backed tidal stream capacity. The first installations are expected to be deployed at sea in 2026, following the completion of the onshore substation in 2023 and the start of preliminary work in 2024 to upgrade the underground cables.

At the Marine Energy Test Area in Pembrokeshire, a tidal turbine for remote communities has been successfully deployed, demonstrating the potential of small-scale marine technologies.

Additionally, in early 2024, Swansea University, the Offshore Renewable Energy Catapult and Cardiff University were named winners of the Welsh Government's £750,000 Tidal Lagoon Challenge²². The research will focus on removing the environmental, engineering and technical barriers to future tidal lagoon technology deployment, further reinforcing the region's position as a centre for marine technology.

²¹ DESNZ, 2024. [Contracts for Difference Allocation Round 6 results](#)

²² Welsh Government, 2024. [Winners of Welsh Government's £750,000 Tidal Lagoon Challenge named](#)

Waste technology

There were no new waste projects commissioned in 2024, resulting in the total capacity remaining at 123 MW for anaerobic digestion, energy from waste, landfill gas and sewage gas.

Energy from Waste (EfW)

Wales has two operational Energy from Waste sites: Trident Park in Cardiff (30 MW) and Parc Adfer in Flintshire (21 MW), generating approximately 270 GWh of electricity combined. For the purpose of this report, half of the electricity generated from these EfW projects is assumed to be renewable, due to the nature of non-biogenic waste being incinerated. No new EfW plants are currently planned, and the Welsh Government's zero waste strategy focuses on reducing and recycling waste. To help reduce emissions from existing sites, Enfinium has submitted a planning application to install full-scale carbon capture and storage (CCS) at the 21 MW Parc Adfer EfW site²³. The site is already home to a pilot CCS plant that was installed in April 2025.

Anaerobic Digestion (AD)

Wales has 50 anaerobic digestion sites with a total capacity of 26.9 MW, representing 65% of waste projects and the second-largest installed waste technology capacity in the country, (after EfW).

Sewage and landfill gas

Wales has 21 landfill gas and four sewage gas sites, with a total combined capacity of 46 MW. This capacity is split almost evenly between the two technologies. Two new landfill gas sites were added in 2023, with a 0.25 MW site at the Briton Ferry landfill site in Neath Port Talbot and a 0.63 MW site at the Tir John landfill site in Swansea.

²³ Let's Recycle, 2025. [Enfinium submits plan for full-scale carbon capture at Parc Adfer EfW](#)

Low carbon heat

In 2024, an estimated 8,700 heat pumps were installed in Wales – the most annual installations to date, and approximately 1,900 more than in 2023. This brings the total number of heat pumps in Wales to just over 31,000.

Across Wales, biomass makes up the largest proportion of renewable heat capacity in most local authority areas, followed by heat pumps. The increase in heat pump installations is expected to continue to rise and is therefore likely to take up a larger proportion of Welsh renewable heat. Some local authority areas have substantial generation from specific renewable heat sites, including over 30,000 MWh generated from sewage gas at the Cardiff East Wastewater Treatment Works. The two largest biomass CHP generators in Wales are the Shotton Paper Mill in Flintshire, which generates approximately 50 GWh in 2024, and the Voldac Dairy Nutrition Factory in Ceredigion generating around 94,000 MWh in the same

Heat pumps

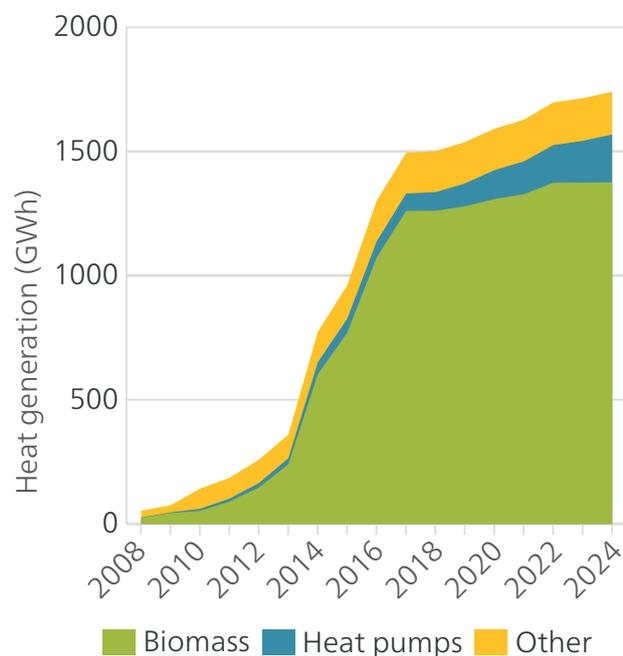
UK and Welsh government incentives, including the Boiler Upgrade Scheme, Energy Company Obligation, Optimised Retrofit Programme, NEST and Green Home Wales grants are key contributory factors driving the increased uptake in heat pumps, alongside shifting public opinions. Both schemes provide funding to households to replace old heating systems with low-carbon options, including heat pumps and biomass boilers.

