Socio-economic Analysis of Wales

March 2026

Local Growth Fund

Welsh Government

Contents

Introduction

I. This document attempts to provide an overview of the data and literature relevant to the three priority areas set out in the Welsh Government's Investment Plan. These priority areas are:

- **More productive and competitive businesses**
- **Increasing skills and supporting people into work**
- **Improving regional infrastructure**

II. The evidence is designed to help policymakers and stakeholders throughout Wales understand why intervening to improve outcomes in these priority areas is a priority of the Local Growth Fund and to offer examples of actions that could lead to better outcomes in these areas. It is important to note however that suggested interventions are not exhaustive.

III. As the evidence sets out, many of these priority areas are interconnected and should be considered in that context so that interventions are best designed to maximise outcomes. For example, to ensure businesses here in Wales can be as productive as possible they will require a workforce that best meets the skills they need to succeed; skills which should improve labour market outcomes. These skills will also be crucial in enabling Wales to deliver the infrastructure it requires to transition to a green economy and make Wales as desirable a place to live for its people.

IV. Every effort has been made to ensure that all data and figures presented in this document reflect latest data available as of February 2026.

1 More productive and competitive businesses

What is productivity and how is it linked to business competitiveness?

1.1 Productivity refers to the efficiency with which goods and services are produced, typically measured as output generated per unit of an input (such as labour). In practical terms, when it relates to businesses, higher productivity means that a firm can produce more output relative to its inputs.

1.2 The link between productivity and business competitiveness is well established. Productivity improvements reduce relative input costs and enable firms to offer lower prices and/or higher-quality products. At the same time, competitive pressures often push firms to improve efficiency and adopt better practices. This creates a reinforcing cycle between productivity growth and sustained competitive advantage.

1.3 Improving productivity raises living standards because it enables an economy to produce more with the same resources, creating the room for higher profits, real wages, lower prices, and better public services. Such improvements are necessary to sustainably increase households' purchasing power and overall economic wellbeing.

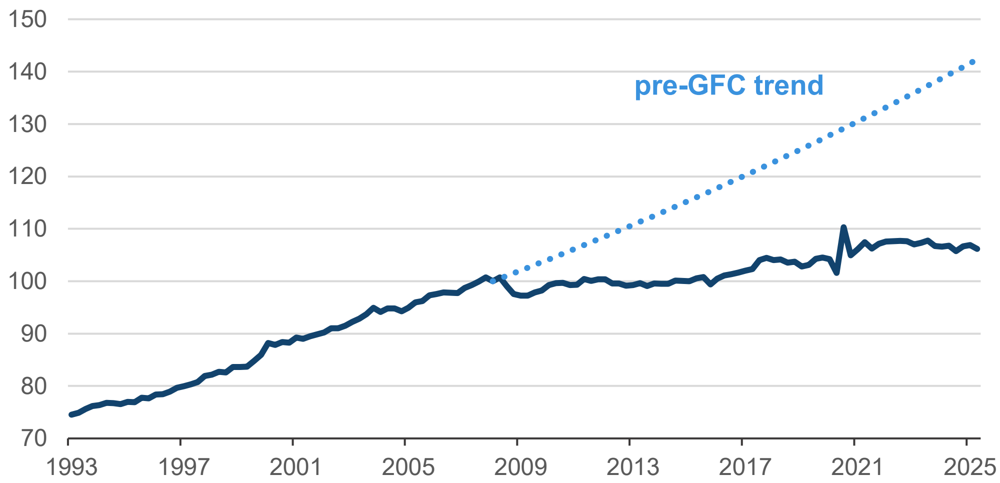
Productivity trends

UK productivity trends

1.4 While productivity improvements were strong in historical terms for most of the UK's post-war period, recent decades have seen this growth slow substantially in the aftermath of the global financial crisis (GFC) of 2008-09. **Figure 1.1** shows the trajectory of productivity in the UK, as expressed as real output per hour worked. Had productivity continued on its pre-GFC trend, productivity for the latest period (Q2 2025) would have been over a third higher (34%) than that recorded. Given the crucial role productivity plays in determining living standards, this ongoing trend has been a significant source of anxiety for policymakers across the UK.

Figure 1.1: Productivity growth is substantially lower than had it followed pre-GFC trajectory

UK real output per hour worked, Index (2008 Q1 = 100)

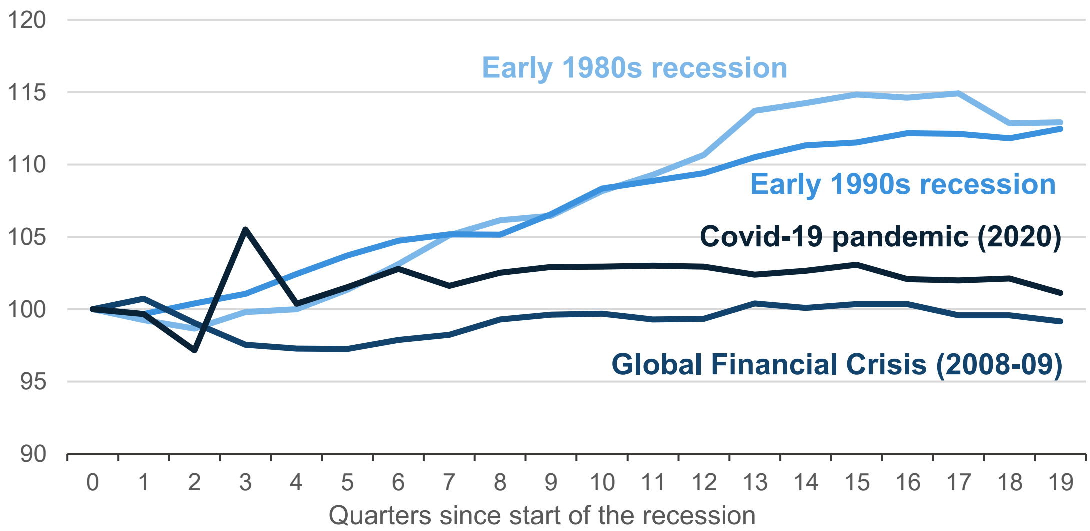


Note: The periods used to generate trendlines are 1993 to 2007 (pre-GFC) and 2010 to 2019 (pre-pandemic).
Source: Welsh Government analysis of ONS data

1.5 The extent of the post-GFC productivity slowdown relative to previous UK recessions is shown in **Figure 1.2**. While UK productivity had typically recovered to its pre-recession levels within two years of previous recessions, productivity largely lingered below this for five years after the GFC. Productivity performance since the Covid-19 pandemic has also been slow relative to past recessions and was only 1.6% higher in Q2 2025 than it was in Q4 2019.

Figure 1.2: Labour productivity growth has been sluggish after recent recessions

UK real output per hour worked – Index: First quarter before recession = 100



Note: First quarter before recessions – Early 1980s recession (1979 Q4); Early 1990s recession (1990 Q2); Global Financial Crisis (2008 Q1); Covid-19 pandemic (2019 Q4).
Source: Welsh Government analysis using ONS data

1.6 Most developed countries experienced falls in productivity growth in the aftermath of the GFC, however, the UK's productivity performance compares particularly poorly relative to many other large/high income countries it typically compares itself against. For example, GDP per hour worked grew at a slower rate in the UK than all G7 countries other than France and Italy between 2008 and 2023.[1] UK productivity levels have also been continuously lower than the United States, Germany, and France over this period and were 11.8% lower than the United States in 2023 (the G7 nation with the highest productivity). Given the strong links between productivity and living standards, there are serious concerns that the UK risks seeing further falls in living standards relative to these countries unless it can begin to reverse such trends.

Welsh productivity trends

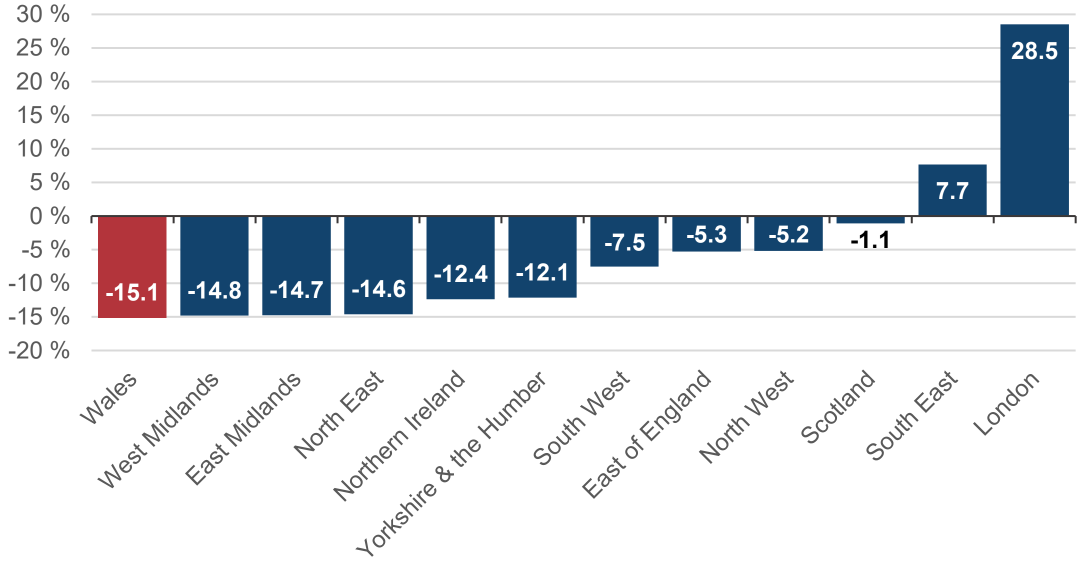
Wales relative to other UK nations/regions

1.7 Wales' longstanding productivity challenges sit within this wider UK context of recent weak performance. The UK economy has long been considered geographically uneven and this is reflected in the productivity data, with the inter-regional productivity differences seen in the UK are generally thought to be amongst the largest for OECD countries.[2] **Figure 1.3** shows regional productivity differences relative to the figure for the UK as a whole and provide some indications as to how the average UK figure is driven by the performance of London and the South East of England. Wales' productivity in 2023 was the lowest of all UK nations/English regions at 15.1% lower than the UK average, but this figure was broadly similar with comparable regions of England.

[1] Welsh Government analysis of OECD Data Explorer. 'Productivity levels: GDP per hour worked'. [accessed 15 January 2026].
[2] McCann and Yuan (2023). 'The Productivity Performance of Different Types of UK Regions and the Challenges of Levelling Up'. Cambridge University Press.

Figure 1.3: Disparate levels of labour productivity across the UK with Wales similar to comparable English regions

Output per hour relative to UK average, 2023

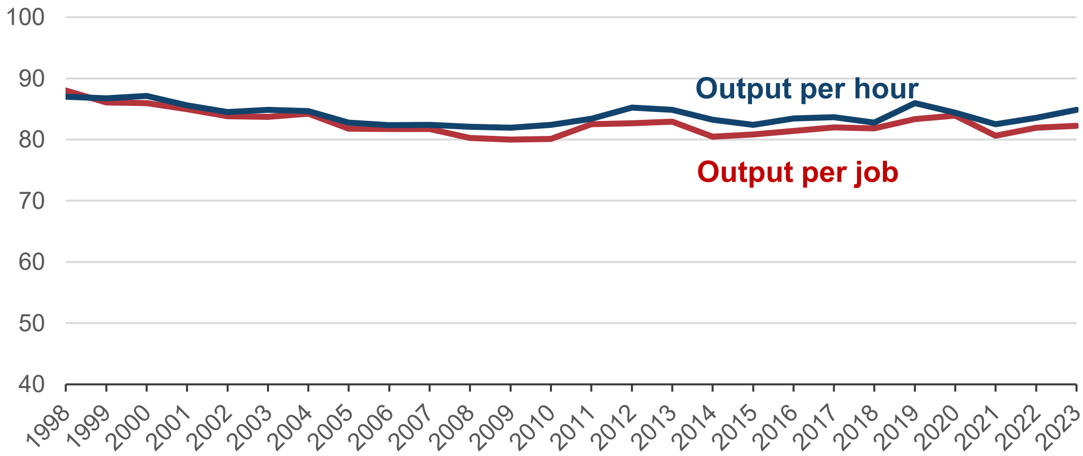


Source: ONS

1.8 As **Figure 1.4** shows for both of the principal measures of labour productivity, Wales' gap with the UK has persisted over a long time horizon. This a reflection of the deep-rooted structural challenges that Wales must address to converge with the UK average.

Figure 1.4: Wales' productivity gap with the UK has persisted over recent decades

Productivity in Wales relative to the UK, Index (UK=100)



Note: Y-axis does not start at zero

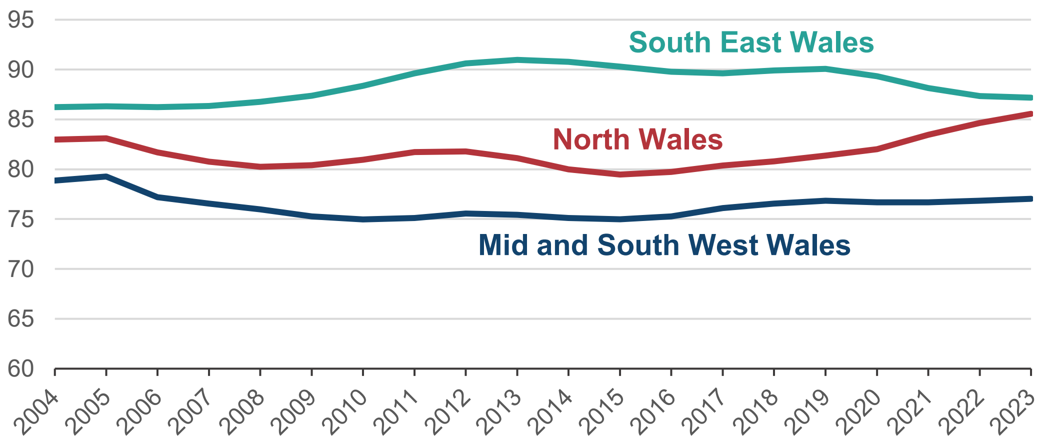
Source: ONS

Wales regional trends

1.9 The UK's unbalanced productivity levels are not only reflected in the differences between Wales and other UK nations/English regions. There is also substantial intra-regional variation seen within Wales. Across Wales' economic regions productivity has consistently been higher in the South East of the country and lowest in Mid and South West Wales (see **Figure 1.5**). In 2023, output per hour in South East Wales was equivalent to 87.2% of the UK average (3.2 percentage points higher than the all Wales figure), in North Wales the same figure was 85.6% (1.6 percentage points higher than the Welsh figure), and 77.0% in Mid and South West Wales (6.9 percentage points lower than the Welsh figure).[3]

Figure 1.5: Productivity performance relative to UK of Welsh economic regions

Output per hour relative to UK, Index (UK=100) by ITL2 region



Note: Subregional using balanced GVA approach (smoothed)

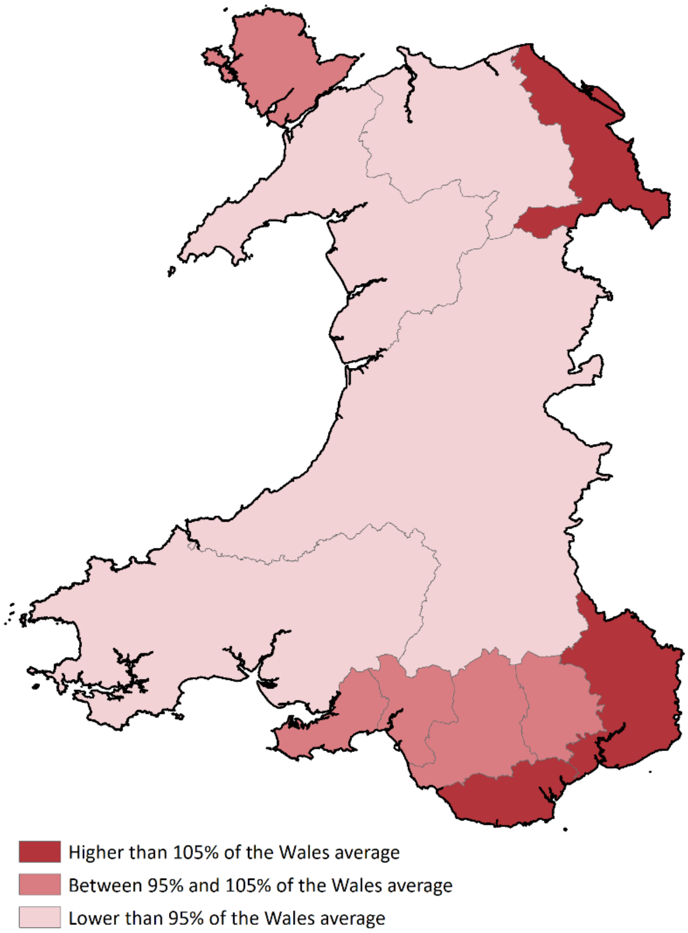
Source: ONS

1.10 These intra-regional challenges and how they are geographically located is brought into sharper focus by looking at the map shown in **Figure 1.6**. As can be seen, those areas with labour productivity over 5% higher than the Welsh average are those urban or metropolitan areas closest to the English border in both North and South East Wales – something touched on further in this chapter.

[3] Note that figures quoted use smoothed figures for subregional GVA per hour worked, and figures may differ slightly to those used elsewhere in report. Smoothed figures are used to reduce the volatility of productivity data at lower geographical levels.

Figure 1.6: Labour productivity is lower in more remote regions of Wales

Gross Value Added (GVA) per hour worked relative to Welsh average, by ITL3 region (2023)



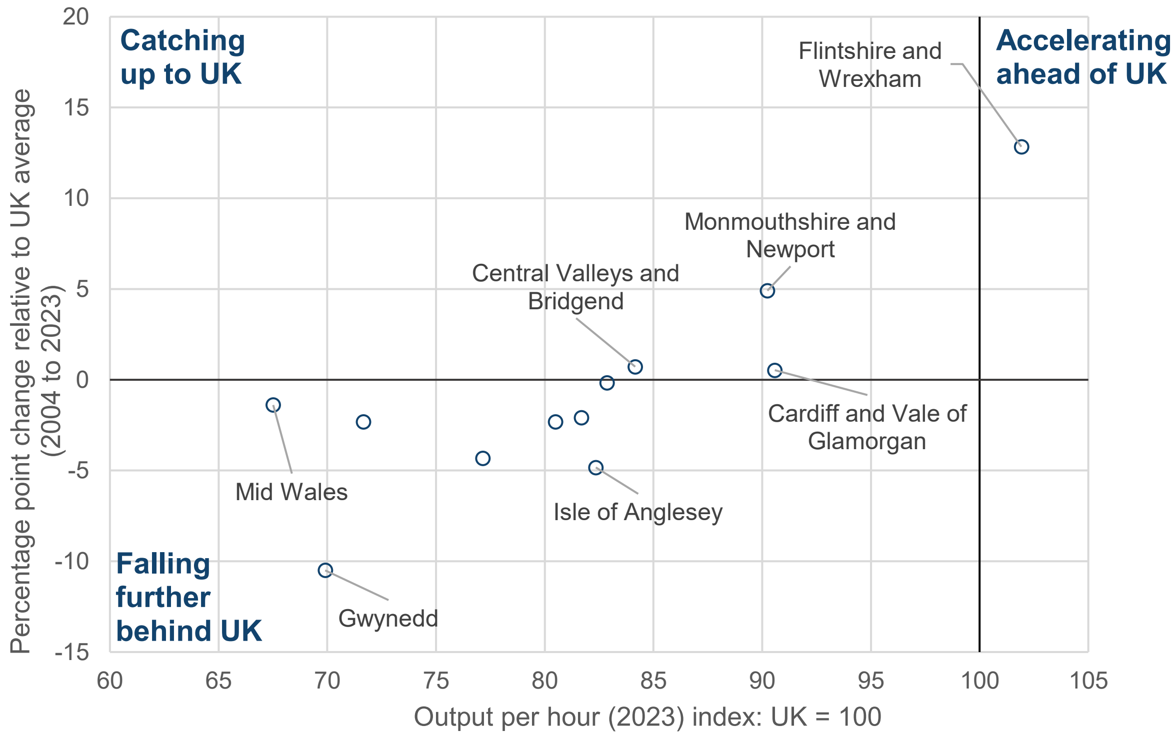
Source: Welsh Government analysis of ONS

1.11 Whilst the map above highlights the extent of regional disparities across Wales, it is equally crucial to examine how these differences have evolved over time and to assess whether Welsh regions are moving closer to or further away from the UK average. **Figure 1.7** highlights how the four Welsh regions that recorded the highest labour productivity in 2023 were those which also saw faster growth relative to the UK over the two decades prior. These regions are either catching up with the UK average or, in the case of Flintshire and Wrexham, have surpassed it. Research indicates that this pattern can largely been seen across the UK, with past relative productivity performance serving as a strong predictor of current relative productivity performance.[4] Clearly if such trends continue, regional productivity disparities in Wales risk further widening.

[4] McCann and Yuan (2023). '[The Productivity Performance of Different Types of UK Regions and the Challenges of Levelling Up](https://)'. Cambridge University Press.

Figure 1.7: Regions with higher productivity are also those that have seen higher productivity growth in recent decades

Output per hour: Percentage point change relative to UK average (2004 to 2023) and relative figure in 2023 for Welsh ITL3 regions



Source: Welsh Government analysis of ONS

The importance of improving productivity across Wales

1.12 The above evidence demonstrates that addressing productivity disparities is not only essential to strengthen Wales' overall economic performance relative to the UK but is also vital to reduce regional inequalities within Wales. The evidence demonstrates that those regions with higher productivity levels have experienced faster growth, and in some cases, have managed to exceed the UK average. However, this trend also highlights the risk of widening gaps between areas, underlining the need for a coordinated approach to improve productivity across all Welsh regions.