In 2021, the Welsh Housing Quality Standard announced that all new build social housing should have low carbon heating systems. This will support the Welsh Government's goal of installing 580,000 heat pumps by 2035.

Biomass

In 2024 there were 61 biomass installations in Wales, adding 1.4 MW of new biomass boiler capacity. This brings the total Welsh biomass capacity to 685 MW and 1.3 TWh of generation in 2024.

Low carbon heat generation in Wales by technology, 2024



Data source: (12-26)

Case study: Trinity Chapel retrofit

Trinity Chapel is a historic building in Abertillery, Blaenau Gwent, originally constructed in 1877 and converted for retail use over 20 years ago. From January to September 2024, it was comprehensively refurbished to become a modern, decarbonised library and adult education centre, run by Aneurin Leisure Trust, offering library services, community-hub access, adult learning and digital facilities.

The retrofit modernised the building by installing a low-carbon heating and hot-water system: four air-source heat pumps delivering a combined 34 kW output, a wet underfloor heating system, electric point-of-use water heaters, thermal insulation to the building's solid walls and an upgraded electrical connection to the grid. The project was largely funded through the Welsh Government's Low Carbon Heat Grant (with £206,778 covering 90% of costs) along with other public funds.

By turning a disused historic chapel into a vibrant, energy-efficient community hub, Trinity Chapel exemplifies how low-carbon heating retrofits, supported by grants and institutional collaboration, can revitalise public services and infrastructure, cut emissions, reduce energy costs, and boost community resilience in Wales.



Trinity Chapel (image credit: Welsh government)

Fossil fuels

In 2024, Wales had 4.3 GW of installed fossil fuel generation capacity, producing approximately 13.8 TWh of electricity over the year and accounting for 64% of total Welsh electricity generation.

Whilst the total capacity reduced only slightly from 2023 the amount of generation decreased by 1.6 GWh from 2023 and by 7.3 GWh from 2022, largely as a result of reduced activity at large generation plants.

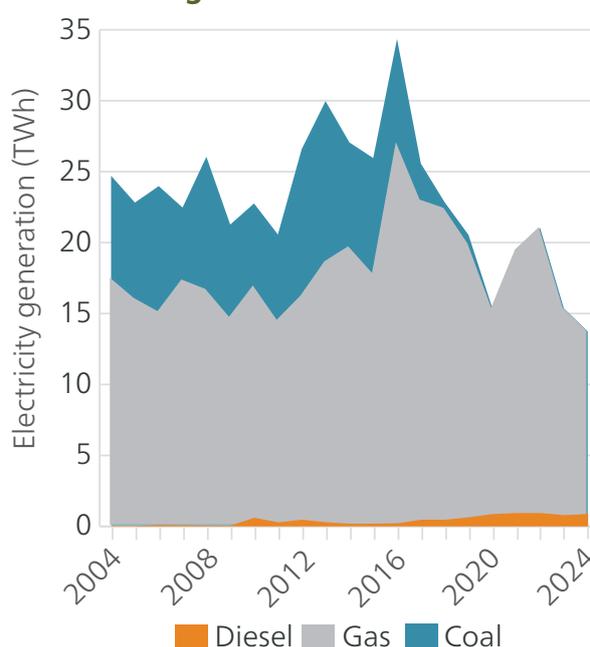
Natural gas has been Wales's dominant fossil fuel for electricity generation for the past two decades, accounting for 93% of total fossil fuel generation. Its use has declined slightly in recent years, with 2024 generation falling to 12.8 TWh - the lowest level in the last twenty years.

The two largest gas power plants - Pembroke (2,199 MW) and Connah's Quay (1,380 MW) - both recorded lower generation in 2024 than in 2023, yet together they still produced 82% of Welsh fossil-fuel electricity. The remaining gas capacity comes from smaller-scale generators, operating principally as flexible

The remaining fossil fuel capacity is mostly small-scale diesel used for backup, and some of these are being converted to battery storage, further reducing diesel use. There is also a small proportion of EfW capacity, half of which is assumed to be non-renewable and represents less than 1% of Welsh fossil fuel generation .

Wales' declining fossil fuel generation reflects its decarbonisation focus and the shifting role of gas from baseload to flexible use. Gas plants will remain important in the short to medium term for meeting electricity demand during low wind and solar output but, in the longer-term, unabated fossil fuel generation will be phased out under the UK's net-zero commitment. Future system stability will depend on batteries, flexibility services, biomethane, Carbon Capture Utilisation and Storage (CCUS)-enabled gas, Bioenergy with Carbon Capture and Storage (BECCS) and other technologies, with projects like carbon capture at Connah's Quay already developing.

Fossil fuel generation over time



Data source: (12-26)

²⁴ Data on fossil fuel projects come from sources including DUKES power station data and Wales' two distribution network operators. Small backup and on-site generators, often located on farms or industrial and commercial sites, are likely underestimated. While these generators may increase project numbers, their impact on total capacity and generation trends is minimal due to their size and infrequent use.

Battery

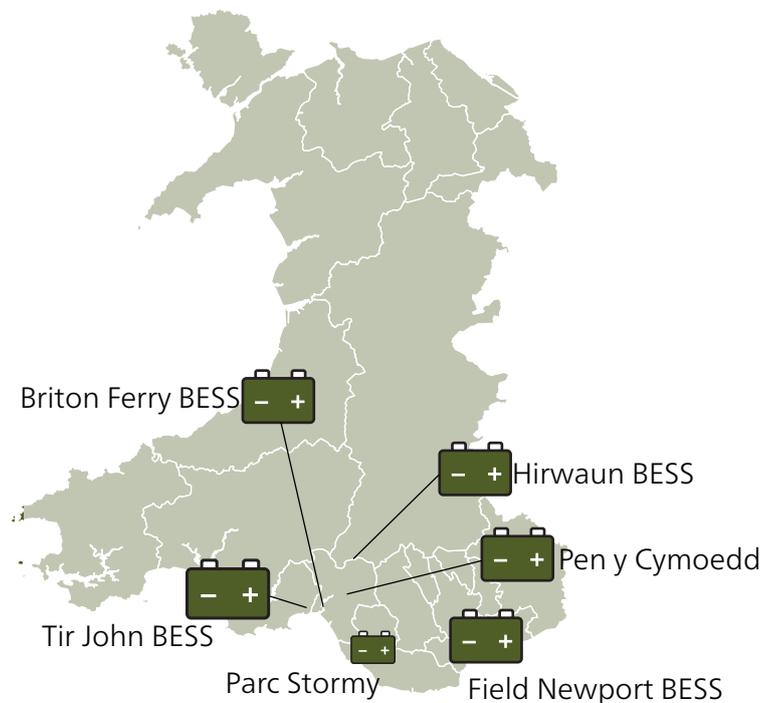
There are currently five commercial-scale battery sites in Wales, with a total power capacity of 115 MW. In addition, there are ten smaller-scale sites, contributing an additional 5.5 MW of capacity.

A key addition to the Welsh battery portfolio in 2024 is another diesel-to-battery conversion by Habitat and Pulse Clean Energy, changing the previous diesel power station site at Hirwaun in South Wales into a 22 MW battery site. This marks the fifth of nine sites that are earmarked for diesel-to-battery conversion, supporting the decommissioning and repurposing of fossil fuel sites into grid-scale battery storage and energy optimisation assets²⁵.

The largest battery site in Wales remains the 25 MW Tir John Battery Energy Storage System (BESS) in Swansea. All large-scale battery sites in Wales are concentrated in the Swansea Bay and Cardiff Capital regions. There are currently 44 battery sites in Wales that have been granted planning permission and are either under construction or ready for construction, comprising more than 2.3 GW of additional BESS capacity²⁶.

As Wales and the rest of Great Britain aim to achieve a 95% clean power system by 2030, battery storage is a critical technology type that delivers low-carbon flexibility and replaces high-carbon alternatives. Battery storage operators help maintain network security by providing sub-second response services and wider balancing services to support the operation of the UK's electricity grid whilst enabling further integration of renewables.