Welsh business context

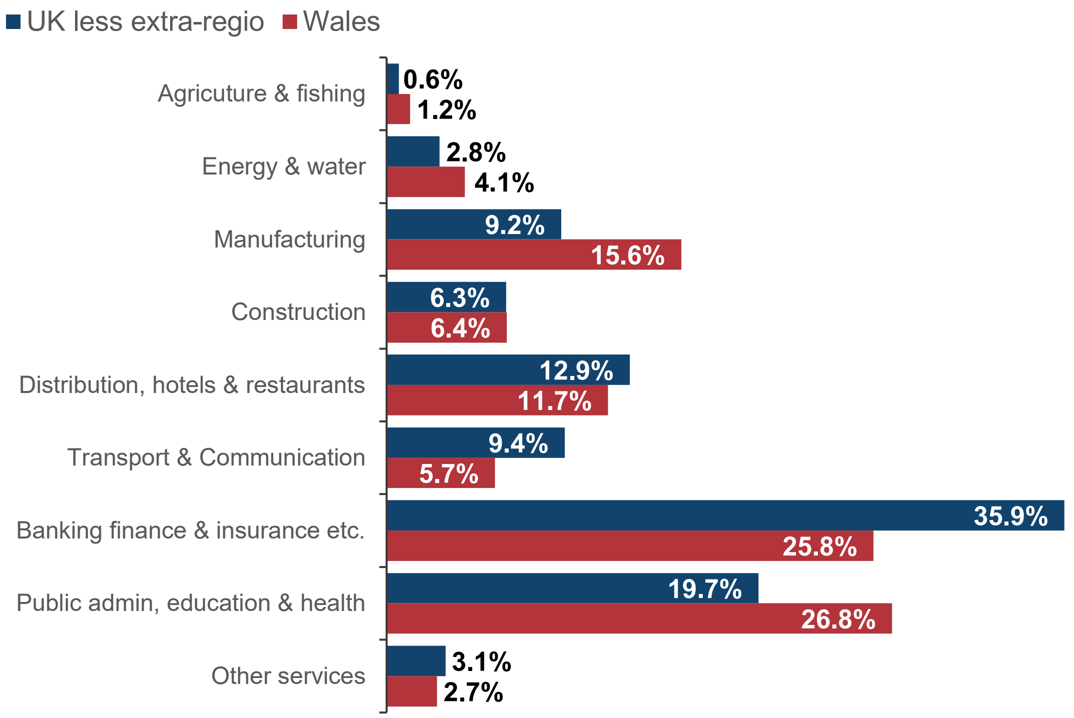
1.13 The following section provides an overview of factors relevant to understanding the make-up of the Welsh economy as it relates to the business population and those that work within it.

Sector make-up of Welsh businesses

1.14 In 2023, in terms of total output, the Welsh economy generated £81.5 billion of Gross Value Added (GVA), equivalent to 3.3% of the total figure for the UK (less extra-regio). Compared to the UK, the features that distinguish the Welsh economy is that a notably larger share of output is generated by the *manufacturing* sector and the *public* sectors, with lower shares of output generated by the *banking, finance, and insurance* sector – see **Figure 1.8** for full comparison of UK and Wales.

Figure 1.8: How Wales output composition differs from the UK

Share of total GVA generated by sector (2023)

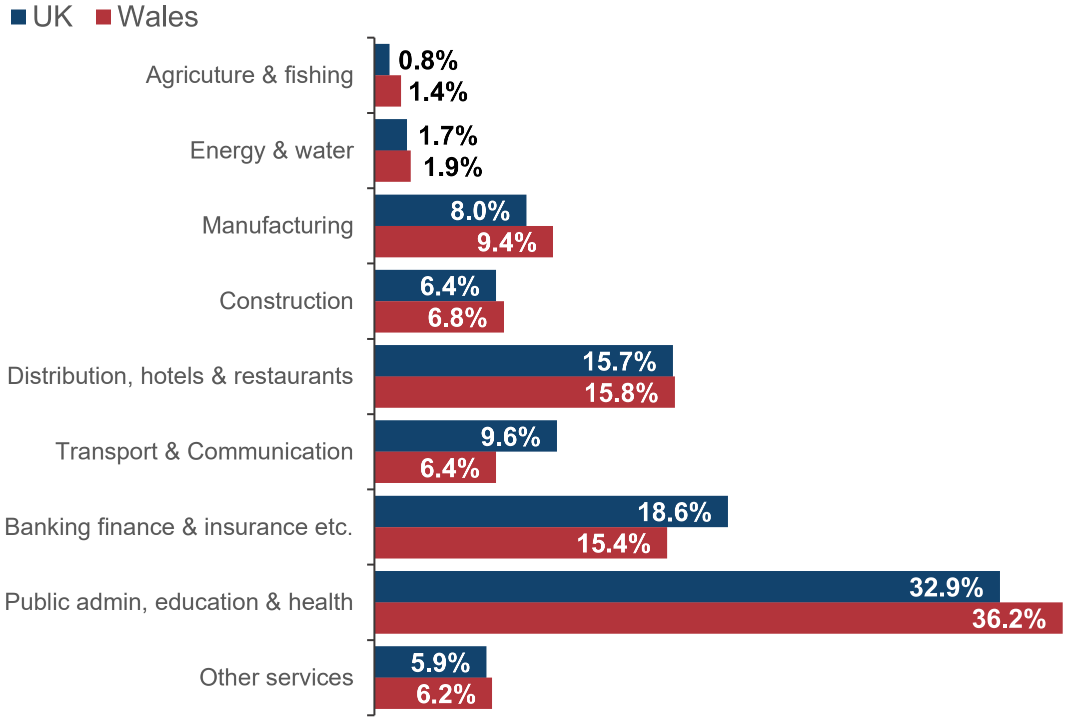


Source: Welsh Government analysis of ONS

1.15 More than a third (36.2%) of jobs in Wales are in the public sector, compared to just under a third (32.9%) across the UK. Demand for public services is generated by the resident population and on a per capita basis, public sector jobs are more prominent but broadly comparable to other English regions. Employment in the service industries is lower in Wales, while sectors such as manufacturing, agriculture, and construction account for a greater proportion of jobs. These patterns are increasingly significant for Wales' productivity challenges, particularly as the UK's post-pandemic economic recovery has been driven primarily by the service sectors.

Figure 1.9: How Wales employment composition differs from the UK

Share of total employment by sector (for year ending June 2025)



Source: Annual Population Survey (ONS)

1.16 In 2025, the UK Government unveiled its Industrial Strategy, pinpointing eight 'growth sectors' anticipated to propel the UK's economic expansion.[5] Among these, Wales stands out for having a higher share of its workforce employed in Advanced Manufacturing and Life Sciences compared to the UK average. The Clean Energy Industries sector also has an employment footprint in Wales that closely matches the UK figure. Within these broad growth sectors, Wales displays particular strength in several niche areas, such as the manufacture of electronic and communications equipment, the recovery of sorted materials, and the activities of insurance agents and brokers. This underscores Wales' significant role in sectors identified by the UK Government as key drivers of future economic growth.

1.17 It should be emphasised that earlier examinations of regional productivity data indicated that most of Wales' productivity gap with the UK overall stems from differences in productivity within individual sectors, rather than from the composition of industries in the Welsh economy.[6] Addressing why Welsh firms

[5] Department for Business and Trade (2025). 'The UK's Modern Industrial Strategy'. UK Government.
[6] Office for National Statistics (2018). 'Regional firm-level productivity analysis for the non-financial business economy, Great Britain: April 2018'.

demonstrate lower productivity than average UK firms operating within the sector should therefore be a priority for LGF interventions.

Business population and characteristics

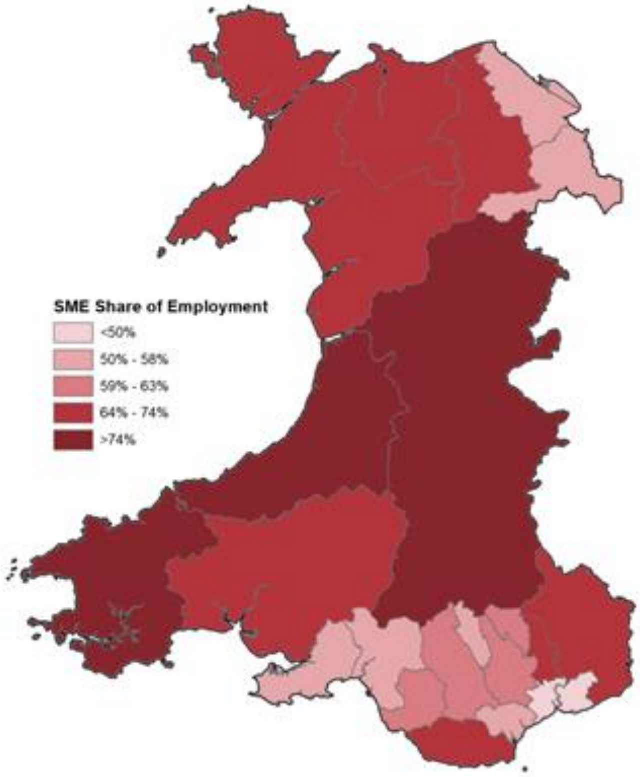
1.18 Looking at the distribution of businesses by size sheds further light on the Welsh economy's structure and the factors underpinning regional productivity patterns. In 2023, Wales was home to approximately 248,000 enterprises, with small and medium-sized enterprises (SMEs – those employing between 0 and 249 people) comprising 99.3% of this total. The importance of SMEs is underscored by their contribution to 62.3% of all employment in Wales and 43.4% of overall business turnover. SMEs accounted for a 2.0 percentage point greater share of employment in Wales compared to the UK average of 60.3%, highlighting the significance of boosting SME productivity to enhance overall productivity levels.

1.19 Analysing how employment is distributed by firm size is also a key consideration when attempting to understand regional productivity differences within Wales and across the UK. While care must be taken not to exaggerate the effect, studies based on UK firm-level data indicate that, after accounting for other variables, larger firms typically exhibit higher average labour productivity levels than their smaller counterparts. However, this relationship is not consistent across all sectors and is non-linear – meaning that increases in firm size yield diminishing returns to productivity on average after a certain point.[7]

[7] Office for National Statistics (2022). 'Firm-level labour productivity measures from the Annual Business Survey, UK: 1998 to 2019'

Figure 1.10: SME employment share highest in mid and west Wales

Map of SME share of total employment, by local authority 2023

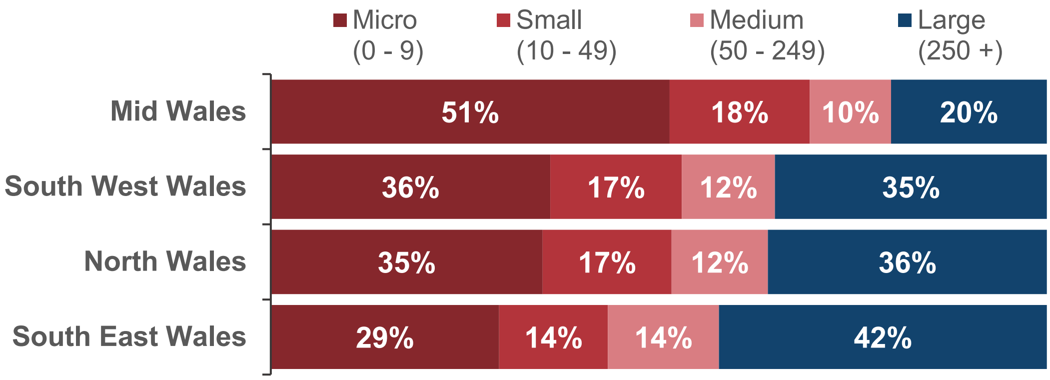


Source: Welsh Government analysis of 'Size analysis of Welsh Businesses'

1.20 **Figure 1.10** illustrates the proportion of employment accounted for by SMEs within each Welsh local authority, while **Figure 1.11** provides a breakdown by economic region and business size. The data reveal that SME employment is particularly significant in Mid Wales, where SMEs are responsible for 80% of total employment – an outcome largely attributable to the prevalence of micro businesses (those with 0 to 9 employees). In contrast, the South East region records the lowest SME employment share, with SMEs contributing just 58% to overall regional employment.

Figure 1.11: Micro businesses account for the large share of SME employment seen in Mid Wales

SME employment concentration across regions, 2023



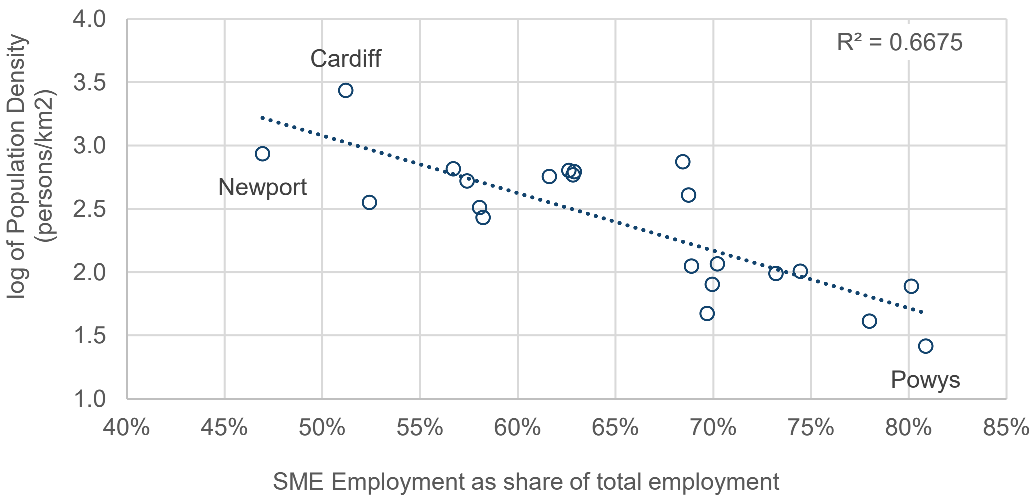
Note: Due to rounding errors figures may be marginally inaccurate

Source: Welsh Government analysis of 'Size Analysis of Welsh Businesses'

1.21 Several factors help explain the differing levels of SME employment across Welsh regions. One key reason is that areas with a greater proportion of SME jobs often have a higher share of sectors associated with SME activity – for example, in agriculture. Additionally, SME employment is generally more prominent in regions more orientated towards the rural economy. **Figure 1.12** offers supporting evidence for this pattern within Wales, indicating an inverse relationship between SME employment share and population density – regions with lower population density tend to have a higher share of employment in SMEs.

Figure 1.12: SME employment increases and population density decreases

Population density and SME employment share of local authorities



Note: Due to rounding errors SME figures may be marginally inaccurate

Source: Welsh Government analysis of 'Size Analysis of Welsh Businesses'; StatsWales

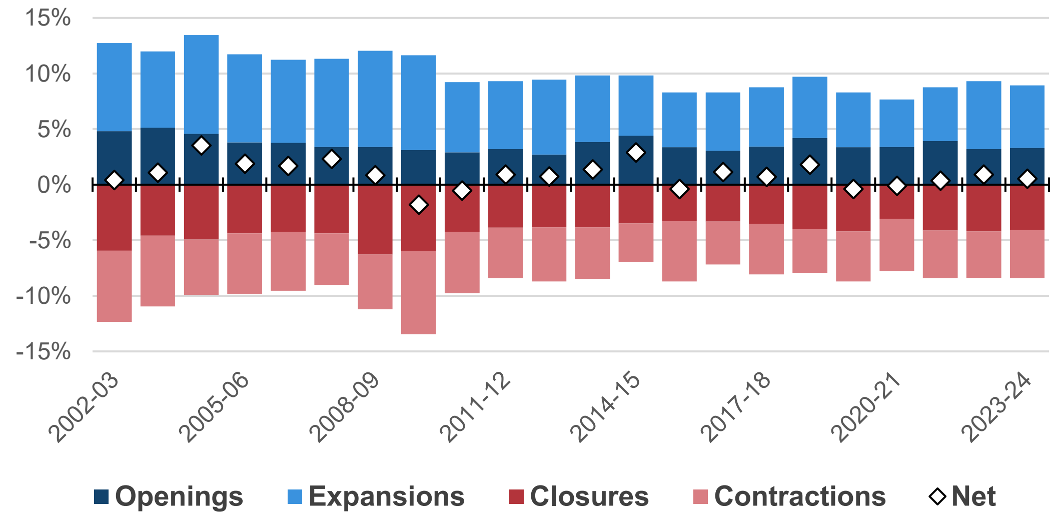
Business dynamism

1.22 Business dynamism refers to the continual process of business formation, growth, and closure within an economy. It is characterised by the ongoing entry of new firms and the expansion, contraction, and exit of existing firms. This cycle is generally thought to positively contribute to a more productive allocation of resources and support business competitiveness economy wide.

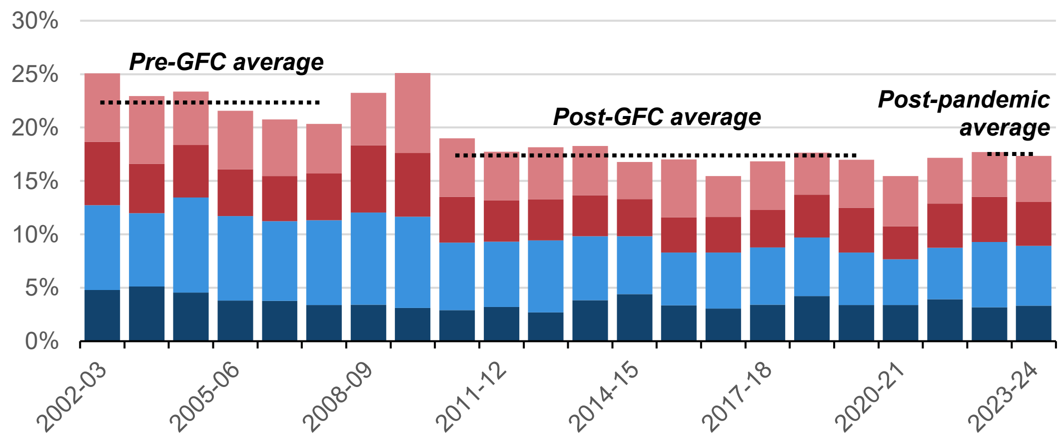
1.23 In the context of job creation and destruction, business dynamism captures the net effect of these movements. New businesses and expanding firms generate employment opportunities, while those that downsize or close contribute to job losses. **Figure 1.13** shows that the net effect of this has generally been positive in Wales over the past two decades of available data, reflecting an expansion in the levels of overall employment.

Figure 1.13 & 1.14: Evidence in slowdown in employment churn

Net effect of job creation/destruction in Wales, as share of active jobs



Total job creation/destruction, as share of active jobs



Source: Welsh Government analysis of the Inter-Departmental Business Register (IDBR)

1.24 Business dynamism has been highlighted as a factor in the UK's productivity slowdown since the global financial crisis because lower rates of business formation, expansion, and exit can reduce competitive disruption that can stimulate innovation and hinder the reallocation of resources to more efficient and innovative firms.[8] When fewer new businesses enter the market, underperforming firms are less likely to face competitive pressure to improve or be replaced and this can lead to stagnation, with slower adoption of new technologies and practices. This diminished dynamism can contribute to a less responsive and less productive economy overall, amplifying the effects of other structural issues such as limited investment in capital and skills.

High-growth firms

1.25 High-growth firms (HGFs) are widely regarded as crucial to improving UK productivity, with evidence from inside and outside the UK showing that a relatively small number of rapidly scaling firms drive a disproportionately large share of productivity, output and employment growth. [9] The typical definition of a high-growth firm/enterprise (HGF) used within the UK is a business with an average growth in employment of greater than 20%, per annum, over a three-year period. The size threshold used to identify these businesses is that they have 10 or more employees.

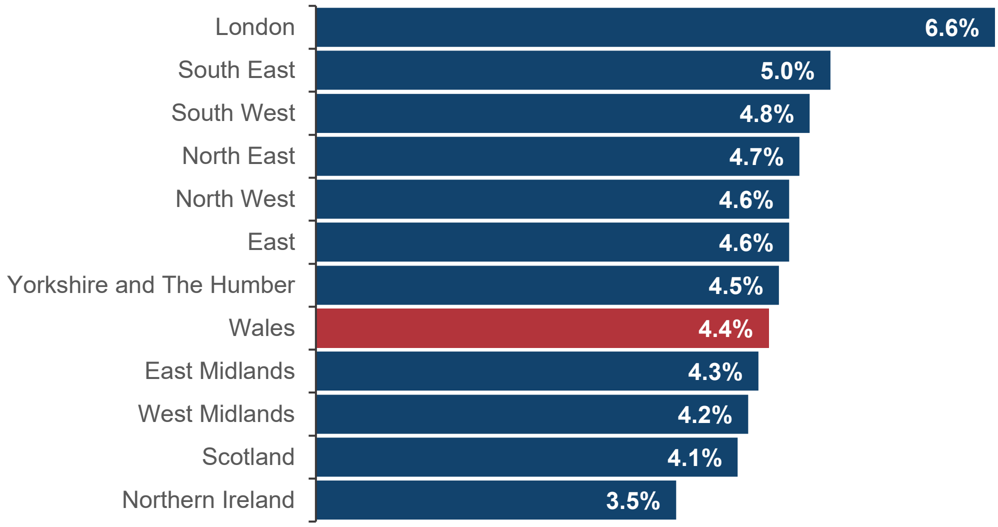
1.26 Evidence from the UK and internationally indicates that, while only a small proportion of (non-micro) SMEs demonstrate the potential to rapidly scale up – reflected in significant year-on-year increases in employment growth – these firms are responsible for the majority of employment growth among the same group of firms.[10]

1.27 In 2024, 4.4% of (non-micro) firms in Wales were identified as being high-growth businesses, the 8th highest rate of the 12 UK nations/English regions. The UK figure stood at 4.9% and, as with other statistics, was largely driven by the performance of London and the South East of England – see **Figure 1.15**.

[8] The Productivity Institute (2024). 'Should we be worried about business dynamism?'. Blog.
[9] Hart and Anyadike-Danes (2015). 'Contribution to Job Creation by High Growth SMEs'. ERC insights paper.
[10] OECD (2021). 'Understanding Firm Growth: Helping SMEs Scale Up, OECD Studies on SMEs and Entrepreneurship'

Figure 1.15: Wales share of high-growth firms lower than UK average

Share of (non-micro) active businesses* within region that are 'high growth' (2024)



Note: * Active businesses with 10 of more employees

Source: ONS

1.28 When looking at the figures for 2024 across sectors at the UK level, the three sectors that had the highest HGF rates were *'Information & Communication'* (9.2%), *'Finance & insurance'* (7.3%), and *'Business administration and support services'* (6.8%). Across Welsh regions there were three LAs where the high-growth rate was above the UK average – these were Caerphilly (6.1%), Cardiff (6.0%), and Swansea (5.3%).

Improving business growth and productivity

1.29 This section examines evidence that can provide insights into how the LGF can be effectively targeted to enhance the productivity of businesses across Wales. The focus of this section is on several key areas thought to be most relevant to the strategic objectives of the LGF, therefore it should be recognised that this is not an exhaustive list; other factors contribute positively to productivity but are not discussed here.