Location of battery storage projects



²⁵ PES, 2024. [Pulse Clean Energy energises 22 MW Hirwaun battery storage project.](#)

²⁶ Sourced from the [Renewable Energy Planning Database: April 2025](#)

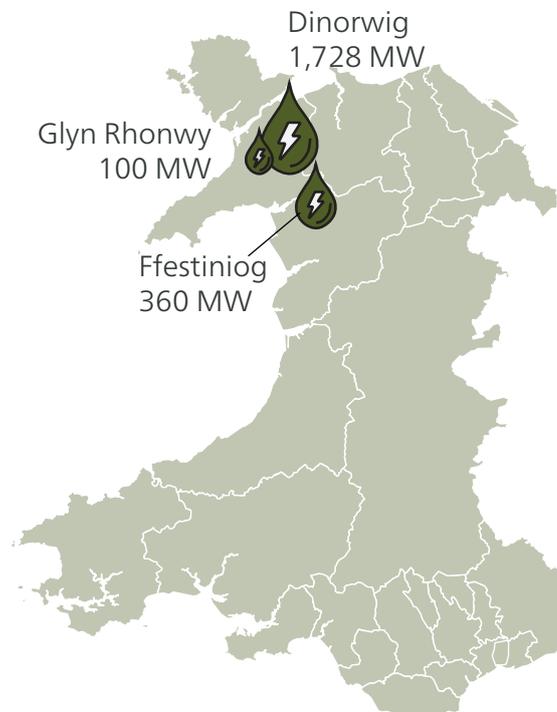
Pumped hydropower

There are two operational pumped hydropower energy storage sites in Wales, providing 2.1 GW export capacity and approximately 11 GWh of energy storage capacity. An additional 100 MW site, Glyn Rhonwy, is in development.

Wales is home to three quarters of the UK's total pumped hydropower storage capacity. The largest site in the UK is Dinorwig, a 1.7 GW capacity site in North Wales that has been in operation for over forty years. Both existing hydropower stations are undergoing a £1 billion refurbishment, with Ffestiniog's upgrade due to be completed in June 2026 after a nine-year program, and Dinorwig's refurbishment is still in the planning stages²⁷. A third Welsh site, Glyn Rhonwy, was granted consent to develop in 2017 and has a construction commencement date of no later than March 2026.

Pumped hydropower provides vital long-term storage flexibility with the ability to respond quickly to changes in demand and project lifespans typically extending beyond 80 years. This technology facilitates a rapid response to balance the grid, with the Dinorwig power station able to generate 1,728 MW of power within 12 seconds²⁸. This technology is likely to continue to play a key role in ensuring stability in the future energy system, enabling an increasing number of variable renewable generation sources.

Location of pumped hydropower projects



²⁷ Engie, n.d. [Replanting First Hydro](#)

²⁸ Engie, n.d. [Dinorwig Power Station](#)

Hydrogen

While there are no operational large-scale low-carbon hydrogen energy projects in Wales, there has been significant progress towards using this technology as part of a decarbonised energy system.

Hydrogen requires energy to produce, making it relevant to both supply and demand. Its role in electricity generation is expected to focus on providing energy storage and dispatchable power. It will also be consumed as a fuel, predominantly in industrial processes, commercial transport, construction and manufacturing. The National Energy System Operator's (NESOs) Clean Power 2030 plan highlights hydrogen's value as a dispatchable, low-carbon technology that can significantly ease electricity system challenges²⁹.

The Pembroke Green Hydrogen project, an initial 110 MW green hydrogen (hydrogen produced from renewable energy) production plant based at the RWE Pembrokeshire site, was granted planning approval in December 2024³⁰. Green hydrogen produced here is intended to be used in local industry and there is an ambition to scale the plant significantly (up to GW of capacity) in the future. This project is part of the Pembroke Net Zero Centre (PNZC) aimed at decarbonising South Wales, and RWE have plans to develop an additional 200 MW electrolytic hydrogen plant in the next phase.