1.30 As noted earlier in this chapter, a significant focus of UK policymakers has been to better understand – and ultimately tackle – the causes of the UK's productivity slowdown since the Global Financial Crisis. This has been a particular concern given how the UK slowdown compares relative to other advanced economies. The evidence from existing studies points towards reduced capital investment and slower growth in workforce skills as significant factors contributing to this trend.[11]

[11] L. Indraccolo (2025). '[Bridging the Gap: Understanding the UK-US Productivity Decoupling]'. IMF Selected Issues Paper.

There is strong evidence that business investment positively contributes to productivity and economic growth, as well as a host of core performance indicators for business.[12] It is for these reasons that both contributing to and unlocking further investment are core objectives within the Regional Investment Framework.

Supporting enterprises and entrepreneurs

Business Advice

1.31 The importance of supporting the creation and growth of high potential businesses in order to address regional productivity differences within Wales and with the wider UK has been alluded to earlier in this chapter. The avenue through which government typically provides direct support to SMEs is via business support programmes that provide advice and/or financial support (for example, in the forms of grants, repayable finance, etc.). In Wales the Welsh Government's business support system includes programmes such as Business Wales, Farming Connect, and the Development Bank of Wales.[13]

1.32 International evidence as to how business advice impacts productivity does not provide a clear picture as to how they are linked, in part due to the limited level of evaluation conducted for such programmes. A review of business advice programmes suggests their impact is greater on improving sales levels than they are for employment and productivity, but results are generally mixed.[14] However recent research suggests business advice can positively impact productivity, especially where it provides expertise on issues that are codified and specific – for example, around export finance, legal, tax, and regulatory compliance.[15]

Under-represented entrepreneurs and business leaders

1.33 Under-represented groups in entrepreneurship – including migrants, ethnic minorities, women, disabled people, and those with low educational attainment – face both shared and group-specific barriers. Common challenges include discrimination, limited access to finance, restricted access to business advice and networks, and gaps in skills and experience, all of which contribute to lower business turnover and survival rates. Group-specific obstacles further compound these difficulties. Migrants often face language barriers and unfamiliarity with local institutions and culture, while women encounter institutional and social

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[12] Enterprise Research Centre (2024). 'Business investment - drivers, barriers and economic impacts. A rapid literature review'. Final Report.
[13] Welsh Government (2025). 'Business support review'.
[14] What Works Centre for Local Economic Growth (2016). 'Business Advice'. Evidence Review.
[15] Henley (2024). 'What Kind of Business Advice Improves Small Business Productivity?'. ERC Insight Paper

biases. Disabled entrepreneurs may fear losing benefits and frequently lack supportive networks, and those with low educational attainment face multiple, under-researched barriers.[16]

1.34 In the year ending 2024, women made up 50.2% of the working age population (those aged 16 to 65). In 2024, approximately 14% of Welsh SME employers were led by management teams headed by women, a proportion closely matching that of the UK overall. Additionally, 31% of Welsh SME employers had management teams equally led by both men and women – a figure notably higher than the UK average of 26%.[17]

1.35 In the year ending 2024, 5.9% of the working age population identify as an ethnic minority. Around 4% of Welsh SME employers were led by a management team with at least half of its members from minority ethnic groups (MEG-led), this compared to 6% for the UK as a whole.[18]

1.36 In the year ending 2024, 29.4% of the working age population were disabled. Around 3% of all SME employers were led by disabled people, with the UK figure 2%. Among Welsh SME employers with more than one owner, director or partner, 8% reported at least one of their senior team having a disability.[19]

International Trade

1.37 Engaging in international trade can enhance productivity for businesses based in Wales by opening up access to larger markets and a broader consumer base. By exporting goods and services, Welsh firms are exposed to greater competition, which helps to encourage innovation, efficiency improvements, and the adoption of international best practice. Participation in international trade can allow businesses to benefit from new technologies, diverse ideas, and opportunities for collaboration with global partners – all factors that drive product and process improvements. Evidence from the UK suggests that businesses that trade, even when controlling for other firm characteristics, are on average more productive than those that do not.[20]

1.38 Professional-led export advice – for example on regulatory/legal considerations – can provide a valuable form of business support assistance. Evidence suggests

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[16] Wishart (2018). ‘Under-represented entrepreneurs: A literature review’. Enterprise Research Centre.
[17] Department for Business & Trade (2025). ‘Longitudinal Small Business Survey 2024: SME employers (businesses with 1 to 249 employees)’. Table 35.
[18] Department for Business & Trade (2025). ‘Longitudinal Small Business Survey 2024: SME employers (businesses with 1 to 249 employees)’. Table 36.
[19] Department for Business & Trade (2025). ‘Longitudinal Small Business Survey 2024: SME employers (businesses with 1 to 249 employees)’. Tables 30 & 37.
[20] Office for National Statistics (2022). ‘Firm-level labour productivity measures from the Annual Business Survey, UK: 1998 to 2019’

that, despite its effectiveness in boosting productivity, export advice remains a resource many businesses often under-utilise.[21]

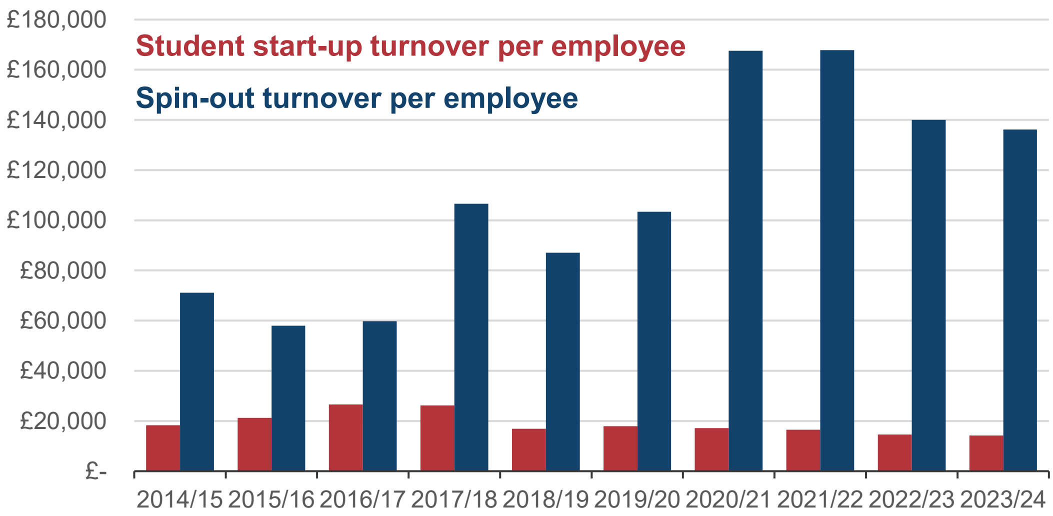
Higher education spin-outs

1.39 Universities can play a pivotal role in fostering entrepreneurial activity by working closely with businesses, nurturing student-led start-ups, and commercialising innovations through enterprises known as 'spin-outs'. Spin-outs are a distinct form of start-up, rooted in intellectual property (IP) generated from university research. Typically, these ventures arise when academics or research teams within a university develop a discovery or technology with strong commercial potential. Supporting spin-out enterprises not only boosts economic productivity but also enhances the financial sustainability of higher education institutions, which commonly maintain an equity interest in these companies.

1.40 While student-led start-ups are established in greater numbers each year in Wales compared to spin-outs, the total revenue generated by active spin-out companies has consistently surpassed that of student-led start-ups over the past five years for which data is available. Moreover, as it relates to labour productivity, spin-outs have maintained a higher average turnover per employee than student-led start-ups throughout the last decade, as illustrated in **Figure 1.16**.

Figure 1.16: Spin-out companies consistently achieve a higher average turnover per employee than student start-ups

Turnover per employee of start-ups/spin-outs (Welsh higher education institutions)



Source: Welsh Government analysis of HESA

[21] Henley (2024). '[What Kind of Business Advice Improves Small Business Productivity?](#)'. ERC Insight Paper.

Improving access to finance

1.41 Enabling access to finance is crucial for boosting productivity growth, as it allows businesses to invest in new technologies, expand their operations, and upskill their workforce. When firms can more easily secure funding, they are better equipped to innovate, adopt modern processes, and respond to changing market demands. Conversely, barriers to finance can stifle ambition, hinder the scaling up of firms with high growth potential, and reduce business dynamism.

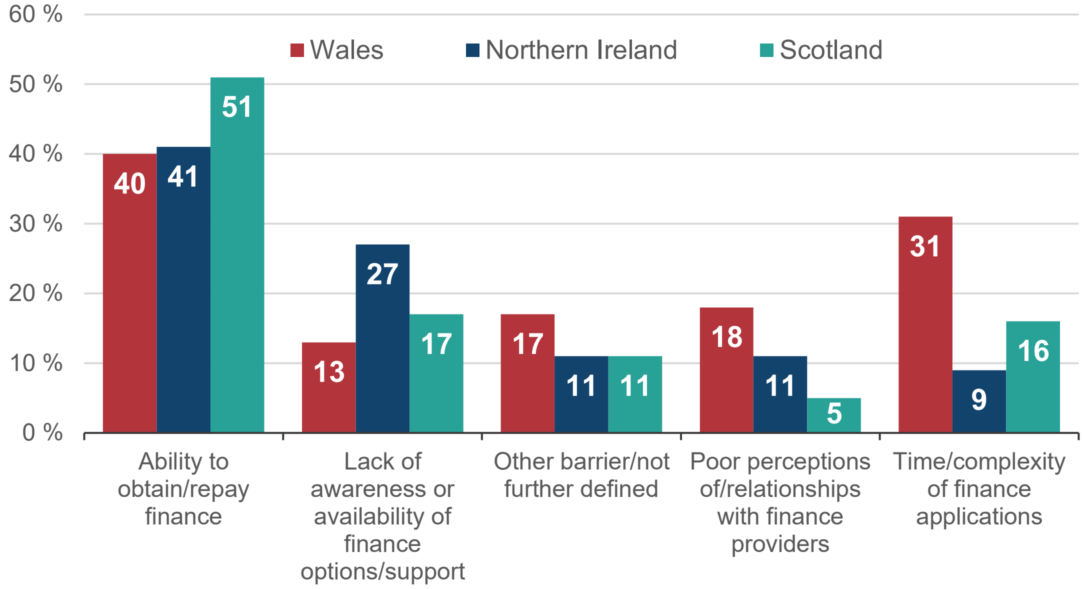
1.42 HGFs, however, often struggle to access the finance to enable their expansion due to their lack of tangible assets that can be used as collateral or a lack of reputation or credit history.[22] This is a common barrier encountered by new and young firms.

1.43 As well as enabling business expansion, prior research suggested that for approximately one third of Welsh SMEs, access to finance was perceived as a barrier to accessing wider consumer bases via export.[23] The same study highlighted that awareness of existing export finance products was low amongst those who export and those who were considering exporting. Given that engaging in export and import – both in goods and/or services – is associated with higher productivity amongst UK firms,[24] such barriers can negatively impact firm performance.

[22] Bank Overground (2025). 'Unlocking growth: what can the literature tell us about what's holding back high-growth firms?'. Bank of England.
[23] Kapitsinis and others (2019). 'Export Finance in Wales'. Economic Intelligence Wales.
[24] Office for National Statistics (2025). 'Trade and productivity in British firms: 2005 to 2022'.

Figure 1.17: Welsh firms are more likely than those in other devolved nations to cite the time and/or complexity of applications as barriers to finance

Identified barriers to accessing external finance as a share of firms reporting facing any barriers, by devolved nation (2024)



Source: Development Bank of Wales

1.44 According to the 2025 Wales SME Access to Finance report by Economic Intelligence Wales and the British Business Bank, 57% of Welsh SMEs had utilised at least one form of external finance, a proportion broadly in line with figures from the other devolved UK nations. Approximately one in five SMEs in Wales (21%) reported encountering at least one barrier to obtaining external finance. Of those highlighting barriers, the most frequently mentioned challenge in Wales was the ability to secure and/or repay finance, cited by 40% of respondents who faced such obstacles. Notably, Welsh SMEs were significantly more likely than their counterparts elsewhere in the UK to identify the time and complexity involved in finance applications as a key barrier – see **Figure 1.17** for further detail. At a regional level, SMEs in South West Wales were the most likely to report barriers to accessing finance (26%), whereas those in Mid Wales were the least likely (15%). However, these intra-regional comparisons should be interpreted with caution due to smaller sample sizes in some areas.

Skills and productivity

1.45 Enhancing the skills of the workforce – often referred to as developing human capital – is widely recognised as a key driver of improved productivity.[25] A more skilled workforce is not only able to perform current tasks more effectively but also

[25] Sianesi and Van Reenen (2003). ‘The Returns to Education: Macroeconomics’. Journal of Economic Surveys, Volume 17, Issue 2, pp. 157-200

better positioned to embrace innovation and adapt to emerging technologies and working methods. These improvements can occur within individuals' existing roles or by transitioning to new positions. Equally, difficulty in recruiting workers with the required skills for vacant roles can prevent firms from expanding their operations and/or improving processes and products. Gaining a clearer understanding of the specific skill requirements of businesses throughout Wales is crucial for efforts to boost productivity across the regions. The importance of skills as it relates to employability more widely is explored in further detail in the next chapter, '**Increasing skills and supporting people into work**'.

1.46 While a substantial body of research underscores the crucial role of early childhood education in developing both cognitive and non-cognitive skills – foundations that strongly influence individuals' future earning capacity and employment opportunities – it remains important to promote adult education more broadly. Although building non-cognitive skills early on can make individuals more likely to engage in further learning later in life,[26] adult education should still be actively encouraged as a way to address skill shortages and ensure that firms can both initiate and absorb innovations. Lifelong learning offers not just economic advantages but also brings significant social and health benefits, reinforcing the value of supporting education at every stage of life.[27]

1.47 Due to the array of roles and their skill requirements, providing clear insights into the nature of skill shortages can be challenging, especially at lower-geographic areas. The Employer Skills Survey (ESS) provides evidence for understanding the labour market, including skills shortages and gaps in Wales and across Wales' regions and sectors. The ESS 2024, based on a sample of 5,605 Welsh employers, showed that 1 in 6 (17%) of employers reported that they had at least one vacancy. Employers in South East Wales (19%) were most likely to have vacancies, while those in Mid Wales were least likely (13%).

1.48 Employers that indicated that they had vacancies at the time of the interview were asked whether any of those had proved hard-to-fill and, if so, whether it was due to a lack of skills, experience or qualifications among applicants (skill-shortage vacancies, SSVs).

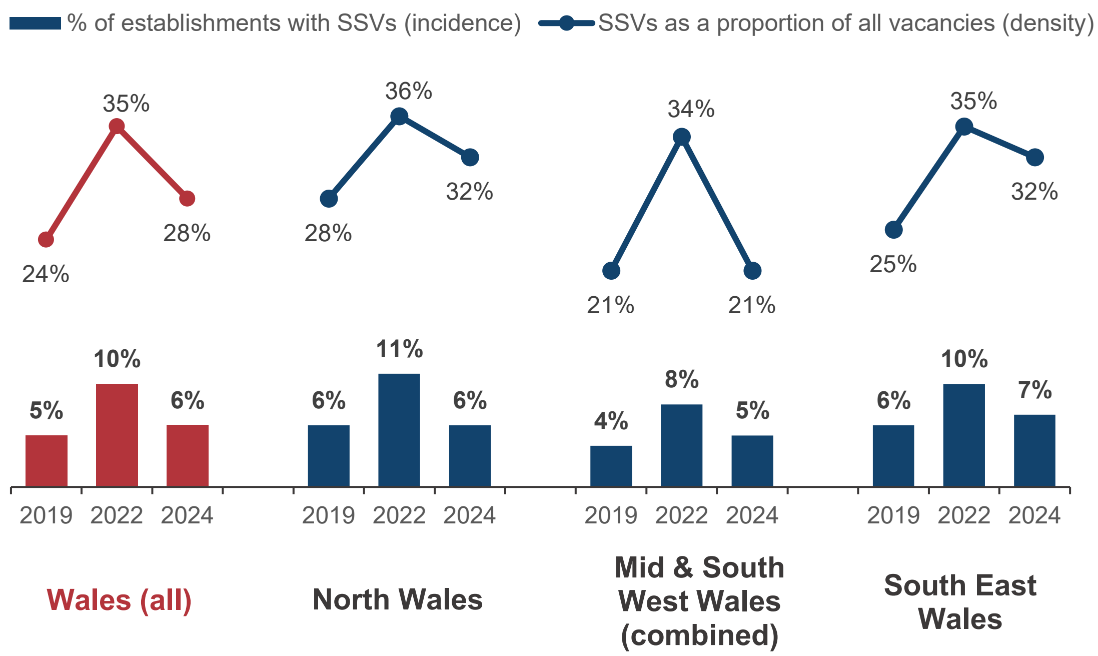
1.49 As **Figure 1.18** shows, around 1 in 20 employers in Wales (6%) reported a SSV in 2024. This was lower than 2022 (10%) but comparable to levels seen in previous years. The proportion of employers reporting SSVs decreased across all Welsh regions, although employers in South East Wales reported the highest incidence

[26] Government Office for Science (2017). 'Future of Skills & Lifelong Learning'.
[27] Schuller (2017). 'What are the wider benefits of learning across the life course?'. Foresight, Government Office for Science.

of SSVs (7%) while Mid Wales reported the lowest (4%). The proportion of all reported vacancies in Wales which were SSVs (SSV density) accounted for 28% of all vacancies in Wales. This was a lower proportion than in 2022 (35%) but higher than in 2019 (24%). Despite some variation in recent years, the density of SSVs has been gradually increasing since 2011. In 2024, SSV density was lowest among employers in South West Wales.

Figure 1.18: SSV incidence decreased across all regions to levels similar to 2019, and was highest in South East Wales and lowest in Mid & South West Wales

Incidence and density of skill-shortage vacancies (SSVs), by Welsh economic region



Source: Employer Skills Survey 2024 report (Welsh Government)

1.50 A review of the literature evaluating employment training programmes found that such training had positive effects on employment or earnings in half of those reviewed.[28] Short programmes (below six months, often shorter) were found to be more effective for less formal training activity. Extended training programmes proved to be particularly beneficial for training that was more ‘skill intensive’. Additionally, training delivered within the workplace or through hands-on experience was found to be more successful than traditional classroom-based approaches. Programmes designed in collaboration with employers and closely aligned to actual job tasks emerged as crucial aspects of effective training. Any public support for training provision, however, needs to be well targeted and clear as to how the training will address existing skill gaps.

[28] What Works Centre for Local Economic Growth (2016). ‘Evidence review: Employment Training’.

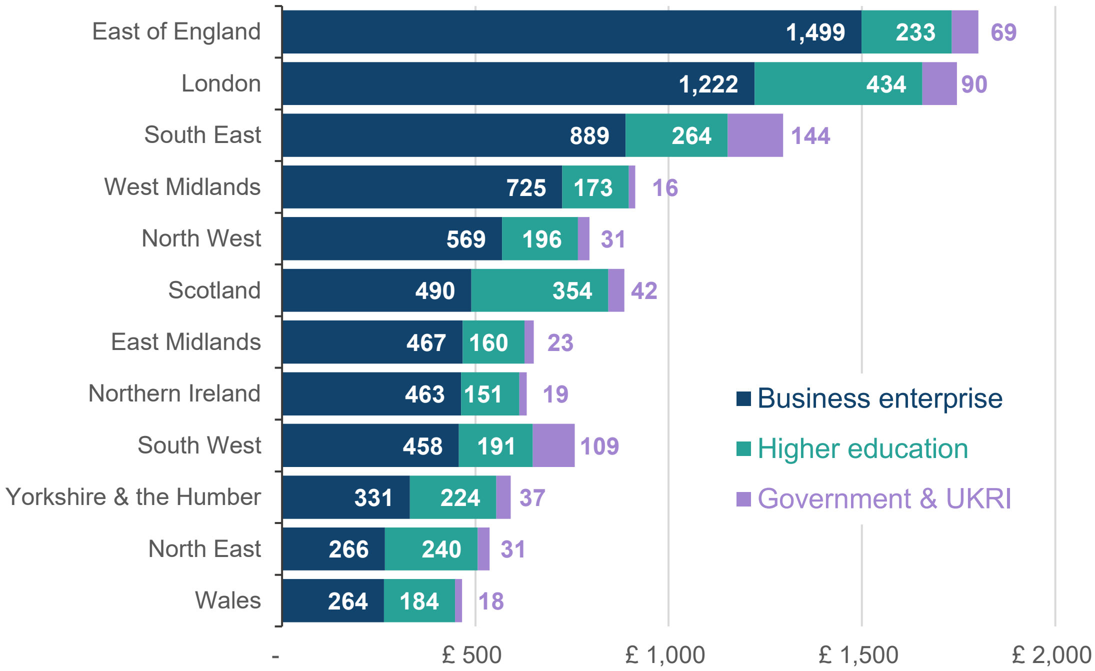
Research, development, and Innovation

1.51 Research, development, and innovation (RD&I), and the role of knowledge more widely, have long been seen as fundamental drivers of labour productivity that occur within an economy. Investment in RD&I enables businesses to develop new products, improve existing processes, and adopt cutting-edge technologies, all of which can boost productivity. These factors also enhance the capacity of the workforce to adapt to technological change and increase their contribution to economic growth.

1.52 For Wales, strengthening RD&I is especially important given the current lower share of UK R&D expenditure seen relative to its population size. Despite Wales accounting for 4.6% of the UK population, its R&D spend of £1.5 billion represented only 2.1% of UK R&D spending in 2023 (excluding private non-profits organisations).[29] **Figure 1.19** shows R&D expenditure adjusted so it is shown on a per head of population basis. As can be seen, on this basis Wales has the lowest level of R&D expenditure per head of population and, drilling further down, the lowest level of business enterprise R&D expenditure.

Figure 1.19: Welsh R&D expenditure low relative to other regions

R&D expenditure (£) per head of population in 2023, by expenditure source



Note: Non-profit organisations not included

Source: Welsh Government analysis of ONS Gross domestic expenditure on R&D and Mid-year population estimates for 2023

[29] Private non-profit organisations have been excluded as the lower levels of spending for this sector are often disclosive at lower UK regional areas, therefore data is not available for many UK ITL1 regions.

1.53 Network capital – which refers to quality and density of inter-organisational links – is seen as a core factor which enables knowledge diffusion within and between regions.[30] For example, collaboration between businesses, research organisations, and universities can create positive spillover effects, allowing these entities to exchange ideas and expertise that they do not or cannot access internally. These ideas can then be harnessed to enhance productivity within firms.