In June and July 2024 Dolphyn Hydrogen successfully undertook sea trials for offshore Hydrogen Production Technology in Milford Haven, South Wales³¹. The results of the trial will now feed into improving the future design and development of a commercial-scale demonstrator. The Hydrogen Port Refuelling initiative (HyPR Phase 2), funded by the Welsh Government with additional support from UKRI, the Swansea Bay City Deal, and Innovate UK, is centred on the Port of Milford Haven, which is being developed as a green hydrogen hub under the Milford Haven: Hydrogen Kingdom project. Nearby, Haush is developing trials for hydrogen production and designing a permanent hydrogen refuelling solution for Pembroke Port, which is also supported by the Welsh Government under the HYBRID SBRI HyPR initiative.

²⁹ National Energy System Operator, 2024. [Clean Power 2030](#)

³⁰ RWE, n.d. [Hydrogen](#)

³¹ Dolphyn Hydrogen, n.d. [Dolphyn process trials](#)

Reference pages

Data tables

Local authority	Totals					Renewables							
	Renewables			Fossil fuels		AD			Biomass heat		Biomass electricity and CHP		
	Number of projects	Capacity (MW _e)	Capacity (MW _{th})	Number of projects	Capacity (MW _e)	Number of projects	Capacity (MW _e)	Capacity (MW _{th})	Number of projects	Capacity (MW _{th})	Number of projects	Capacity (MW _e)	Capacity (MW _{th})
Blaenau Gwent	2,281	23	9	6	107	-	-	-	13	8	1	4	-
Bridgend	5,030	92	7	4	24	1	3	-	34	6	1	0	-
Caerphilly	5,712	71	9	3	19	2	2	1	50	6	3	0	-
Cardiff	7,418	43	14	7	37	1	2	-	20	4	5	0	-
Carmarthenshire	14,644	323	47	2	10	2	1	0	570	36	-	-	-
Ceredigion	10,200	193	64	2	10	4	1	1	272	35	4	3	17
Conwy	5,818	103	13	3	2	3	-	0	121	9	5	1	0
Denbighshire	7,206	162	23	2	1	3	1	1	178	12	5	2	0
Flintshire	10,340	134	116	9	1,434	-	-	-	141	21	2	25	90
Gwynedd	9,405	109	20	3	10	2	0	0	206	13	16	0	-
Isle of Anglesey	8,539	81	13	1	0	2	2	0	51	2	1	0	0
Merthyr Tydfil	1,647	17	6	3	40	-	-	-	15	3	1	1	2
Monmouthshire	8,290	67	31	4	6	2	0	0	181	19	5	18	7
Neath Port Talbot	4,864	331	31	7	87	-	-	-	103	25	2	56	-
Newport	4,654	126	11	4	39	2	0	0	40	10	2	9	0
Pembrokeshire	12,940	226	32	6	2,258	2	0	0	311	21	2	0	0
Powys	16,313	242	170	4	1	16	3	3	991	145	11	1	2
Rhondda Cynon Taf	8,684	264	32	10	51	1	1	1	65	21	21	0	-
Swansea	7,321	109	42	6	84	-	-	-	63	6	1	1	-
Torfaen	3,482	15	7	5	0	-	-	-	21	3	1	0	1
Vale of Glamorgan	4,943	98	17	8	62	1	1	-	66	11	3	10	-
Wrexham	7,971	47	41	4	63	6	0	1	83	33	2	0	1
Offshore	3	726	-	-	-	-	-	-	-	-	-	-	-
Unknown	28	0	0	-	-	-	-	-	-	-	2	0	0
Total	167,730	3,601	755	102	4,344	50	18	9	3,595	449	96	132	120

Data tables

Local authority	Renewables											
	Energy from waste		Heat pumps		Hydropower		Landfill gas		Offshore wind		Onshore wind	
	Number of projects	Capacity (MW _e)	Number of projects	Capacity (MW _{th})	Number of projects	Capacity (MW _e)	Number of projects	Capacity (MW _e)	Number of projects	Capacity (MW _e)	Number of projects	Capacity (MW _e)
Blaenau Gwent	-	-	133	1	1	0	1	1	-	-	9	7
Bridgend	-	-	293	3	3	0	1	0	-	-	17	59
Caerphilly	-	-	369	4	-	-	-	-	-	-	21	17
Cardiff	1	30	549	6	1	0	2	2	-	-	3	0
Carmarthenshire	-	-	3,355	51	14	6	1	0	-	-	128	145
Ceredigion	-	-	3,524	34	26	56	-	-	-	-	90	100
Conwy	-	-	1,307	13	30	35	1	1	-	-	49	40
Denbighshire	-	-	2,023	21	22	3	-	-	-	-	44	147
Flintshire	1	21	1,947	18	-	-	2	0	-	-	22	2
Gwynedd	-	-	2,798	28	152	60	1	0	-	-	44	7
Isle of Anglesey	-	-	2,571	50	-	-	1	0	-	-	59	41
Merthyr Tydfil	-	-	80	1	4	0	2	6	-	-	7	2
Monmouthshire	-	-	1,027	12	12	0	-	-	-	-	11	4
Neath Port Talbot	-	-	532	5	10	1	2	1	-	-	12	230
Newport	-	-	249	3	-	-	1	1	-	-	11	16
Pembrokeshire	-	-	3,090	32	14	1	1	2	-	-	173	26
Powys	-	-	4,667	71	81	8	1	2	-	-	135	199
Rhondda Cynon Taf	-	-	493	30	4	0	2	1	-	-	16	207
Swansea	-	-	949	10	2	0	1	1	-	-	5	34
Torfaen	-	-	87	16	1	0	-	-	-	-	3	0
Vale of Glamorgan	-	-	443	5	-	-	-	-	-	-	7	1
Wrexham	-	-	732	9	-	-	3	3	-	-	1	0
Offshore	-	-	-	-	-	-	-	-	3	726	-	-
Unknown	-	-	-	-	3	0	-	-	-	-	-	-
Total	2	51	31,218	420	380	170	23	22	3	726	865	1,285

Data tables

Local authority	Renewables							Fossil fuels					
	Sewage gas			Solar PV		Solar thermal		Coal		Diesel and unknown		Gas	
	Number of projects	Capacity (MW _e)	Capacity (MW _{th})	Number of projects	Capacity (MW _e)	Number of projects	Capacity (MW _{th})	Number of projects	Capacity (MW _e)	Number of projects	Capacity (MW _e)	Number of projects	Capacity (MW _e)
Blaenau Gwent	-	-	-	1,857	11	266	0	-	-	1	21	5	86
Bridgend	-	-	-	4,638	30	42	0	-	-	-	-	4	24
Caerphilly	-	-	-	4,938	51	329	1	-	-	1	18	2	1
Cardiff	1	4	5	6,754	20	81	0	-	-	1	1	5	21
Carmarthenshire	-	-	-	10,303	170	271	7	-	-	-	-	2	10
Ceredigion	-	-	-	6,074	33	206	4	-	-	1	10	1	0
Conwy	-	-	-	4,131	26	171	1	-	-	-	-	3	2
Denbighshire	-	-	-	4,862	9	69	21	-	-	-	-	2	1
Flintshire	-	-	-	8,137	96	88	7	-	-	1	14	7	1,409
Gwynedd	-	-	-	6,068	42	118	9	-	-	-	-	3	10
Isle of Anglesey	-	-	-	5,778	38	76	5	-	-	-	-	1	0
Merthyr Tydfil	-	-	-	1,520	7	18	7	-	-	1	20	2	19
Monmouthshire	-	-	-	6,957	45	95	4	-	-	2	6	2	0
Neath Port Talbot	1	3	3	4,179	40	23	1	-	-	4	48	3	39
Newport	-	-	-	4,317	99	32	0	-	-	1	12	3	27
Pembrokeshire	-	-	-	8,887	198	460	14	-	-	-	-	6	2,258
Powys	-	-	-	9,935	28	476	12	-	-	-	-	4	1
Rhondda Cynon Taf	-	-	-	7,579	54	503	1	-	-	-	-	10	51
Swansea	-	-	-	6,176	73	124	284	-	-	3	46	3	37
Torfaen	-	-	-	3,358	15	11	0	-	-	-	-	5	0
Vale of Glamorgan	1	3	3	4,329	83	93	0	-	-	3	19	5	42
Wrexham	1	1	1	7,053	43	90	29	-	-	2	36	2	27
Offshore	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	-	-	-	23	0	-	-	-	-	-	-	-	-
Total	4	11	13	127,853	1,212	3,642	409	-	-	21	251	80	4,067

Methodology and data sources

Regen was commissioned by the Welsh Government to develop a database of energy generation projects in Wales and to collect data for energy use in Wales and analyse both datasets to produce this report.