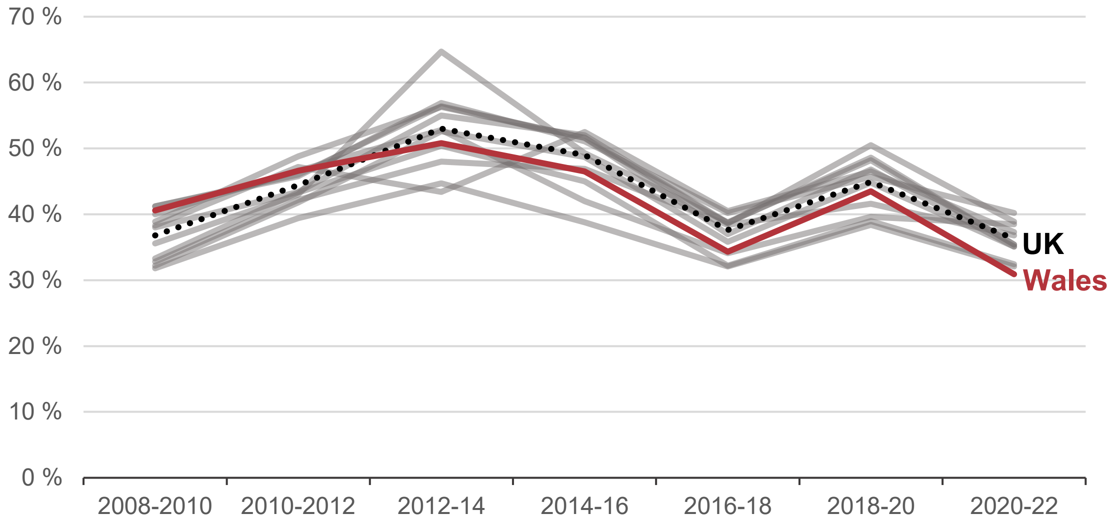
1.54 As with skills, wider network benefits can also be achieved by improving transport infrastructure within regions to better make use of 'agglomeration' effects – the benefits that accrue from firms being physically closer together (actual density) or better connected by transport links (effective density). As it relates to knowledge diffusion, the benefits of agglomeration not only include the ability for firms and workers to share and learn from each other but also allow for more efficient matching of firms with buyers, suppliers, and employees that more closely meet their skill needs.[31] Indeed, one explanation for the higher productivity seen in regions closest to the Welsh border is their proximity and connectivity to other significant population centres on the English side of the border.

1.55 An innovation-active firm is defined by the OECD as one "engaged at some time during the observation period in one or more activities to develop or implement new or improved products or business processes for an intended use. Both innovative and non-innovative firms can be innovation-active during an observation period."[32] In the latest period (2020 to 2022) of UK Innovation Survey data (UKIS), an estimated 30.9% of Welsh firms were defined as innovation active, 5.4 percentage points lower than the figure for the UK which stood at 36.3%.[33] While some volatility can be seen in the regional data, Wales has had a lower share of innovation active firms than the UK average for each of the last five periods of available data – see **Figure 1.20**. While these figures do not provide insight into the quality of the innovation carried out – in terms of outcomes or other metrics – they feed into the wider picture of low levels of business RD&I expenditure in Wales.

[30] Huggins and Thompson (2014). 'A Network-Based View of Regional Growth'. Journal of Economic Geography 14, pp 511-545
[31] Andersson and others (2004). 'Cities, Matching and the Productivity Gains of Agglomeration'. Centre for Economic Performance discussion paper No 648.
[32] OECD/Eurostat (2018). 'Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation'. The Measurement of Scientific, Technological and Innovation Activities (4th Edition)
[33] Department for Business and Trade (2024). 'UK innovation survey 2023: report'. Statistical Annex.

Figure 1.20: Evidence suggests Welsh firms have been less likely to be pursue innovation than their UK counterparts

Share of businesses that are innovation active, UK nations and English regions



Source: UK Department for Business and Trade (Innovation survey 2023)

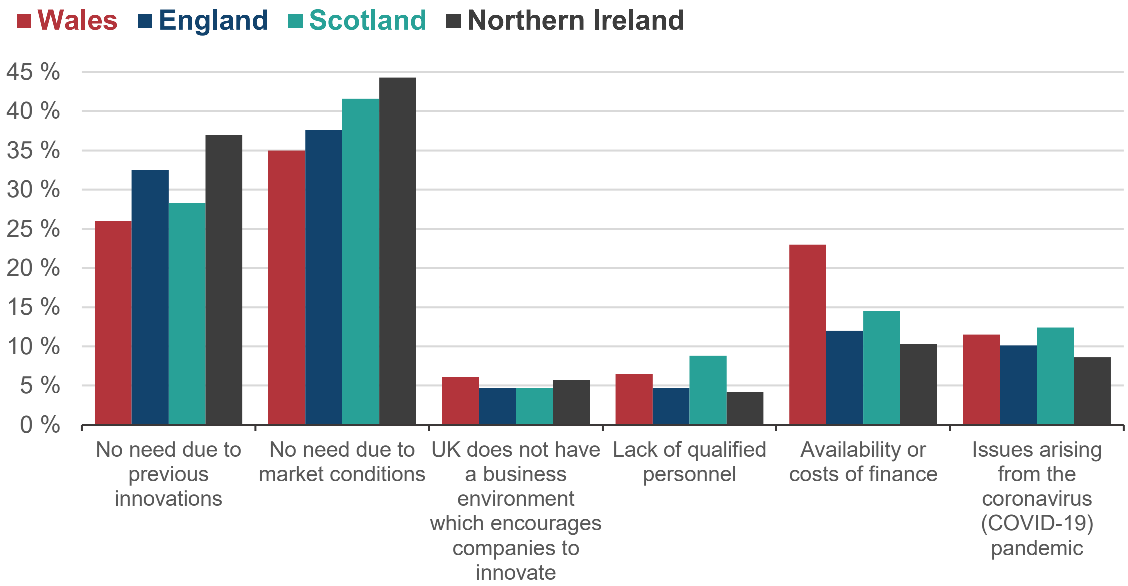
1.56 The same dataset suggests firms are more likely to innovate the larger they are, with 35.9% of UK SMEs being innovation active in 2020-22 as opposed to 49.5% of large businesses. Innovation was also highest for firms in both the manufacturing and knowledge intensive service sectors – both of which are typically subject to high levels of trade and competitive exposure – while it was lowest in the construction sector.

1.57 UKIS sheds further light on the reasons why some firms are not pursuing innovation. Among UK businesses classified as 'non-broader innovative',[34] the most frequently reported reason – given by 38.0% – was that there was no need due to market conditions. This was also the most cited reason across all UK nations (see **Figure 1.21**). One factor that was more likely to be cited as a reason for not innovating in Wales than other areas of the UK was the availability or cost of financing innovation, with 23.0% of non-broader innovative businesses in Wales citing this as a barrier. This was 10.4 percentage points higher than the figure for the UK as a whole (12.6%).

[34] Non-broader innovative businesses are those not engaging in any of the activities that innovative active firms are and are not investing in the following areas: internal research and development, training, acquisition of external knowledge or machinery and equipment linked to innovation activities.

Figure 1.21: Availability/cost of finance far more likely to be cited as barrier to innovation by Welsh firms

Reasons for not innovating (share of non-broader innovative business), 2020 to 2022



Source: UK Department for Business and Trade (Innovation Survey 2023)

1.58 Digital technology adoption has been found to have a significant impact on firm-level productivity.[35] However, there is a range of possible barriers that can prevent businesses from adopting digital technologies. In a recent survey last year, the most cited reason given by UK SMEs as to what was stopping them investing in such technologies was the cost of software to the business (32%) – the likelihood of this being cited as a barrier was higher for micro businesses than their small and medium-sized counterparts.[36]

1.59 Artificial Intelligence (AI) is increasingly being adopted by firms as a means to boost productivity, streamline operations, and enhance decision-making. In 2024, approximately 12% of Welsh firms were utilising artificial intelligence on their sites (this compares to 14% of UK firms).[37] However, surveys of UK management practices suggest that interest in adopting the technology has been increasing.[38] While there are ongoing debates about the inclusivity of AI, with concerns regarding potential disparities in access and benefits, the imperative to remain competitive in a rapidly evolving marketplace is driving businesses to embrace

[35] Nucci and Others (2023). "Digital technologies and productivity: A firm-level investigation". Economic Modelling, Volume 128, 106524

[36] Ipsos Mori (2025). '[Understanding technology adoption among UK SMEs]'. Report for the UK Department for Business & Trade.

[37] Department for Education & Skills England (2025). '[Employer Skills Survey 2024]'. Results tables – Wales/UK. [Accessed 23 January 2026]

[38] Office for National Statistics (2025). '[Management practices and technology adoption by firm characteristics in the UK]'. 2023 edition of dataset.

these technologies. For many organisations, the use of AI is a tool not only for improving but also maintaining their competitive edge, as those who fail to keep pace risk falling behind their more technologically advanced peers. Of course, the use of AI will not currently be applicable or appropriate for use across all sectors and business types.

Summary

1.60 Improving productivity is a pressing priority for Wales, as it underpins economic growth, competitiveness, and drives increases in living standards. Enhanced productivity enables businesses to make better use of resources, innovate, and respond more effectively to market challenges, which is essential for sustaining prosperity in the face of global competition. For Wales, targeting productivity improvements is particularly significant given the need to close the gap with other areas of the UK, ensuring that businesses and workers alike can benefit from more resilient and dynamic economic conditions.

1.61 The creation of high-potential start-ups and spinouts, especially those led by under-represented groups, is crucial for fostering innovation and inclusivity within the Welsh economy. These ventures are often the source of breakthrough ideas, new technologies, and job creation, helping to drive long-term growth. Interventions such as targeted business support programmes, access to collaborative grants, and the establishment of innovation hubs can help nurture entrepreneurial talent and ensure that promising companies—regardless of background—are able to scale and thrive.

1.62 Increasing capital investment in high-growth businesses is vital for unlocking their potential and accelerating economic transformation in Wales. Access to finance allows these businesses to expand their operations, adopt new technologies, and compete effectively in international markets. Supporting their growth can be achieved by raising awareness of existing finance options, such as export finance for SMEs, and ensuring that business support programmes are well-coordinated, measurable, and address genuine funding gaps rather than duplicating existing efforts.

1.63 Finally, boosting investment in research, development, and innovation (RD&I) across the Welsh economy is essential for maintaining competitiveness and exploiting existing technologies. Higher levels of RD&I encourage the development of new products and processes, driving productivity and reinforcing strengths of a knowledge-based economy. Interventions such as facilitating collaboration between businesses and research organisations, developing collaborative spaces, and supporting cluster development can play a significant role in increasing RD&I investment, thereby strengthening the innovation ecosystem throughout Wales.

2 Increasing skills and supporting people into work

Why is labour market participation important?

2.1 Labour market participation refers to the proportion of the working-age population that is either employed or actively seeking employment. It is a critical indicator of economic health, social inclusion, and the availability of opportunities within an economy.

2.2 Encouraging participation in the labour market is desirable for several reasons. For example:

- **Economic Growth:** Greater participation in the form of increased employment boosts output, income, and tax revenues within an economy.

- **Social Inclusion:** Employment can support an individual's well-being and reduce poverty and feelings of social exclusion.

- **Fiscal Sustainability:** Higher participation reduces welfare dependency and public expenditure on benefits, freeing up resources for other services.

- **Intergenerational Impact:** Participation influences educational and health outcomes for future generations.

2.3 This chapter provides an overview of figures and trends relevant to the labour market in Wales. This includes an overview of the skills profile of the Welsh workforce, given their important role in enabling workers to both gain employment and/or command better salaries. This chapter will also seek to provide an overview of the type of interventions that have been employed in Wales and elsewhere to boost labour market participation and skills.

The Welsh labour market

2.4 In the year ending September 2025, there were 1,934,000 people of working age (16 to 64) in Wales, equivalent to 4.6% of those of working age in the UK. Just over half (50.1%) of those aged 16 to 64 were resident in South East Wales, with 22.0%

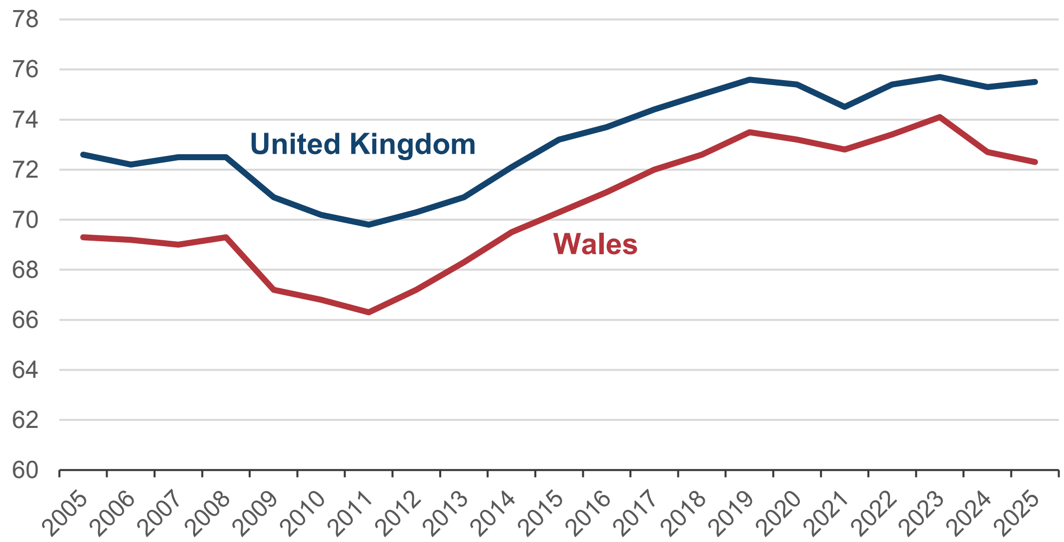
in South West Wales, 21.6% in North Wales, and 6.3% in Mid Wales.[39] Information on the distribution of employment by sector can be found in the previous section **'More productive and competitive businesses'**.

General trends (Wales vs UK)

2.5 The employment rate for people aged 16 to 64 in Wales was 72.3% in the year ending September 2025, 3.2 percentage points lower than the same figure for the UK (75.5%). The gap with the UK has remained relatively persistent having stood at 3.3 percentage points in the year ending September 2005, however, both the UK and Wales have seen increased employment rates over the past two decades, with Wales largely tracking the UK rate (see **Figure 2.1**).

Figure 2.1: There has been an improvement in employment rate in Wales over past the two decades, which largely tracks the UK

Employment rate (%) of those aged 16 to 64, Wales and UK



Note: Annual data is for year ending 30 September of stated year

Source: StatsWales (Annual Population Survey)

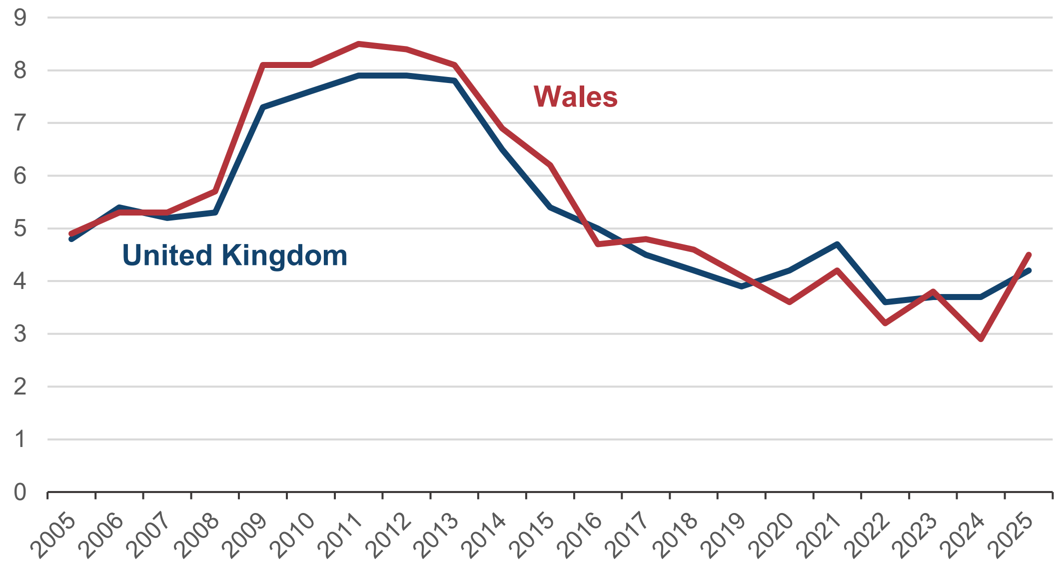
2.6 As **Figure 2.2** suggests, the decline in the employment rate observed between 2007 and 2011 can partly be explained by increases in the unemployment rate seen during the economic downturn of that period. As a result of the GFC, the unemployment rate eventually rose to 8.5% in 2011 (for year ending September) but fell in the following years and was 4.5% in 2025. The unemployment rate in Wales has tracked closely to the UK over the past two decades of available data. However, at the time of writing there are concerns amongst independent

[39] Welsh Government (2026). '[Annual Population Survey: summary of economic activity](#)'. [Accessed 9 March 2026]

forecasters that economic conditions will lead to heightened levels of unemployment in the UK in 2026, relative to that seen in recent years.[40]

Figure 2.2: Unemployment rate rose sharply during the GFC but recovered in following years

Unemployment rate (%) of those aged 16 and over



Note: Annual data is for year ending 30 September of stated year

Source: StatsWales (Annual Population Survey)

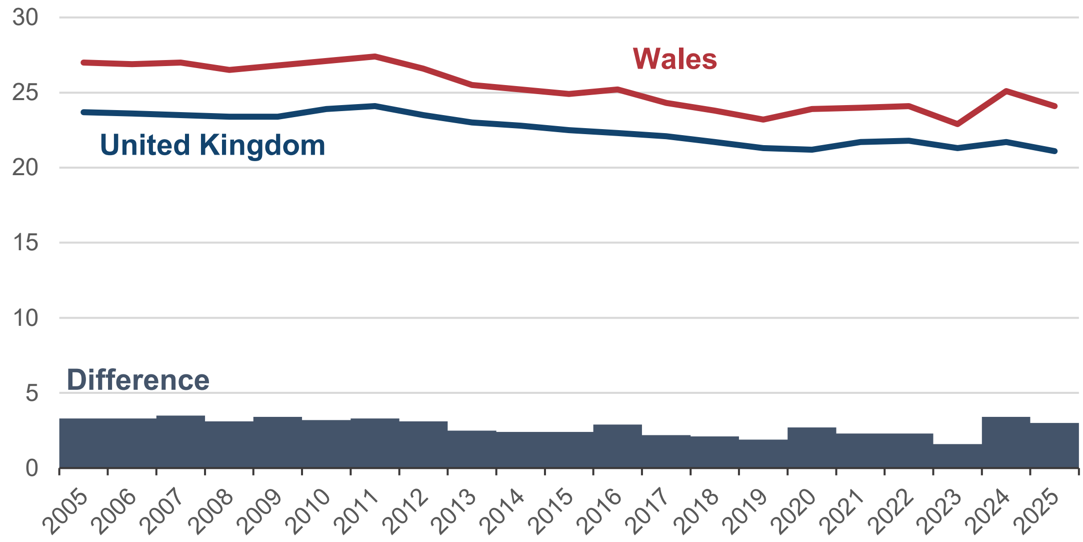
2.7 The economic inactivity rate for those aged 16 to 64 in Wales was 24.1% for the year ending September 2025, equivalent to 446,200 people. The economic inactivity rate was 3.0 percentage points higher in Wales than the same figure for the UK, which stood at 21.1%. If Wales' economic inactivity rate was brought in line with the UK rate this would be equivalent to roughly 58,100 more economically active individuals aged 16 to 64.

2.8 Much of the historical employment rate gap seen between Wales and the UK has been attributed to persistent elevated levels of economic inactivity in Wales. As **Figure 2.3** shows, while economic inactivity rates have been gradually falling over recent decades, the gap between Wales and the UK has remained relatively stable.

[40] HM Treasury (2026). 'Forecasts for the UK economy: a comparison of independent forecasts'.

Figure 2.3: Economic inactivity rate has been gradually falling in Wales but persistent gap with UK remains

Economic inactivity rate (%) of those aged 16 to 64



Note: Annual data is for year ending 30 September of stated year

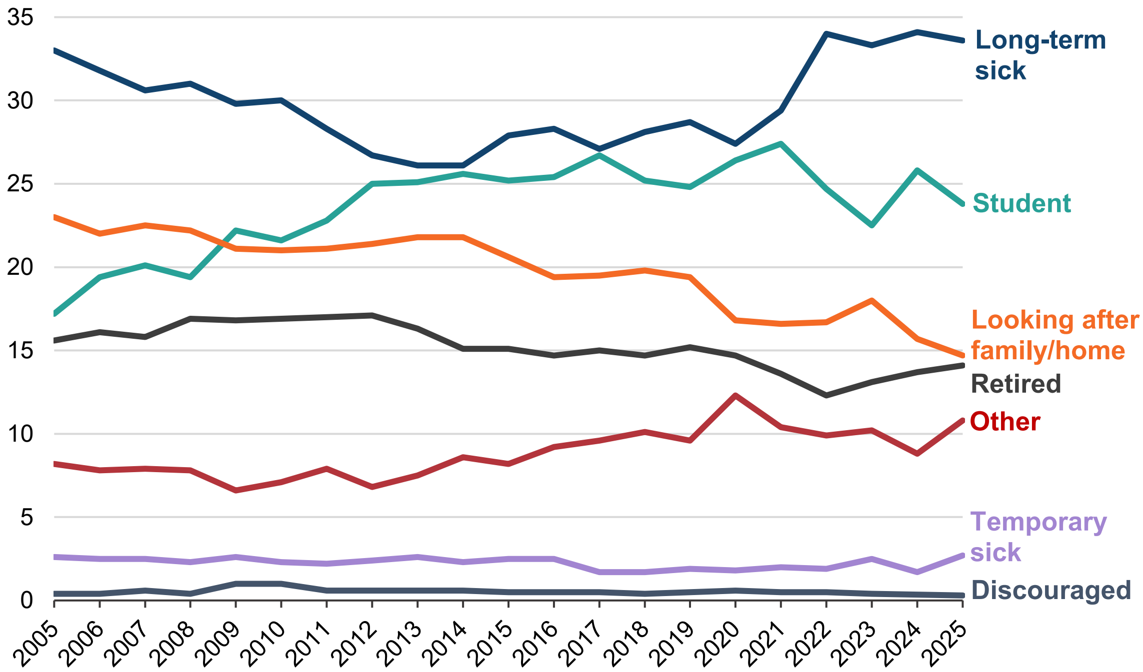
Source: StatsWales (Annual Population Survey)

2.9 Given Wales' elevated rates of inactivity relative to the UK, it is helpful to understand the reasons given for that inactivity. Long-term sickness is the predominant reason for inactivity in Wales, cited by 33.6% of individuals (year ending September 2025) and is higher than that seen across the UK (28.1%). As **Figure 2.4** shows, the share of those citing a long-term health problem as the primary cause of their economic inactivity grew in the years following the Covid-19 pandemic, with a rise across health condition types (both mental and physical).[41] There has been a decline in inactivity due to caring responsibilities, possibly reflecting changing social norms and greater utilisation of social care and childcare provision.

[41] Office for National Statistics (2023). '[Rising ill-health and economic inactivity because of long-term sickness, UK: 2019 to 2023]'.

Figure 2.4: Long-term sickness has become the main reason for inactivity for over a third of economically inactive individuals since Covid-19 pandemic

Primary reason for economic inactivity amongst 16 to 64-year-olds in Wales, share (%) of all economically inactive



Note: All data points are for year ending September for stated year; "Discouraged" data for 2024 is unavailable so 2023 and 2025 are connected

Source: Office for National Statistics (Annual Population Survey)

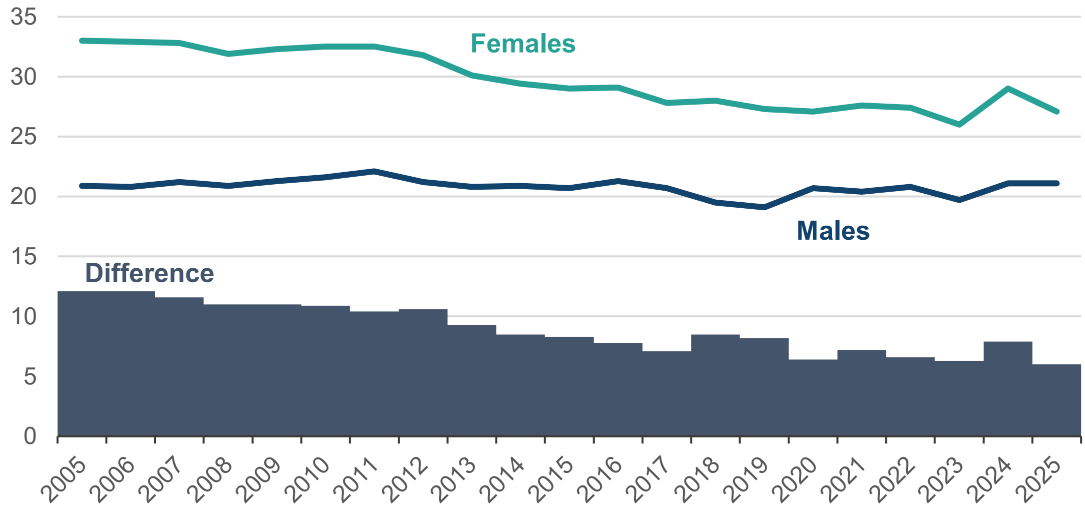
2.10 It is important to recognise that not all causes of economic inactivity are necessarily an issue that needs to be addressed. For example, individuals who are currently in education will often be acquiring skills that will improve their labour market outcomes upon completion. However, data suggests there are many people who are not participating in the labour market who wish to. In the year ending September 2025, 19.3% of those aged 16 to 64 who were economically inactive in Wales stated that they wanted a job. Facilitating pathways into employment for economically inactive individuals who express a desire to work has clear benefits for both the individuals concerned and the broader economy.

Gender

2.11 In the year ending September 2025, economic inactivity amongst females (for those aged 16 to 64) was 6.0 percentage points higher than for males at 27.1% and 21.1% respectively. As **Figure 2.5** shows, while this gap has been observed for every period of available data, there has been positive convergence in the rates seen over the past two decades. In 2005 the economic inactivity gap between males and females was 12.1 percentage points.

Figure 2.5: Economic inactivity continues to be higher for females, but rate has been converging with figure for males

Economic inactivity rate (%) of those aged 16 to 64 in Wales, by gender



Note: Annual data is for year ending 30 September of stated year

Source: StatsWales (Annual Population Survey)

2.12 In the year ending September 2025, the most common reason for economic inactivity for males in Wales was long-term sickness, which increased by 1.6 percentage points over the year to 36.9% of all economically inactive males. This was followed by being a student accounting for 25.5%. Historically, the most common reason for economic inactivity for females in Wales has been looking after family/home, although the overall trend has been decreasing over time. During 2020 to 2021, this proportion dropped suddenly, which could be due to the coronavirus (COVID-19) pandemic, as an opposite trend was observed for those giving 'other' reasons.

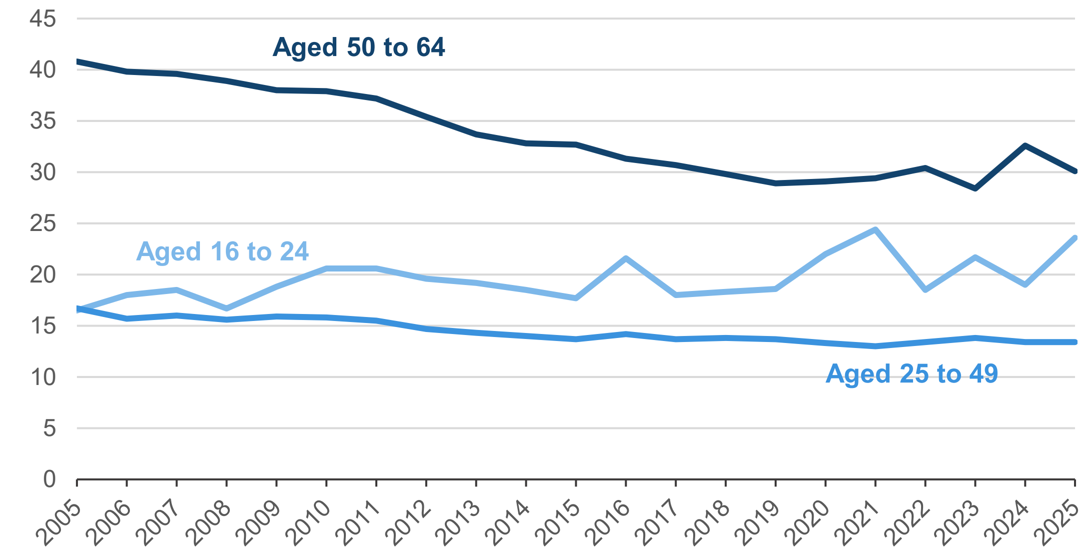
2.13 In the year ending September 2025, the most common reason for economic inactivity for females in Wales was long-term sickness representing 31.1% of all economically inactive females. Over the same period, the proportion of those looking after family/home accounted for 21.8% of all economically inactive females.

Age (young people)

2.14 When looking at labour market participation by age, it is helpful to consider the economic inactivity rate excluding students (as this will typically inflate figures for younger cohorts). **Figure 2.6** shows that the cohort that have seen the biggest fall in their economic inactivity rate was for older working-age adults – those aged 50 to 64. Analysis of the data suggests that, while the economic inactivity rate fell for males and females within this cohort over this period, the fall was particularly pronounced for females aged 50 to 64 with the inactivity rate (excluding students) falling by 14.4 percentage points over this period (as opposed to 7.1 percentage points seen for males).

Figure 2.6: Economic inactivity falling for older cohort of working age population, but rising for youngest

Economic inactivity rate (excluding students) in Wales, by age



Note: Annual data is for year ending 30 September of stated year

Source: StatsWales (Annual Population Survey)

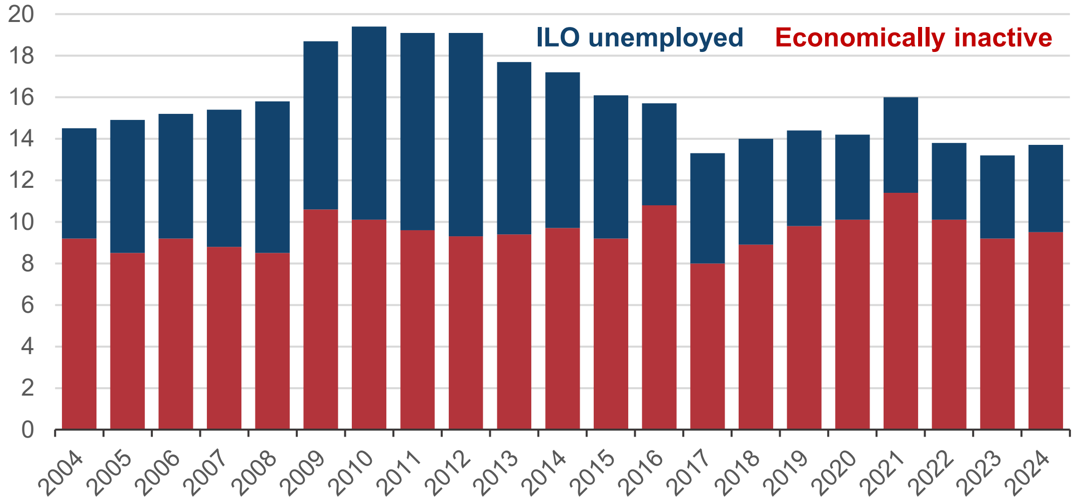
2.15 NEET refers to young people who are not currently engaged in education, employment, or training. The share of those aged 15 to 24 who were categorised as NEET in the UK was 2.6 percentage points higher in the UK than the OECD average in 2024 (13.8% vs 11.2%).[42]

2.16 In 2024 there were 47,100 people aged 16 to 24 in Wales who were NEET, which represented 13.7% of this cohort – 9.5% of the cohort were defined as being economically inactive, and 4.2% unemployed.[43] As **Figure 2.7** shows, the total NEET share was 3.5 percentage points lower than the same figure from a decade prior (17.2% in 2014) and 0.8 percentage points lower than the figure from 2004 (14.5%). As can be seen, an increase was seen in the NEET rate after the GFC, and evidence from recessions suggests that younger workers are the worst affected age cohort by economic downturns.[44]

[42] OECD (n.d). '[Youth not in employment, education or training (NEET)]'. [Accessed 23 February 2026].
[43] Figures for 2024 are provisional.
[44] Benito and Bunn (2011). '[Understanding labour force participation in the United Kingdom]'. Bank of England Quarterly Bulletin 2011.

Figure 2.7: Majority of young people who are NEET are economically inactive

Share of 16 to 24-year-olds not in education, employment or training in Wales



Note: Figures for 2024 are provisional

Source: StatsWales

2.17 As well as impacts on lifelong earning potential, evidence suggests that experiencing prolonged unemployment in the early stages of adulthood can have continued long-term ‘scarring’ effects that affect employment outcomes over an individual’s life.[45] Youth unemployment is also associated with worse mental health outcomes that persist throughout an individual’s life, which worsens with repeated exposure to periods of unemployment.[46]

2.18 The self-reported mental health of young people across the UK has also been found to be lower than all other age groups and, more worryingly, has deteriorated over recent decades, with this decline being attributed to rising levels of economic inactivity seen amongst younger people. Having a mental health problem is associated with worse labour market outcomes, regardless of qualifications.[47]

2.19 Educational attainment, occupational and educational aspirations, attitudes towards school and learning, school absence, socio-economic status, and family

[45] Ralston and others (2021). ‘Economic Inactivity, Not in Employment, Education or Training (NEET) and Scarring: The Importance of NEET as a Marker of Long-Term Disadvantage’. Work, Employment and Society, 36(1), 59-79.

[46] Strandh and others (2014). ‘Unemployment and mental health scarring during the life course’. European Journal of Public Health, Volume 24, Issue 3, Pages 440–445,

[47] McCundy & Murphy (2024). ‘We've only just begun: Action to improve young people’s mental health, education and employment’. Resolution Foundation.

and parental characteristics are key factors linked to the likelihood of young people becoming NEET.[48]

2.20 According to survey data from the UK, young people have reported a shortage of work experience and professional contacts as significant obstacles to securing quality employment, alongside insufficient training opportunities. Additional challenges cited included difficulties with travelling beyond their immediate locality and the highly competitive nature of the jobs market, which further hinder access to stable work.[49]

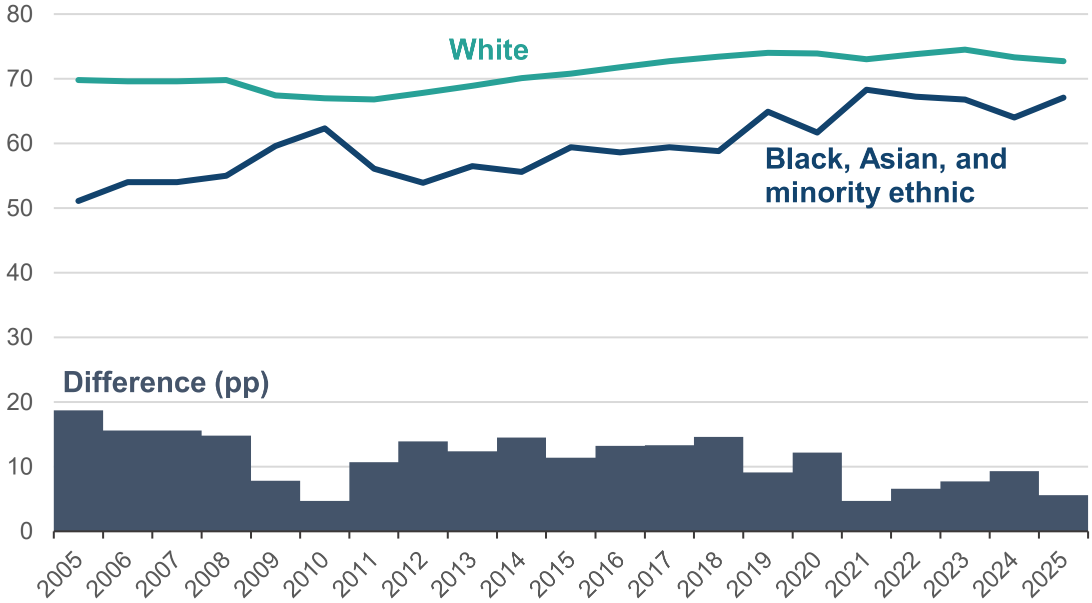
Ethnicity

2.21 In Wales, as in the UK, there has been a long-running gap in labour market participation by ethnicity. In the year ending September 2025, the employment rate for those aged 16 to 64 was 72.7% for White people in Wales,[50] while the figure for Black, Asian, and Minority Ethnic (BAME) people was 67.1% (a difference of 5.6 percentage points). As **Figure 2.8** shows, there has been some convergence in the employment rate difference seen in recent years. While there is some volatility observed, labour market data suggests over recent years that lower employment rates for BAME are caused by both higher rates of unemployment and economic inactivity.

[48] Sottini and others (2025). '[Educational and Psychosocial Factors Associated with Increasing the Risk of Becoming Not in Education, Employment or Training (NEET) Among Young People in England: A Rapid Evidence Assessment]'. Youth Futures Association.
[49] Williams and others (2021). '[A Better Future: Transforming jobs and skills for young people post-pandemic]'. Institute for Employment Studies report.
[50] Category includes White Welsh, English, Scottish, Northern Ireland, British and any other White background including Gypsy and Irish Travellers.

Figure 2.8: Persistent ethnicity employment rate difference, but signs that rates have seen some convergence

Employment rate (%) in Wales of those aged 16 to 64, by ethnicity



Note: Annual data is for year ending 30 September for stated year

Source: StatsWales (Annual Population Survey)

2.22 The likelihood of labour market participation has also been shown to be influenced both by ethnicity and generational influences – for example, there have been observed differences between first (people born abroad) and second generation (people with at least one parent born abroad) ethnic minority groups in the UK.[51]

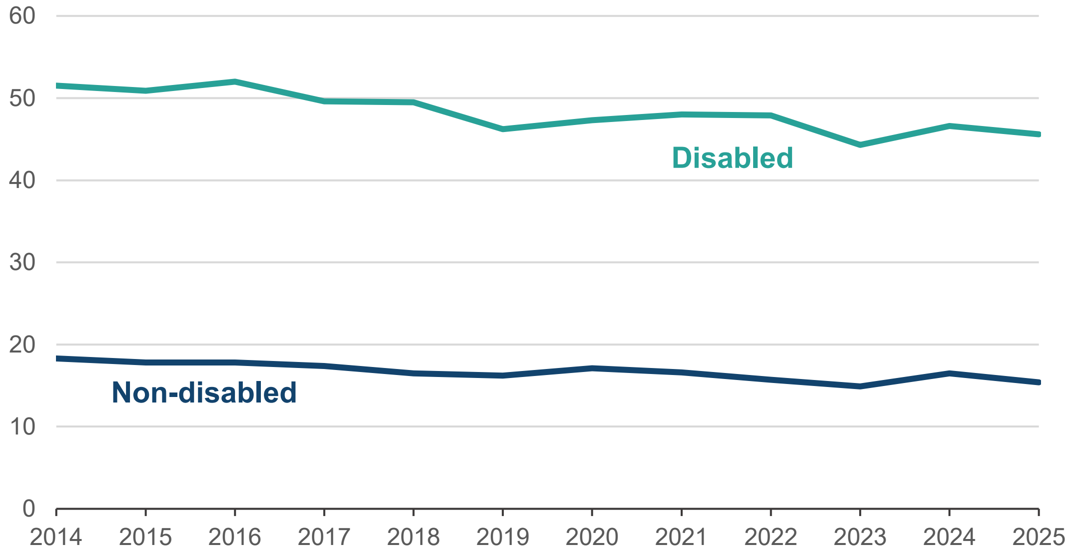
Disability

2.23 Some of the most pronounced differences seen in labour market participation rates by a protected characteristic (for which data is available) is that seen by disabled status. In 2025, of those aged 16 to 64, the employment rate for disabled people in Wales was 50.5%, which was 30.7 percentage points lower than the same rate for non-disabled people (81.2%). **Figure 2.9** provides an indication as to what explains this employment gap, as there are both large and sustained rates of economic inactivity for disabled people in Wales – 45.6% in 2025, 30.2 percentage points higher than non-disabled people (15.4%). The economic inactivity rate for disabled people was also 5.0 percentage points higher in Wales than for the UK as a whole (40.6%).

[51] Race Disparity Unit & Equality Hub (2023). '[Outcomes in labour market for ethnic minorities by immigrant generation status]'. UK Government.

Figure 2.9: Just under half of working age disabled adults are economically inactive, significantly higher than for those who are not disabled

Economic inactivity rate (%) in Wales of those aged 16 to 64, by disabled status



Note: Annual data is for year ending 30 September of stated year

Source: StatsWales (Annual Population Survey)

2.24 Research from 2024 found that most areas (ITL3) of Scotland, Wales, and the North of England have disability employment gaps higher than the GB average, whereas most areas in the south of England had lower gaps.[52] This analysis also estimated that only one third of spatial variation in the disability employment gap could be explained by "people effects", i.e. differences in education levels amongst the working age population. The remaining two thirds of the gap are explained by "place effects", with one third attributed to measurable factors and the other third attributed to factors that could not be measured. Areas with high concentrations of people working in knowledge industries and areas with high concentrations of people working in elementary occupations were found to typically have the lowest disability employment gaps.

2.25 There is a combination of factors cited in the literature for the poorer labour market outcomes for disabled people across the UK. The Social Model of Disability makes an important distinction between impairment and disability. Impairment refers to an individual's health condition while disability refers to the ways in which people with disabilities are discriminated against or disempowered from access or inclusion by other individuals and organisations. Beyond certain limitations an individual's impairment may have on the type of work they can do, disabled people often face physical and organisational barriers to both accessing employment and progressing within their workplace, that can be compounded by negative

[52] Bryan and others (2024). 'The Geography of the Disability Employment Gap'. University of Sheffield.

perceptions of disability by employers and colleagues.[53] For example, a significant barrier to employment for disabled people is a lack of health-related adaptations and/or support.[54]

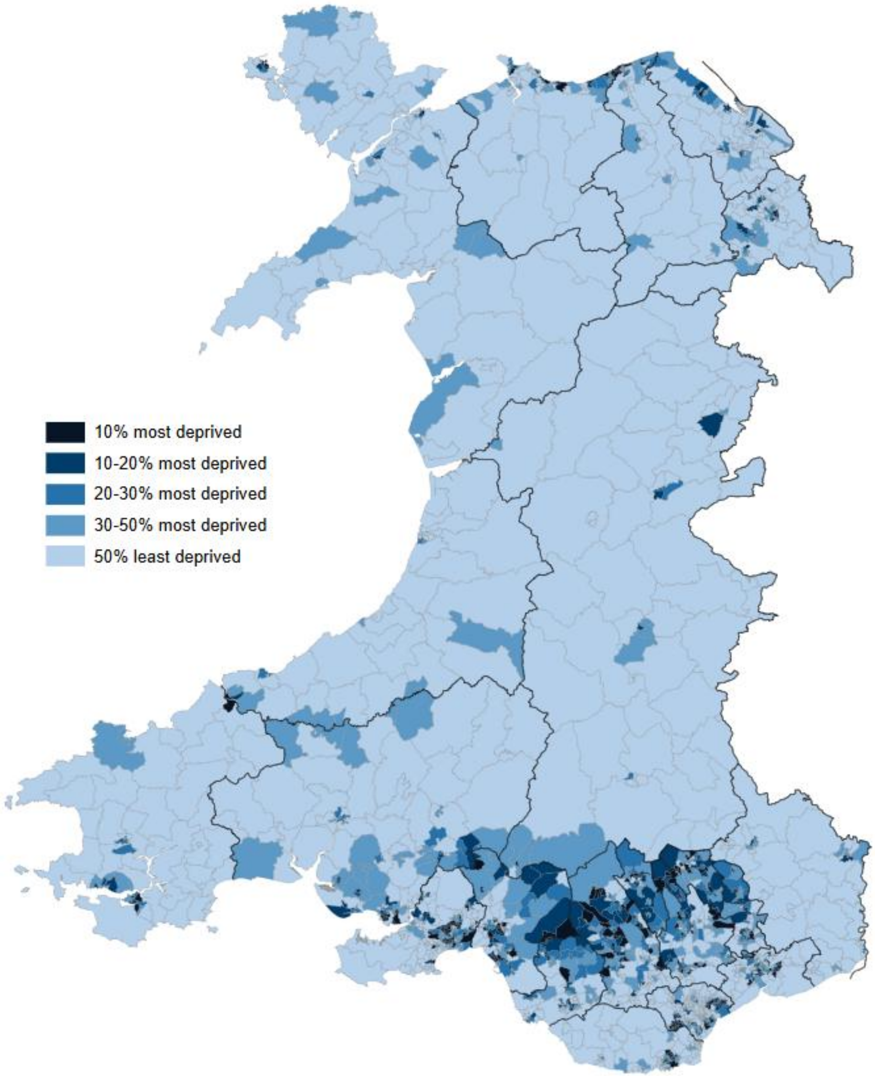
Regional employment deprivation

2.26 As part of its estimation of overall deprivation levels across Wales, as presented in the Welsh Index of Multiple Deprivation (WIMD), the Welsh Government estimates employment deprivation across areas based on the share of the population working-age population entitled to unemployment-related benefits.[55] **Figure 2.10** shows this metric by Lower-Super Output Area (LSOA), areas that typically contain 1,500 people.