Methodology overview

The research method developed by Regen to produce a detailed picture of energy generation and use across Wales includes:

- Identifying, collating, cleaning and cross-referencing records from existing datasets.
- Verifying and analysing the data to ensure a robust national overview and locally specific data where it is available.
- Verifying the data with stakeholders and industry where appropriate.
- Researching ownership details.
- To align with the sector pathways outlined in the Welsh Government's Second Carbon Budget, public sector and commercial energy use is estimated separately (as was the case in the previous iteration of Energy Use in Wales in 2021).

Further details on the methodology can be requested from the Welsh government.

Data sources

The key sources of data, compiled by Regen, and used in the report's analysis and database are numbered and listed as follows:

1. [DESNZ Sub-national total final energy consumption statistics 2023](#)
2. [DESNZ Energy Consumption in the UK \(ECUK\) 2024](#)
3. [StatsWales Workplace employment by industry and area 2019 \(UK and Wales\)](#)
4. [ONS workforce jobs by industry \(SIC 2007\) – seasonally adjusted \(December 2024\)](#)
5. [ONS UK and Wales Census 2021](#)
6. [ONS Energy use by industry, source and fuel, 1990 to 2023](#)
7. [Climate Change Committee, Seventh Carbon Budget, 2025](#)
8. [DESNZ Sub-national gas consumption statistics 2023](#)
9. [DESNZ Sub-national electricity consumption statistics 2023](#)
10. [DfT TRA8901: Motor vehicle traffic \(vehicle miles\) by local authority in Great Britain, annual from 1993- 2024](#)

11. [DfT VEH0132: Licensed ultra low emission vehicles \(ULEVs\) at the end of the quarter by fuel type, keepership \(private and company\) and upper and lower tier local authority: United Kingdom](#)
12. [Anaerobic Digestion & Bioresources Association data](#)
13. Contact with utilities, installers and industry organisations
14. [DESNZ Digest of UK Energy Statistics](#)
15. [EMR Capacity Market](#)
16. [EPC domestic database](#)
17. [Low Carbon Contracts Company Contracts for Difference data](#)
18. [MCS installations data](#)
19. [National Grid Electricity Distribution Embedded Capacity Register](#)
20. [National Grid ESO Transmission Entry Capacity register](#)
21. [Ofgem Feed-in Tariff data](#)
22. [Renewable Energy Guarantees of Origin data](#)
23. [Renewable Energy Planning Database](#)
24. [Renewable Heat Incentive and Renewable Heat Premium Payment data](#)
25. [Renewables Obligation register](#)
26. [SP Energy Networks Embedded Capacity Register](#)
27. [ONS - Labour Market Profile - Wales](#)
28. [Regional and local authority electricity consumption statistics](#)
29. [National Grid Live Data by Licence Area, 2021](#)

Note on energy use in Wales data exclusions

Following methodologies commonly adopted by many government institutions, this report excludes certain sources of energy use which may lead to an underestimation of actual energy consumption in Wales. The exclusions are challenging to quantify but include:

- Gas used for power generation: UK government datasets on sub-national fuel consumption do not include the gas used by power stations for electricity production, as the electricity itself is considered a fuel.
- Gas used by very large industrial plants: Some of the most significant energy consumers in the UK have their gas consumption omitted from the data sources used in this report to prevent disclosure. However, information is not available on whether any of these plants are in Wales. Emissions from these sites are likely addressed through the UK Emissions Trading Scheme (UK ETS).
- Transport and aviation: Consistent with the DESNZ methodology, aviation, shipping and electricity for trains and cars are not accounted for in these datasets, as this energy consumption cannot be attributed at a local or regional level.

Assumptions

Data is not always available to directly meet the analysis requirements of this report. Where appropriate, additional analysis and modelling is undertaken. This section outlines the limitations of the available datasets and the methods used for supplementary analysis.