[53] UK Disability Unit (2025). 'Disabled people's employment in the UK: A thematic review of the literature'. UK Government.
[54] Porter (2024). 'Unlocking benefits: Tackling barriers for disabled people wanting to work'. Joseph Rowntree Foundation.
[55] Calculated by share of those aged 18 to 66 entitled to any of the following: Jobseeker's Allowance (both contribution-based and income-based), New Style Jobseeker's Allowance, Employment and Support Allowance (both contribution-based and income-based), New Style Employment and Support Allowance, Incapacity Benefit, Severe Disablement Allowance, Carer's Allowance, Income Support, and Universal Credit (UC) claimants in various conditionality groups (no work requirements, planning for work, preparing for work, searching for work).

Figure 2.10: Some of the highest levels of employment deprivation are seen in Welsh valleys and coastal areas

Map of LSOAs shaded by employment deprivation group, WIMD 2025



Source: Welsh Government (Welsh Index of Multiple Deprivation)

2.27 One way of considering WIMD data across local authorities is to look at the proportion of LSOAs within the local authority that are in the most deprived 10% or 50% of all areas. This method can identify where deprivation is more acutely concentrated, rather than an average level of deprivation. The local authority with the highest proportion of LSOAs amongst the 10% most employment deprived in Wales was Blaenau Gwent (24% of areas) followed by Neath Port Talbot (20% of areas). Monmouthshire had no small areas in the most deprived 10%, and Ceredigion, Gwynedd, and Powys each had only one LSOA within this category. For more prevalent levels of deprivation you can identify the share of LSOAs that were amongst the top 50% most deprived areas. Using this metric, Powys and Monmouthshire had the lowest concentrations of employment deprived areas in Wales (at 22% and 24% respectively). Blaenau Gwent and Merthyr Tydfil had the highest percentage of areas with above average levels of deprivation in Wales (at 87% and 81% respectively).[56]

Skills and educational attainment in Wales

The role of skills in improving labour and economic outcomes

2.28 Skills are the abilities, competencies, and knowledge that individuals acquire through education, training, and experience. Alongside individuals' standard of health, skills form the core component of human capital within an economy. These skills enable people to perform tasks more efficiently and effectively which can boost their productivity – hence their relevance to the previous chapter.

2.29 As well as the benefits to the wider economy, proficiency in literacy, numeracy, and problem solving are all associated with better labour market outcomes, both in terms of participation and wages.[57] Non-cognitive skills – such as self-control, sociability, and emotional regulation – are all also found to positively influence lifetime outcomes in a range of areas.[58]

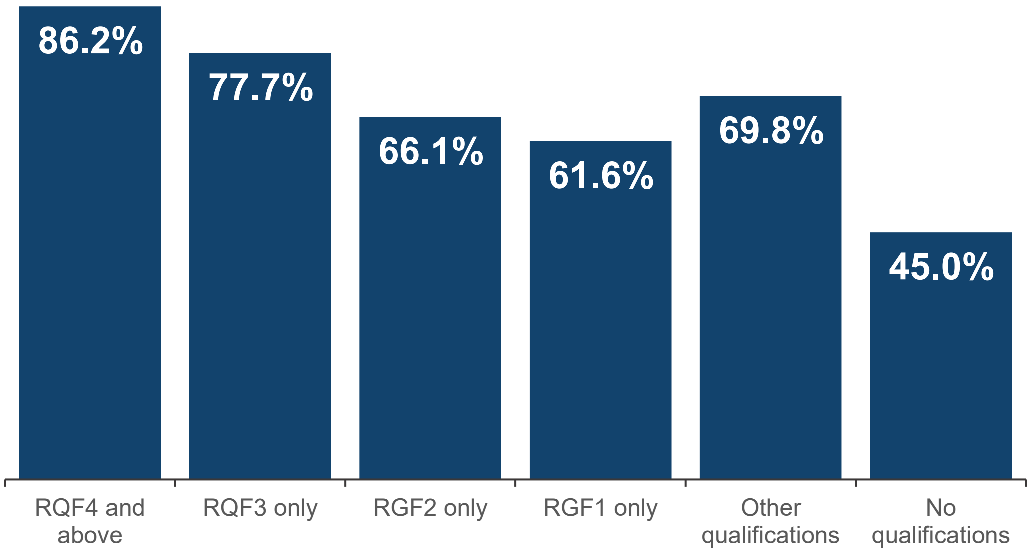
2.30 In Wales, the importance of skills and how they influence labour market incomes can be demonstrated by the correlation between higher educational attainment and higher levels of labour market participation. This is shown in **Figure 2.11** for Wales. Less than half (45.0%) of those with no qualifications were economically active, 41.2 percentage points lower than for those with higher education qualifications or above (RQF level 4+), which stood at 86.2%. Using the LGF to help improve skills of Welsh workers will therefore be vital to improving participation rates.

2.31 The following section provides an overview as to what the current skills (as measured by qualifications) landscape looks like in Wales.

[56] Welsh Government (2025). 'Welsh Index of Multiple Deprivation (WIMD) 2025 results report'.
[57] Quintini (2014). 'Skills at Work: How Skills and their Use Matter in the Labour Market'. OECD Social, Employment and Migration Working Papers No. 158
[58] OECD (2025). 'Skills that Matter for Success and Well-being in Adulthood: Evidence on Adults' Social and Emotional Skills from the 2023 Survey of Adult Skills'. OECD Skills Studies.

Figure 2.11: Higher qualification levels generally associated with greater probability of being economically active

Economic activity rate by qualification level in Wales, year ending December 2024



Source: Annual Population Survey

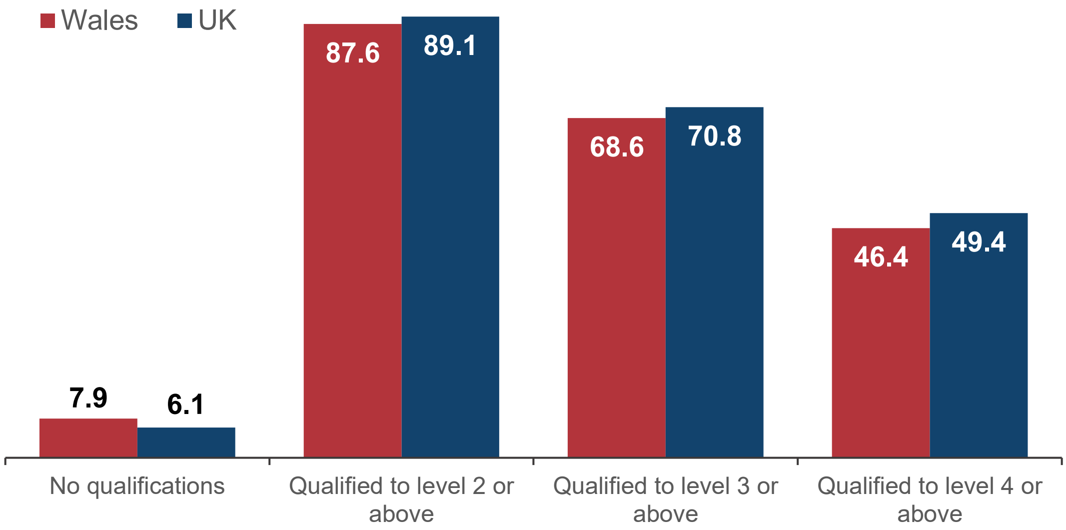
Educational attainment of workforce

2.32 In terms of formal qualifications, the profile of the Welsh workforce is not too dissimilar to that seen in the UK, although it does skew somewhat towards lower skill levels. The distribution of the highest qualification levels achieved by those aged 18 to 64 in Wales and the UK can be seen in **Figure 2.12**. As the figure shows, the proportion of those with no qualifications in 2024 was higher in Wales by 1.8 percentage points, while the share with qualifications at that level or above was lower in Wales than the UK at RQF levels 2, 3, and 4.[59] The share of those with RQF levels at 4 or above (which includes higher education qualifications) was 3.0 percentage points lower in Wales than the UK.

[59] No qualifications: no formal qualifications, Level 1: one to four GCSE passes (grade A* to C or grade 4 and above) and any other GCSEs at other grades, or equivalent qualifications, Level 2: five or more GCSE passes (grade A* to C or grade 4 and above) or equivalent qualifications apprenticeships, Level 3: two or more A-levels or equivalent qualifications, Level 4 or above: Higher National Certificate, Higher National Diploma, Bachelor's degree, or post-graduate qualifications.

Figure 2.12: Welsh workforce has slightly lower qualification levels

Highest qualification levels share (%) of 18 to 64-year-olds, 2024



Source: StatsWales (Annual Population Survey)

2.33 Research suggests that both higher and further education qualifications generally lead to increased earnings in the UK. Earning returns differ according to the field of study; disciplines such as STEM (science, technology, engineering, and mathematics), law, and economics are linked to greater earning premiums. For higher education credentials, the institution at which individuals studied also appears to impact their earnings, whereas this effect is less evident for those with further education qualifications.[60]

2.34 While Wales' qualification profile is skewed slightly towards lower qualifications than the UK, there have been significant positive changes seen in educational attainment of historical working age adults in the UK.[61] In 2004, the share of working age adults with no qualifications was 17.0% and approximately a quarter of adults (25.4%) had a formal qualification at RQF level 4 or above. Over the following two decades the share with no qualifications had more than halved (fall of 9.4 percentage points to 7.6%), while the share of those with qualifications at (or above) levels 2, 3, and 4 have all increased – see **Figure 2.13** for more detail.

2.35 Analysis of the UK economy suggests that a change in the composition of labour towards workers with higher qualification levels has positively contributed to

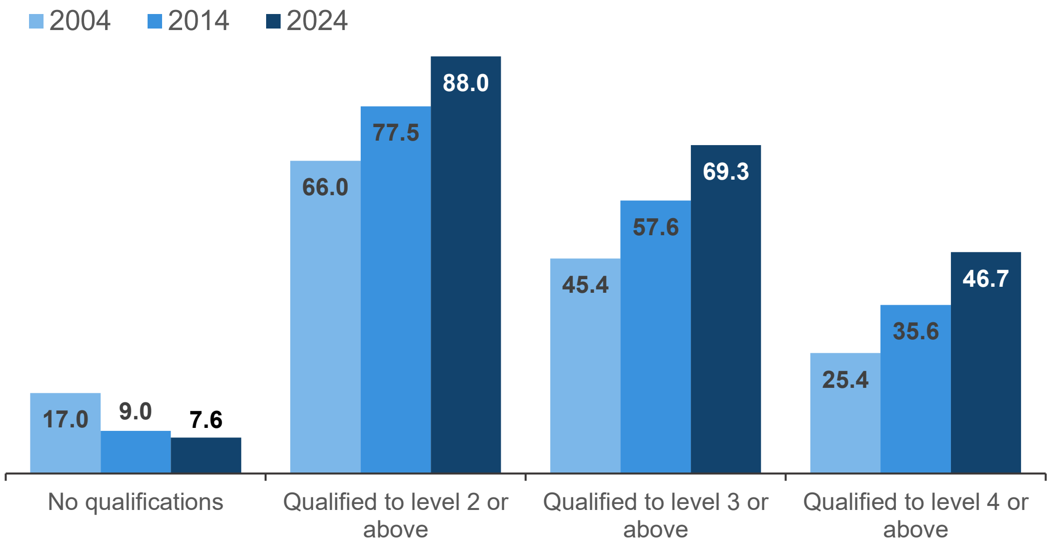
[60] Social Mobility Commission (2023). '[Labour market value of higher and further education qualifications: a summary report](#)'.

[61] Historical working age definition is of females aged 18-59 and males aged 18-64 and has been used to make comparisons over longer time horizons as data in 2004 is only available using this definition of working age.

output and productivity growth (albeit this effect may have weakened in the aftermath of the global financial crisis).[62]

Figure 2.13: Qualification profile of Wales has improved over past decades

Highest qualification levels share (%) of historical working age* adults, 2004 to 2024



Note: *Historical working age definition is of females aged 18-59 and males aged 18-64

Source: StatsWales (Annual Population Survey)

2.36 Educational attainment also differs by region and will be important for CJCs to consider, especially given the poorer labour market outcomes for those with lower levels of educational attainment. As **Figure 2.14** shows, the share of the population with no skills in 2024 was lowest in Ceredigion at 2.3% and highest in Blaenau Gwent at 13.8%. The Welsh valleys have notably elevated levels of low educational attainment, as every local authority in the region reports their share of working-age adults without qualifications exceeding the Welsh average of 7.9%.

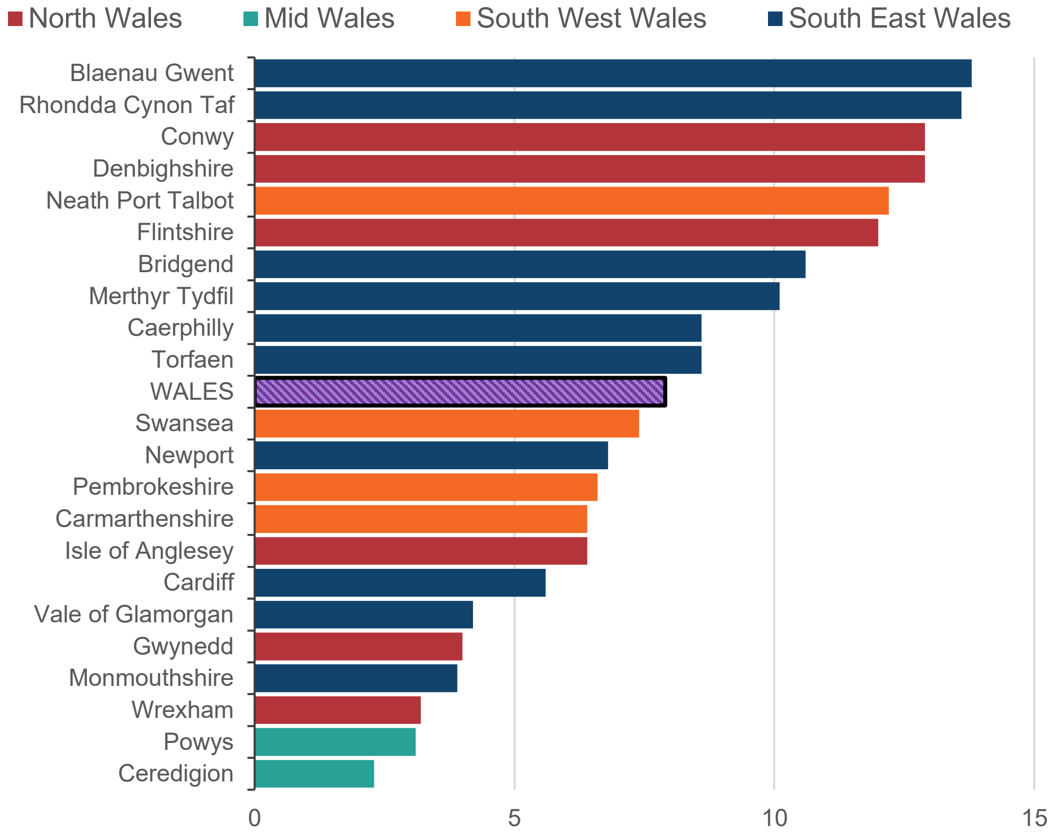
2.37 Regional analysis has previously identified many areas in the Welsh Valleys and North Wales as being in a "low skills equilibrium". This is where local labour demand and labour supply is predominantly skewed towards lower skills. Addressing labour supply therefore without improving conditions for labour demand (with improving higher wage/more productive job opportunities) can therefore lead to skills surpluses.[63] Hence the importance to ensure that interventions addressed at improving business competitiveness and productivity are co-ordinated with labour market interventions considered.

[62] Conlon and others (2023). '[Skills and UK productivity: Estimating the contribution of educational attainment to productivity growth]'. Department for Education.

[63] Government Office for Science (2017). '[Future of Skills & Lifelong Learning]'.

Figure 2.14: South East Wales and North Wales LAs constitute majority of those areas where the workforces' lack of qualifications is above Welsh average

Share (%) of 18 to 64-years olds with no qualification, by local authority, 2024



Source: StatsWales (Annual Population Survey)

2.38 Given the link between qualifications and participation in the labour market, Welsh Government analysis provides insights into whether differences in attainment by protected characteristics helps to explain employment gaps seen between groups. The analysis showed, in 2024, educational attainment was generally higher for working age non-disabled people than it was for disabled people in Wales. This indicates there may be additional barriers that disabled people face in obtaining employment – reflecting the need to improve access to educational activities. However, educational attainment was generally higher for both women and non-white ethnic minorities, which suggests formal skill level is not the primary explanation for the employment gaps seen by these groups.[64]

Improving skills and labour market participation

2.39 The following subsections seek to provide an overview of the type of interventions that the literature suggests can improve labour market participation and skills.

[64] Welsh Government (2025). 'Levels of highest qualification held by working age adults: 2024'.

This includes interventions that have broad applicability across groups, as well as those that are designed to improve labour outcomes for groups by characteristic, based on the specific barriers to employment and education they face.

Upskilling workers

2.40 As has been referred to earlier in this report, qualification levels strongly correlate with labour market outcomes for the individual, as well as wider socio-economic outcomes for countries/regions as a whole. Qualifications themselves act as signals to employers as to the skills prospective employees have.

2.41 Meta-analyses of labour market programmes across Europe and other countries show that interventions that focus on human capital accumulation (upskilling) can improve employment and earnings more effectively than other approaches. Initial impacts are modest, but sustained increases in job likelihood and employment rates are observed over time (typically after two to three years).[65]

2.42 Other reviews of the available literature have also found positive effects from employment training programmes on both employment outcomes and wages.[66] Short programmes were found to be more effective for less formal training activity while extended training programmes proved to be particularly beneficial for training that was deemed to be ‘skill intensive’. A particularly important finding was that skills training delivered within the workplace or through hands-on experience was found to be more successful than traditional classroom-based approaches.

2.43 The types of skills that training programmes can seek to improve will largely fall into three categories:

- **Basic skills:** These are fundamental skills required by everyone regardless of role – it includes literacy, numeracy, and many basic digital skills.
- **Essential skills:** These often include skills like soft skills – communication, teamwork, and leadership – which are transferable and needed across most roles.
- **Technical skills:** Skills required to work effectively in certain professions and/or industries.

[65] Card, Kluve, and Weber (2018). ‘What works? A meta analysis of recent active labor market program evaluations’. Journal of the European Economic Association, Vol. 16, No. 3, pp. 894-831
[66] What Works Centre for Local Economic Growth (2016). ‘Evidence review: Employment Training’.

2.44 Basic skills are fundamental due to the strong link they have not only to an individual's economic outcomes but also to their health and social outcomes. Without these skills individuals can struggle to effectively access and engage with essential services.[67] Evidence reviews suggests positive reinforcement of students efforts, effective use of digital tools, and course length are important considerations for those providing basic skills training to adults.[68]

2.45 Evidence from 2023 analysing job adverts suggests that soft skills (such as communication, teamwork, and leadership) were in high demand across Wales.[69] These skills are still valued highly by employers and are viewed as complementary to digital skills in technologically driven industries.[70] Teaching soft skills however can prove more challenging and care needs to be taken in course design to best ensure that learning objectives are sufficiently met.[71]

2.46 To improve technical skills, a review of demand-driven sector-based models in Canada suggested that such models rely on strong links between employers, training providers, and other workforce development bodies in order to be successful.[72] In Wales this approach is facilitated by the Regional Skills Partnerships (RSPs) one of which is present in each economic/CJC region. These bodies will have insights on skill needs and gaps for key areas of potential growth. Examples include fintech and compound semi-conductors in South East Wales and logistics and advanced manufacturing in Mid Wales. Successful implementation of skills-led training should seek to draw on these existing structures, where appropriate.

Improving labour market outcomes by gender

2.47 As for men, the most common primary reason for inactivity for females aged 16 to 64 in Wales is long-term sickness,[73] meaning that policies aimed at improving outcomes related to poor physical and mental health have clear benefits to

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[67] Age UK (2024). 'Low literacy and numeracy skills lead to difficulties accessing essential services and benefit entitlements, says Age UK'

[68] Bradstreet and others (2023). 'Evidence review: What works to improve adult basic skills?'. Learning and Work Institute.

[69] Pearson (2023). 'Wales Regional Skills Maps'.

[70] Poláková and others (2023). 'Soft skills and their importance in the labour market under the conditions of Industry 5.0'. Heliyon.

[71] Laker and Powell (2011). 'The differences between hard and soft skills and their relative impact on training transfer'. Human Resource Development Quarterly. Volume 22, Issue 1, pp 111-122

[72] Myers, Harding, and Pasolli (2021). 'Skills Training That Works: Lessons from Demand-Driven Approaches'. IRPP Study 84. Montreal: Institute for Research on Public Policy

[73] Welsh Government (2026). 'Labour market statistics (Annual Population Survey): October 2024 to September 2025'.

improving labour market outcomes for women. These interventions are discussed further on regarding improving labour market outcomes for disabled people.

2.48 However, while the share of women reporting being economically inactive primarily due to caring for family/home has been falling in recent years, this is still the second most common reason cited for inactivity according to latest data. For the year-ending September 2025, 21.8% of females aged 16 to 64 in Wales stated they were inactive primarily for this reason, which was 16.2 percentage points higher than the figure for males (5.6%).[74]

2.49 Key interventions referred to in the literature to address inactivity due to caring for others involve those designed to help reduce or at least accommodate these responsibilities. Childcare affordability and availability are something that is cited as important to enable women to enter (or return) to the labour market, given the obvious barriers these impose on participation.[75] In terms of skills, flexibility in delivery of training is likely to be important to accommodate the needs of those with caring responsibilities and improve take-up of opportunities.[76] This is an important consideration regardless of whether skills training is being offered within a workplace setting (for example, by an employer) or outside of such a setting.

2.50 The evidence suggests women skew towards higher levels of educational attainment than men in Wales, so improving barriers to employment for women who want to find employment presents clear opportunities for employers.

Improving labour market outcomes by ethnicity

2.51 Evidence suggests that labour market outcomes for ethnic minorities are influenced by a multitude of factors. As with other groups, skills, networks and cultural norms (for example, regarding caring responsibilities) can influence labour market participation. However, ethnic minorities also face racial discrimination which can impact their access to and performance within education,[77] as well as facing poorer employment outcomes.[78] Individuals from certain ethnic minorities – Bangladeshi, Pakistani, and Black – are also more likely to be in jobs that have low pay and be of poorer job quality, such as more precarious forms of employment.[79]

[74] Data taken from Annual Population Survey
[75] PwC (2023) '[The economic impact of childcare policy: an empirical analysis](#)'.
[76] Women and Equalities Unit (2019). '[Flexible working qualitative analysis](#)'.
[77] Metcalf and others (2014). '[How place influences employment outcomes for ethnic minorities](#)'. Joseph Rowntree Foundation.
[78] UCL (2025). '[UK employers less likely to recruit disadvantaged ethnic minority graduates](#)'.
[79] Hudson and others (2026). '[Ethnicity, poverty, and in-work inequalities in the UK](#)'.

2.52 For migrant groups, limited English language skills can present a real barrier to both searching for and obtaining employment. English for Speakers of Other Languages (ESOL) classes can be beneficial in improving language skills; however, their effectiveness can be determined by students being sent to appropriate classes according to their language proficiency, how intensive classes are, and the motivation of students to learn.[80]

2.53 Past evaluations of apprenticeship programmes across developed countries suggest individuals from minority ethnic and immigrant backgrounds were less likely to participate in such programmes than their peers.[81] The same evaluation suggested that the full benefits of undertaking apprenticeships – in terms of employment and wage returns – may be less clear for minority groups. Similar observations are found for employment training, which emphasises the need for training providers to explore how they can best reach out to individuals from ethnic minorities.

2.54 Mentorship programmes have also been promoted specifically to increase the confidence and job-readiness of young people from ethnic minorities, although these programmes have broad applicability, regardless of ethnicity.

Improving labour market outcomes for disabled people

2.55 Many core aspects of improving labour market outcomes for disabled people are outside of the scope of the LGF, given the critical role that public health and welfare policy play in influencing these outcomes. However, when increasing skills training opportunities, local policy makers can still seek to influence how accessible skills and employment opportunities are to boost participation rates.

2.56 Given educational attainment is generally lower in Wales for disabled people rather than for non-disabled people, skills training should seek to maximise how accessible it is to disabled adults. Evidence suggests that some of the disability employment gap seen between these groups is attributable to differences in qualification levels (approximately 12% in the UK, in one study).[82]

2.57 Consideration should be given to removing barriers to inclusive education. A lack of flexibility in educational arrangements has been cited as something that can

[80] UK Department for Work and Pensions (2019). '[Interventions supporting ethnic minority labour market participation: part one]'.
[81] What Works Centre for Local Economic Growth (2024). '[Rapid evidence review: The impact of local economic growth interventions on minority ethnic and immigrant groups]'.
[82] Bryan and others (2025). '[The role of education in the disability employment gap]'. Oxford Economic Papers. Volume 77, Issue 4, pp 1106–1127

restrict disabled students' ability to participate in education.[83] Ensuring staff who provide training themselves have the skills, knowledge, and training needed to support disabled learners is crucially important to ensure that courses can be designed to best meet individual needs.

2.58 Many disabled people report that attitudes towards them by colleagues and employers can have negative impacts on their ability to both gain and maintain employment opportunities. Providing good quality training for employers to better enable them to recruit and support disabled employees has been cited in the literature as vital to boosting their participation in the labour market.[84] Examples of this include the support the Welsh Government, through Business Wales, provides to employers with resources on how they can best recruit, support, and retain disabled workers.[85]

2.59 A review of the available literature suggests that employment support services, which help people with poor physical or mental health find and retain employment, are effective at improving labour market outcomes.[86] These services are typically integrated with health services to help best meet the individual needs of those who interact with them.

Improving labour market outcomes for young people

2.60 Generally, the best time to ensure young people obtain core qualifications that will improve their prospects later in life is during the period of their compulsory education. However, for young adults no longer in compulsory education, ensuring support is available to obtain vital qualifications is broadly supported across the literature. The skills/qualifications alluded to above can have an added impact if they are obtained earlier in (or before) an individual's working life.

2.61 Subsidised employment programmes have been implemented in countries like the UK (the Future Jobs Fund), the Netherlands, and Sweden. These programmes seek to increase the attractiveness of young people to employers by reducing the associated labour costs shouldered by businesses. Typically, such programmes are aimed at those who are long-term unemployed. Evidence as to the effectiveness of these programmes is mixed, with positive impacts associated with finding employment for those enrolled, but the overall net effect (when

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[83] Disability Unit (2026). '[Disabled people's lived experience of education in the UK: an evidence review](#)'. UK Government.
[84] Disability Unit (2025). '[Disabled people's employment in the UK: A thematic review of the literature](#)'. UK Government.
[85] Business Wales (n.d). '[Disabled People's Employment](#)'. [Accessed 5 March 2026]
[86] Ramsay (2024). '[What Policy Interventions Are Needed to Reduce Economic Inactivity for People with Poor Health and Older People?](#)'. International Public Policy Observatory.

calculating those who would find employment anyway) is judged to be reasonably small.[87]

2.62 Providing dedicated spaces, for example youth employment hubs, also are run in parts of the UK, which provide support across a range of areas (careers advice, mentoring, training) in a youth-friendly environment. In Wales, for example, Coleg Cambria acts as a "one-stop shop" for employability support. The ability to participate in youth clubs has been found to have a positive and sustained impact associating with physical wellbeing, pro-social behaviours, and educational attainment.[88]

2.63 A review of youth employment programmes globally found positive significant effects in roughly a third of programmes evaluated (with a small average effect). Crucially a key finding was that intervention design and delivery was far more important in positively influencing outcomes than the specific type of intervention.[89] A review of youth employment programmes in Canada and similar English-speaking countries found that the promising programmes not only address employment needs of youth, but also provide life skills and life stabilisation support as well (for example, help with mental health, housing, transport, and addiction support).[90]

2.64 Care should be given to ensure that potential programmes are scrutinised to ensure they are well-targeted and well-integrated with other services/employers, clearly setting out how they address employment barriers for young people.

Summary

2.65 Developing relevant skills and qualifications is fundamental to improving individuals' prospects in the labour market, especially for those who may face additional challenges in securing employment. The literature consistently highlights that acquiring core qualifications during compulsory education lays a strong foundation for future opportunities. For young adults who have left formal education, access to targeted support to obtain essential qualifications is also widely recognised as essential. The effectiveness of interventions depends not only on their content but also on how they are designed and delivered. Evidence

[87] Nancarrow and others (2023). 'The impact of wage subsidies on the employment of disadvantaged and/or marginalised young people'. Youth Futures Foundation.
[88] SQW (2024). 'Youth provision and life outcomes'. Report for UK Government (DCMS).
[89] Kluve and others (2019). 'Do youth employment programs improve labor market outcomes? A quantitative review'. World Development. Volume 114, February 2019, Pages 237-253
[90] Youmans and others (2024). 'Meeting the employment needs of marginalized youth: a review of promising youth employment programs'. International Journal of Child, Youth and Family Studies. Volume 15, No 4.

demonstrates that well-designed, flexible, and integrated programmes – those that are closely aligned with individual needs and that provide comprehensive support – are far more likely to yield positive results than generic, one-size-fits-all solutions. Therefore, a focus on both skills development and thoughtful intervention design are critical in addressing economic inactivity and supporting inclusive participation in education and employment.

2.66 Reducing economic inactivity is crucial to foster a more inclusive and resilient society, particularly for young people, disabled individuals, women, and people from ethnic minorities. Economic inactivity among these groups – especially for those with low skills – can often be hindered by their ability to obtain qualifications which employers demand. For disabled people, the lack of tailored support and training can restrict participation in education and the labour market, while for young people, not obtaining core qualifications during or after compulsory education can limit future prospects. For those that care for others, which typically affects women more than men, a lack of flexibility in employment and trainings arrangements can act as barrier to taking up opportunities on offer. For ethnic minorities, economic inactivity may be compounded by additional challenges, including discrimination and unequal access to opportunities. Addressing these barriers is essential not only for individual wellbeing but also for broader economic growth and social cohesion.

2.67 Common themes in effective interventions include the importance of flexibility, integration, and targeted support. Interventions should be well-designed and delivered, focusing on individual needs rather than a one-size-fits-all approach. Providing high-quality training for staff and employers, integrating employment support services with health and social care, and offering dedicated spaces such as youth employment hubs are all cited as promising strategies to boost participation and skills more generally. Programmes for young people that address not only employment needs but also broader life skills and stability – such as mental health, housing, and transport – can help to address wider drivers of inactivity other than skills. Ultimately all interventions should be designed to make sure they are as coherent as possible within the local socio-economic context in which they are delivered.

3 Improving regional infrastructure

The importance of green infrastructure

3.1 Investment in green technologies and improvements has been and will continue to be vital for Wales to meet its legislated climate targets. Decarbonising energy grids, enhancing transportation systems, and improving the energy efficiency of existing and new building stock are all essential components in reducing territorial greenhouse gas emissions and supporting the transition to a low-carbon economy. Infrastructure investments must also be resilient to the impacts of climate change, ensuring physical assets can withstand more frequent extreme weather events and shifting climate patterns.

3.2 Energy efficiency measures represent a cost-effective strategy for both immediate and long-term emissions abatement. Implementing high-efficiency technologies – ranging from heat pumps and smart meters to industrial automation and demand-side management – can unlock significant energy savings and lower operational costs.

3.3 The following subsections provide some context regarding the need for intervention in this area.

Economy-wide emissions and climate obligations

3.4 In 2023, Wales emitted an estimated 34.9 megatonnes of gross carbon dioxide equivalent (MtCO2e) greenhouse gases (GHG),[91] or 11.0 tonnes per person – a 43.2% drop from the 19.1 tonnes per person recorded in 1999.

3.5 Perhaps unsurprisingly given Wales' deep industrial history, per capita emissions in Wales have long exceeded those of the OECD and EU, although the gap has narrowed significantly - especially since 2016. In 1999, per capita emissions in Wales of 19.1 tonnes were markedly higher than both the OECD (11.0 tonnes) and the EU (9.1 tonnes).[92] By 2011, the figure for Wales stood at 14.4 tonnes per

[91] Gross emissions refer to total emissions emitted and do not account for carbon sequestration (or carbon capture – either technological or natural).

[92] Per capita figures (and any total figures used to contextualise them) in this section exclude Land Use, Land-Use Change, and Forestry (LULUCF) sector to align with World Bank cross-country comparison

person, compared to 10.0 for the OECD and 7.5 for the EU. By 2023, Welsh emissions had fallen to 10.8 tonnes per capita, converging closer to the OECD's 8.0 tonnes and the EU's 5.6 tonnes. Overall, Wales' 43.2% per capita decrease outpaced reductions in both the OECD (26.9%) and the EU (32.4%).[93]

3.6 The trajectory of Welsh territorial emissions since the latter part of the 20th Century has been one of consistent decline, albeit not at a steady pace. Since the base year (1990), total 'net' emissions have dropped by 38.4%,[94] falling from 55.4 MtCO2e to 34.1 MtCO2e in 2023. Notably, the rate of reduction has accelerated in recent years: whereas the annual average observed decrease was just 0.37 MtCO2e between 1990 and 2015,[95] between 2016 and 2023 this has hastened to around 2.0 MtCO2e each year.[96]

3.7 Since 2020, more ambitious emission targets have been set to reflect the Welsh Government's increased ambition in reducing territorial emissions. In 2021, Wales committed by law to reaching Net Zero emissions by 2050, an increase in ambition on the 80% reduction target set in 2016. **Table 3.1** provides a breakdown of how interim and 2050 targets changed.

Table 3.1: Legislated Welsh emission targets agreed by Senedd Cymru

	Previous emission targets (agreed 2016)	Net Zero emissions by 2050 (agreed 2021)
2020	27%	~
2030	45%	63%
2040	67%	89%
2050	(At least) 80%	(At least) 100%

Source: Welsh Government

3.8 Emissions must continue to decline at the post-2016 rate if the current 2030 target is to be met. Achieving a 63% reduction relative to the baseline (down to 20.5 MtCO2e) will require an annual decrease of around 1.9 MtCO2e. [97] This differs

standards. Other statistics (when looking at Welsh emissions in isolation), unless stated, include LULUCF.

[93] World Bank (2024). Carbon dioxide (CO2) emissions excluding LULUCF per capita (t CO2e/capita). Online database.

[94] Net emissions refer to total emissions net any emissions sequestered.

[95] Calculated as the reduction in total emissions between 1990 and 2015 (55.504 $MtCO_2e$ – 46.240$MtCO_2e$ = 9.264 $MtCO_2e$), divided by 25 years, giving an average annual decrease of approximately 0.37 $MtCO_2e$ per year.

[96] Calculated as the reduction in total emissions between 2016 and 2023 (48.177. $MtCO_2e$ – 34.084 $MtCO_2e$ = 14.093 $MtCO_2e$), divided by 7 years, giving an average annual decrease of approximately 2.01 $MtCO_2e$ per year.

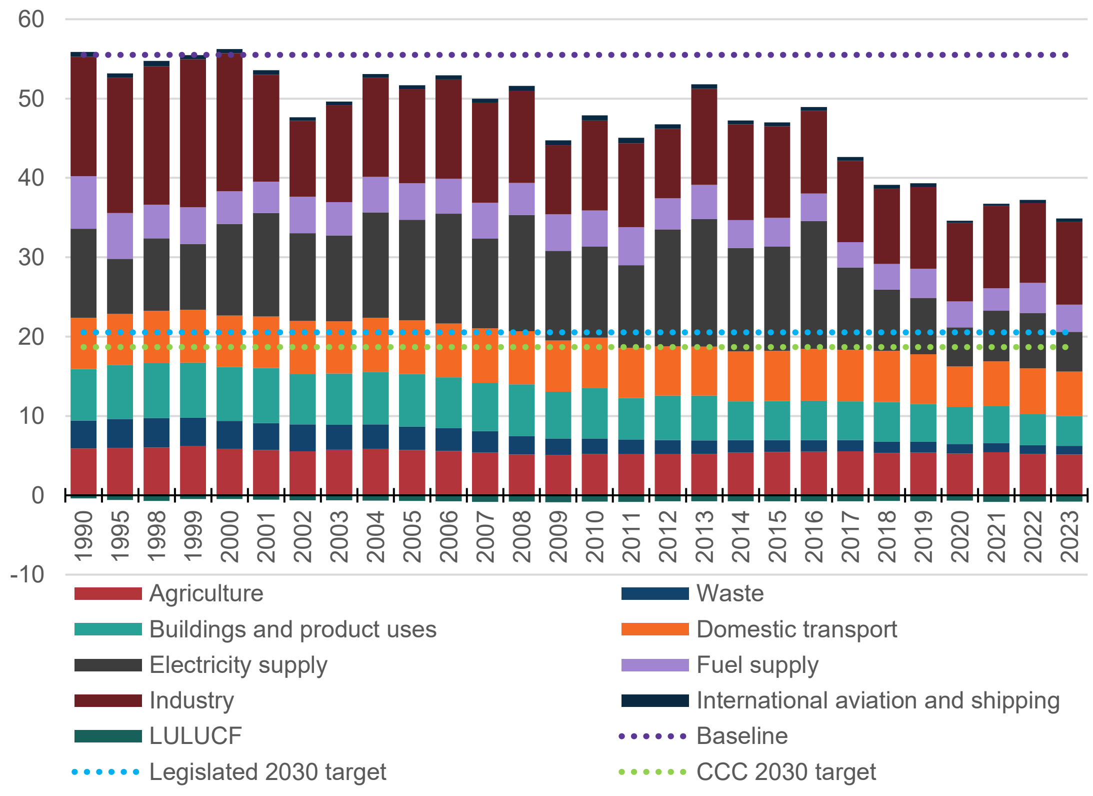
[97] Calculated as the reduction required to meet the 2030 target: (34.084 $MtCO_2e$ – 20.5 $MtCO_2e$ = 13.584 $MtCO_2e$), divided by the seven years between 2023 and 2030, giving an average annual decrease of approximately 1.94 $MtCO_2e$ per year

from the 2.2 MtCO2e annual reduction set-out in the Climate Change Committee's (CCC) Fourth Carbon Budget balanced pathway towards 2050 Net Zero (which sees emissions fall to 18.7 MtCO2e) - equal to a 66% reduction. At the post-2016 annual reduction rate of 2.0 MtC02e, Wales' emissions would reach 63.5% below baseline by 2030, exceeding the statutory target but falling short of the CCC's pathway.

3.9 The 36.5% reduction in emissions seen in 2023 since the base year means Wales had achieved over half (58%) of the total reduction that will be required to meet the 2030 target.[98] That does, however, still leave a significant amount of decarbonisation effort which needs to be delivered to meet the 2030 goal.

Figure 3.1: Welsh territorial emissions continue to fall, but work needed to meet legislated 2030 target

GHG Emissions (MtCO2e) in Wales, by Sector



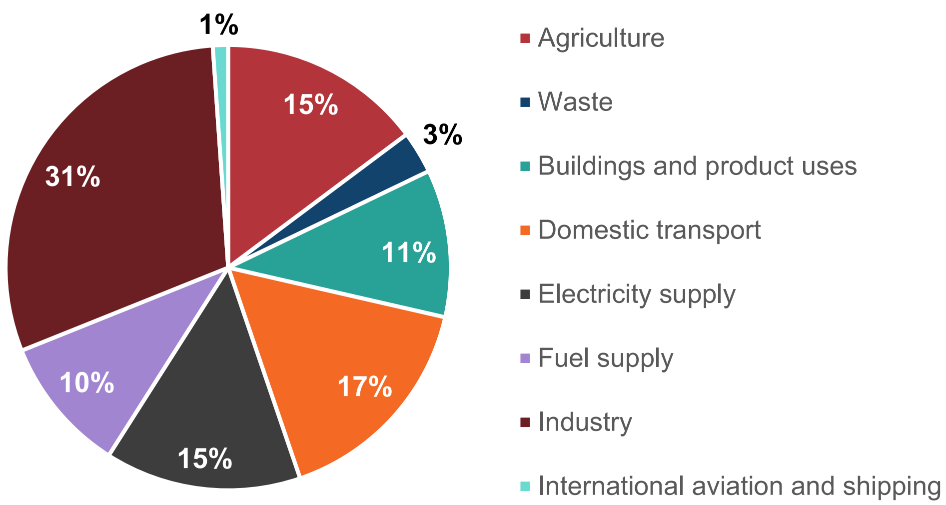
Note: Emissions data is not provided in NAEI dataset for years 1991-1994 and 1996-1997
Source: National Atmospheric Emissions Inventory

[98] Emissions fell from 56.231 in 1990 to 35.688 in 2023, a 36.5% reduction - around 58% of the 63% reduction required by 2030

Sectors

3.10 In 2023, industry (40%) and domestic transport (17%) were the two largest contributors to Welsh CO2 emissions on a by-sector basis. Although actual transport emissions have declined, they have come to represent a growing share of total Welsh emissions, primarily caused by a relatively faster decline in emissions seen within the power sector. Power (15%) remains a notable source of emissions ahead of buildings (11%) and waste (3%). The Land Use, Land-Use Change, and Forestry (LULUCF) sector acts as a carbon sink that captures net -0.8 MtCO2e (and has therefore been excluded when calculating sector shares).