Assumption	Explanation
Fossil fuel electricity generation	Researched by Regen through a survey of major power plants. Actual generation from plants was collected from plants representing 95% of the major electricity generating fossil fuel capacity in Wales.
Capacity factors	Evaluated from a five-year average of DUKES regional capacity factors and other industry established values.
Energy from Waste	It is assumed that half of the electricity generated by energy from waste projects can be attributed to renewable sources, with the other half coming from fossil fuel sources.
Heat pump heat generation	The proportion of electricity that is generated by fossil fuels is proportionally removed from total heat pump generation. Removing this proportion, representing approximately 11% of total heat pump heat generation, ensures the remaining heat pump generation published in this report is categorised as renewable energy.
Progress towards targets	Progress towards Wales' 100% target is estimated by comparing the generation figures estimated in this report against electricity demand in the CCC's Balanced Pathway 2035 with an assumed additional 9% network losses.
Land use, land use change and forestry sector (LULUCF)	The LULUCF sector of the Net Zero Wales Carbon Budget 2 covers carbon emissions and sinks associated with land use. The energy consumption associated with this sector is negligible so has been excluded from this study.
Power (generation) sector	Energy consumption associated with the power sector is excluded from this study. DESNZ data on gas consumption excludes gas used in the production of electricity, as those power stations are producing electricity as another 'primary' fuel.

Assumption	Explanation
Estimated energy in each Net Zero Wales Carbon Budget 2 sector	Where the sectors in DESNZ energy statistics and Net Zero Wales Carbon Budget 2 do not align, a modelling exercise was undertaken to estimate the energy trends of the Net Zero Wales Carbon Budget 2's sectors. To estimate the disaggregation of DESNZ's 'Industrial and Commercial' sector into 'industrial', 'commercial', 'public' and 'agriculture', the relative energy intensity of those sectors' jobs were used as a proxy to disaggregate their energy consumption, using ONS workplace employment data and ONS Energy use data. This analysis was undertaken to a local authority level.
Estimated Welsh domestic energy end uses	DESNZ energy statistics do not split Welsh energy consumption into end uses, such as for heating and appliances. It's assumed that all domestic gas consumption is used for heating (including cooking), but the disaggregation of electricity consumption into heating and appliances is modelled. Domestic electricity consumption is disaggregated by assessing the proportion of homes heated with electricity based on analysis of Energy Consumption in the UK (ECUK) and Census data. The remaining electricity consumption is assumed to be used by appliances. Domestic energy use excludes transport as a primary domestic fuel in regional sections.
Estimated Welsh transport energy use	DESNZ transport energy use was distributed between domestic and non-domestic sectors by applying the proportion of DESNZ sub-national road transport fuel consumption categorised as 'personal' and 'freight' use in Wales respectively.
Unallocated DESNZ energy consumption	DESNZ energy consumption attributed to Wales but not allocated to a local authority has been excluded from this study.
WWU Welsh temporal gas consumption data	WWU's temporal gas consumption data excludes very large daily metered sites - due to commercial confidentiality.
National Gas transmission data portal	National Gas transmission data was used to understand the seasonal trends in energy use. The total gas use data does not exactly match with the DESNZ gas consumption statistics for Wales due to differences in scope, such as inclusion or exclusion of major energy users.

Abbreviations and definitions

Abbreviation	Explanation
<1	Less than 1
>1	Greater than 1
BECCS	Bioenergy with Carbon Capture and Storage
BESS	Battery Energy Storage System
Capacity	How much power a project can generate at maximum output.
Capacity factor	The percentage of a project's maximum theoretical output that it achieves. This is calculated by dividing the actual energy generated over a year by its theoretical maximum capacity, i.e. the amount it would have generated if it ran at full capacity, 24 hours a day, 365 days a year. For example, the capacity factor for offshore wind in Wales is evaluated to be 33%.
CCC	Climate Change Committee
CCGT	Combined Cycle Gas Turbine
CCS	Carbon Capture and Storage
CCUS	Carbon Capture, Utilisation and Storage
CHP	Combined Heat and Power
CO ₂	Carbon dioxide emissions
EfW	Energy from Waste
FiT	Feed-in Tariff
LAEP	Local Area Energy Plan. These set out the changes needed to transition an area's energy system to net zero. They are commissioned and published at the discretion of local authorities.
MW	Megawatt – a unit of power (capacity). Where heat capacity is listed, it is the thermal output capacity of heat technologies.
MWe	Megawatt of electrical capacity
MWh	Megawatt hour – a unit of energy (demand or generation)
MWth	Megawatt of thermal capacity
RHI	Renewable Heat Incentive
Solar PV	Solar photovoltaic panels

Abbreviations and definitions

Orders of magnitude	Explanation
W	1 watt = 1 watt
kW	1,000 watts = 1 kilowatt
MW	1,000,000 watts = 1 megawatt
GW	1,000,000,000 watts = 1 gigawatt
TW	1,000,000,000,000 watts = 1 terawatt

A note on power and energy



A note on generation and demand