Figure 3.2: Industry is the largest contributor to Welsh emissions
Share of total 'gross' Greenhouse Gas Emissions in Wales, by sector (2023)



Source: National Atmospheric Emissions Inventory

Renewables and low carbon energy generation

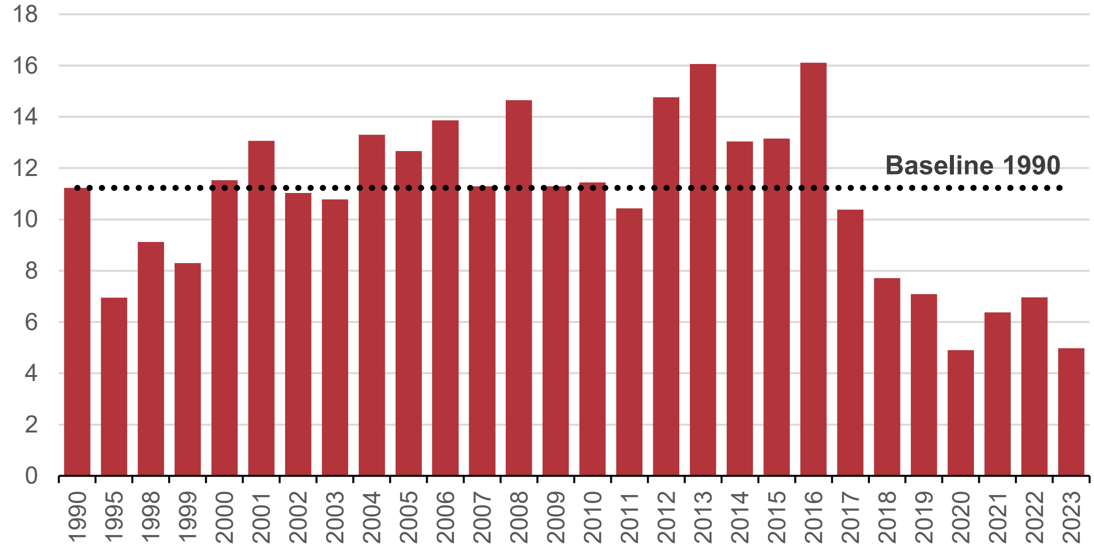
Electricity

Emissions

3.11 Greenhouse gas (GHG) emissions from the power sector increased overall across the two decades to 2016. However, they fell sharply in 2017 and have continued a downward trajectory since. As a result of this reduction, emissions in 2023 stand at 5.0 $MtCO_2e$, compared with the baseline level of 11.2 $MtCO_2e$ - a 56% reduction from the baseline (see **Figure 3.3).**

Figure 3.3: Electricity supply emissions fluctuate year to year but overall have declined from base year

Emissions contribution of electricity supply in Wales



Source: National Atmospheric Emissions Inventory

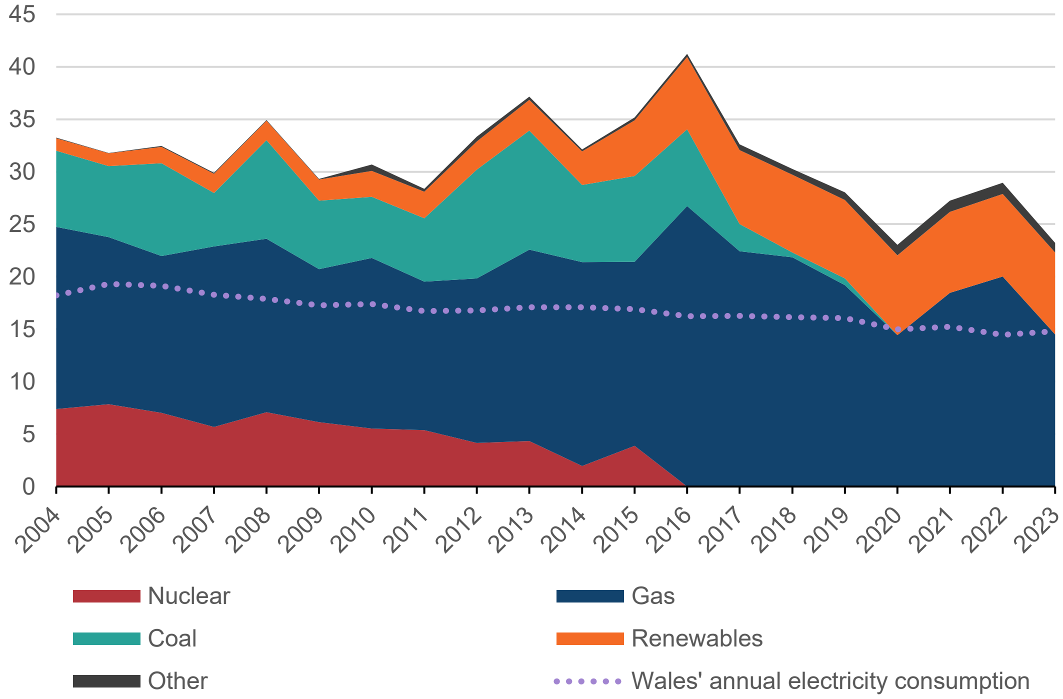
Electricity Generation

3.12 Wales is a net exporter of electricity and was estimated to have generated 23.2 terawatt-hours (TWh) of electricity in 2023, while consuming 14.8 TWh. The energy mix of electricity generated in Wales is dominated by gas-fired electricity (14.5 TWh; 62%), with coal and nuclear generation no longer contributing to the Welsh energy mix following the decommissioning of Aberthaw, the last coal-fired power station in Wales, in 2020 (see **Figure 3.4** and **Figure 3.5**). Nuclear is expected to re-enter the energy mix, as the UK Government has announced that Wylfa in North Wales has been selected as the site for the UK's first Small Modular Reactor nuclear power station. [99]

[99] Welsh Government (2025). 'Written statement: Wylfa announced as the site for the UKs first small modular reactor SMR nuclear power station'.

Figure 3.4: Wales' energy generation mix has shifted over past two decades, but gas remains the dominant energy source

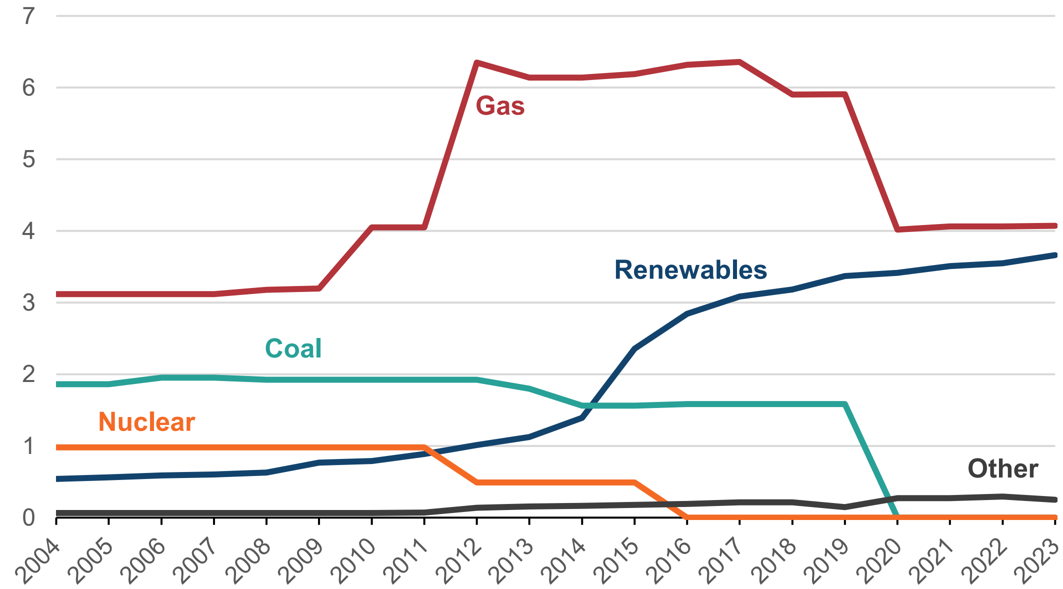
Generation and consumption of electricity in Wales (TWh), by fuel source



Source: Energy Generation in Wales 2023

Figure 3.5: As expected, energy generation trends reflect Wales' electricity capacity mix shifting, with increased focus on renewables

Electricity Installed capacity (GW) in Wales, by fuel source



Source: Energy Generation in Wales 2023

Renewable energy in Wales

3.13 In 2023, Wales had 3,663 MW of installed renewable electricity capacity, generating 7,798 GWh of renewable electricity over the year. Renewable heat technologies provided a further 869 MW of capacity and produced 2,678 GWh of renewable heat. In total, 118,248 renewable energy projects were operational across Wales in 2023 (see **Table 3.2**).

Table 3.2: Renewable Energy in Wales, by energy technologies

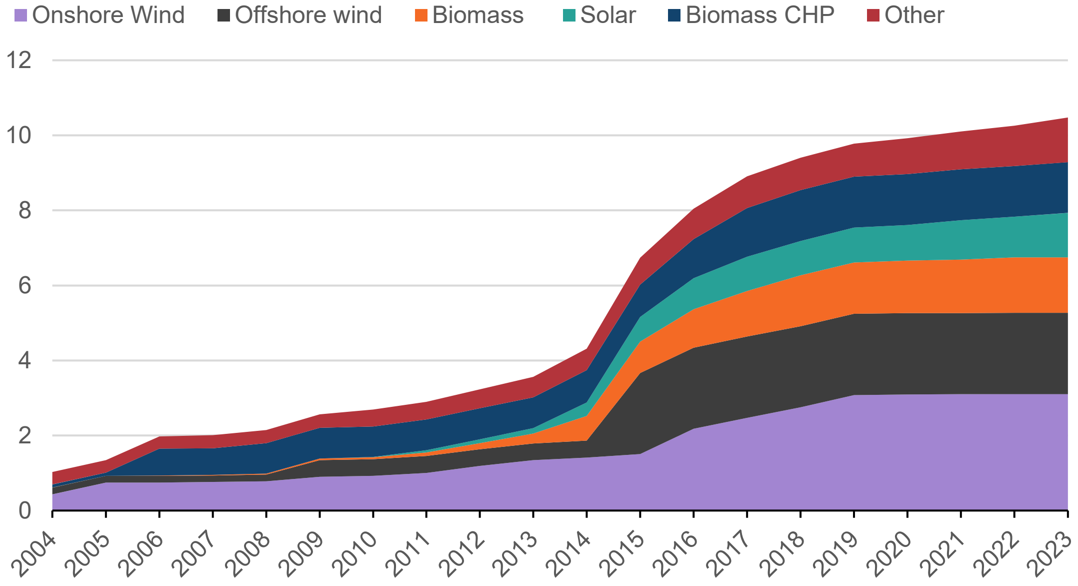
Renewable energy technologies	Number of projects	Electricity		Heat	
		Estimated capacity (MW)	Estimated generation (GWh)	Estimated capacity (MW)	Estimated generation (GWh)
Anaerobic digestion	50	18	94	9	54
Biomass	3,691	0	0	482	1,479
Biomass electricity and CHP	51	132	691	120	663
Energy from Waste	2	26	134	0	0
Heat Pump	22,067	0	0	231	396
Hydropower	380	170	332	0	0
Landfill gas	21	22	53	0	0
Offshore wind	3	726	2,163	0	0
Onshore wind	754	1,267	3,106	0	0
Sewage gas	4	11	41	13	78
Solar PV	86,398	1,291	1,184	0	0
Solar thermal	4,828	0	0	14	8
Grand Total	118,248	3,663	7,798	869	2,678

Source: Energy Generation in Wales 2023

3.14 In 2023, 176 MW of renewable energy capacity was installed in Wales, comprising 109 MW of electrical capacity and 67 MW of new heat technologies.

Figure 3.6: Renewable generation grew between rapidly 2013 to 2016

Renewable energy generation (TWh) in Wales



Source: Energy Generation in Wales 2023

Renewable electricity

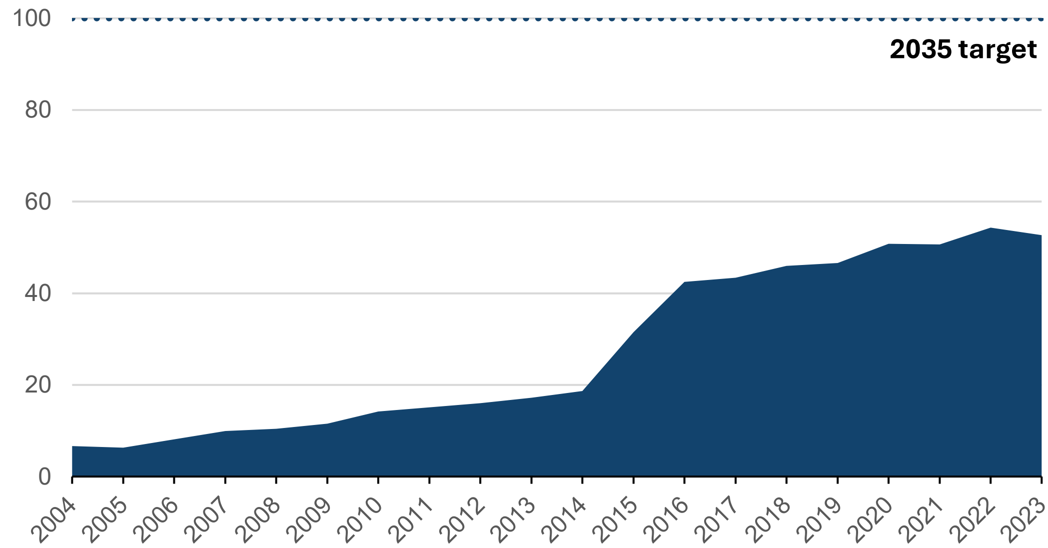
3.15 Renewable electricity generation in Wales has generally increased in recent years. In 2023, renewables accounted for 34% of all electricity generated in Wales, up from 27% in 2022. Although total renewable capacity continued to grow (see **Figure 3.5**), overall renewable output fell slightly - from 7.9 TWh in 2022 to 7.8 TWh in 2023 (see **Figure 3.4**). This was due to small changes in average annual load factors, particularly for onshore wind. Around 68% of Wales's renewable electricity generation comes from onshore and offshore wind, with most of the remaining output produced by solar PV and biomass (see **Table 3.2**).

3.16 In the CCC's Balanced Net Zero Pathway, for Wales' fourth carbon budget, emissions from the electricity-supply sector fall by around 85% between 2022 and 2033, reflecting a rapid shift away from fossil-fuel generation and a corresponding scale-up of renewables. As the CCC emphasises, "Further deployment of low-carbon generation technologies, such as wind and solar, is needed to decarbonise existing demand and meet new demand as other sectors electrify." This underscores the strategic importance of expanding Wales's renewable generation capacity - not only to decarbonise the current electricity system, but also to accommodate rising demand from heat pumps, electric vehicles and industrial electrification over the coming decade (see **Figure 3.8**).

3.17 The Welsh Government has set a target for renewable electricity generation in Wales to equal Welsh annual electricity consumption by 2035. In 2023, renewable electricity generation in Wales was equivalent to 53% of its electricity consumption (see **Figure 3.7**).

Figure 3.7: Renewables now provide 53% of Wales' electricity consumption - progressing but still only about half of the 2035 target

Share of Welsh electricity consumption from renewables



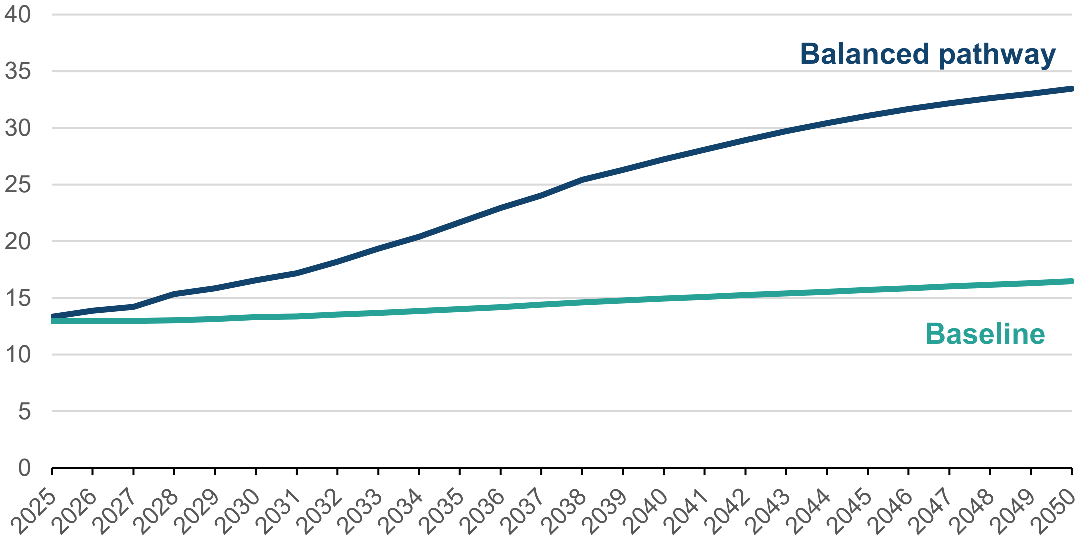
Source: Energy Generation in Wales 2023

3.18 Although the share of renewables used to meet Wales's energy consumption has grown, electricity demand is expected to rise as Wales takes action to reduce emissions in other sectors, due to greater electrification of transport, buildings, and industry (see **Figure 3.8**). Meeting the 2035 target will require renewable electricity generation to increase by around three-fold.[100]

[100] Current renewable generation is 7.8 TWh compared with anticipated electricity demand of 21.7 TWh in 2035, implying that renewable output would need to increase by around three-fold to meet the 100% target.

Figure 3.8: Under the CCC's net zero pathway, anticipated electricity demand is expected to rise substantially

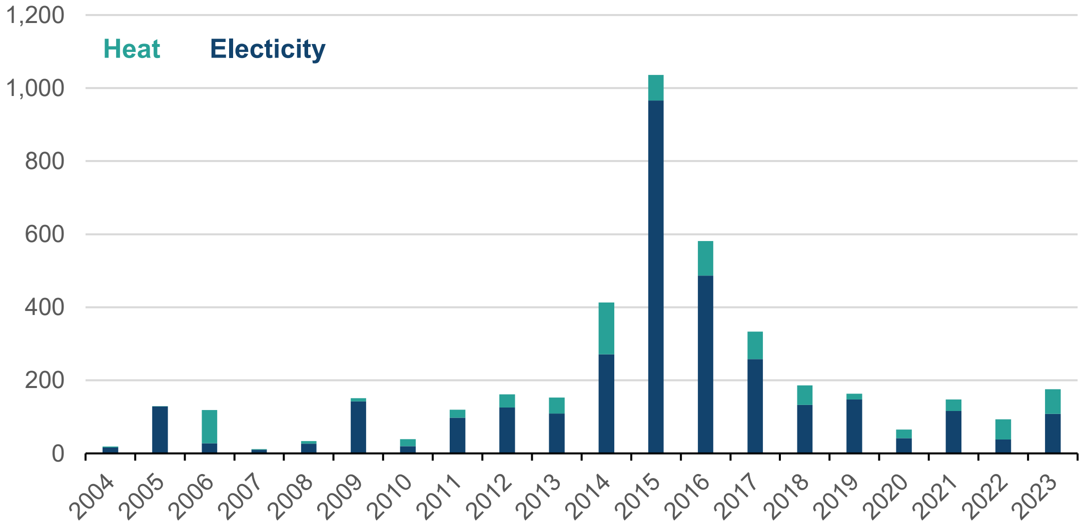
Anticipated electricity demand (TWh)



Source: UK Climate Change Committee

Figure 3.9: Annual installed renewable capacity peaked in 2015

Installed renewable energy capacity in Wales (MW), by year

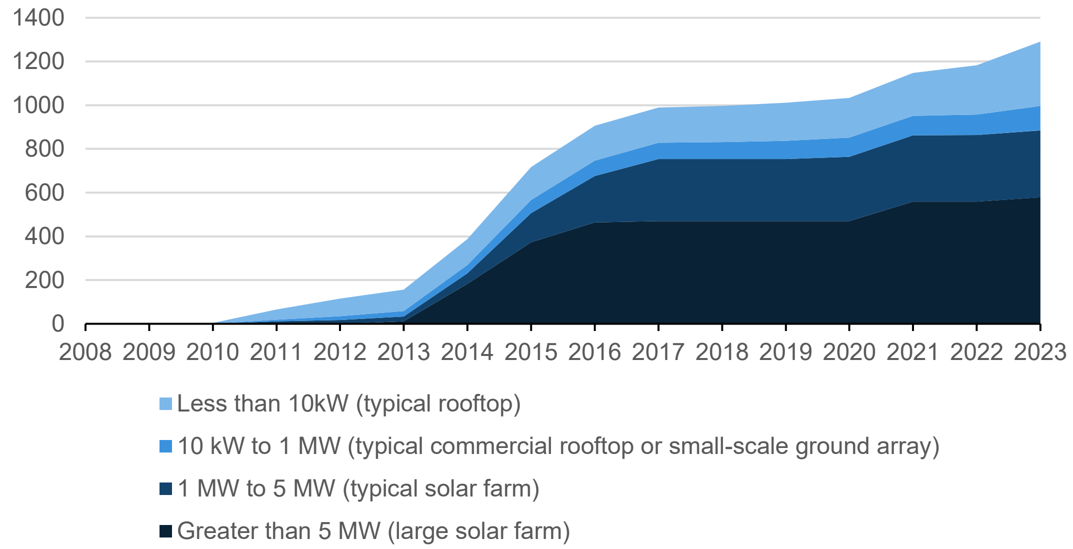


Source: Energy Generation in Wales 2023

3.19 New capacity installed in 2023 was almost double that of 2022, reaching 176 MW compared with 93 MW. This comprised 109 MW of electricity and 68 MW of heat capacity. However, 2023 remains well below the 2015 peak of 1,036 MW, and below annual additions recorded between 2014 and 2018. It is, nevertheless, the highest annual increase since 2018 (see **Figure 3.9**)

Figure 3.10: Solar PV installations rose sharply in 2013–2016 and have shown renewed growth recently

Total Solar PV installed capacity (MW) in Wales, by scale



Source: Energy Generation in Wales 2023

3.20 Solar PVs accounted for 15.2% of Wales renewable electricity generation in 2023 and 35.2% of capacity.[101] This demonstrates the inherent variable nature of solar power - despite considerable installed capacity, actual generation is constrained by seasonal daylight patterns, weather conditions and daily fluctuations in solar irradiance.

3.21 In 2023, 108 MW of new solar PV capacity was installed in Wales - more than double the amount installed in 2022. Very small-scale (<10kW) projects accounted for approximately 64% of this new capacity. The total solar PV capacity across Wales is now 1.3 GW across more than 86,000 projects.

Renewable Heat

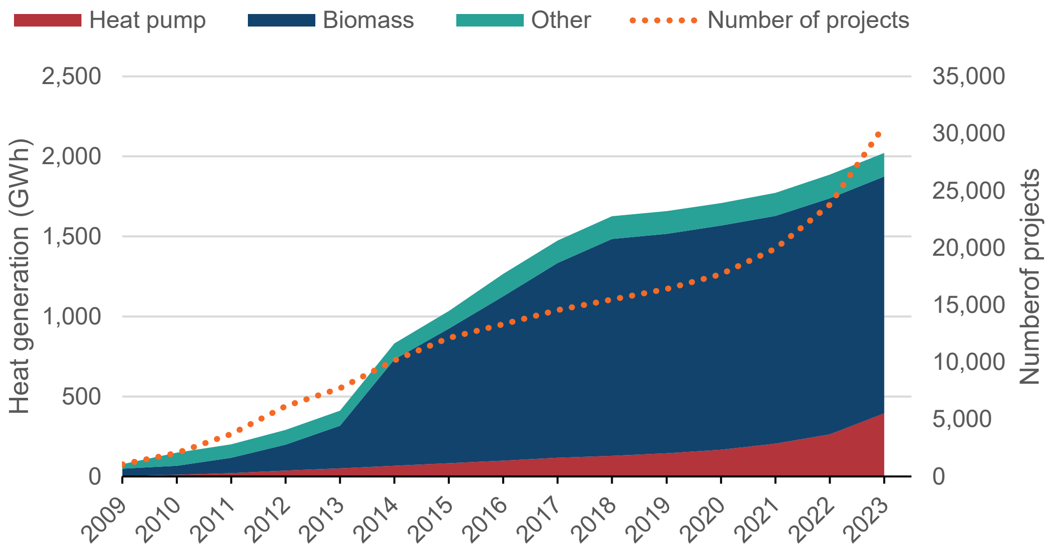
3.22 In 2023, Wales generated an estimated 2.6 TWh of renewable heat, supported by a total installed renewable-heat capacity of 869 MW (see **Table 3.2**). Two main sources of renewable heat are Biomass and Heat pump which generate 1,479 and 396 GWh respectively in 2023 (see **Figure 3.11**). Biomass remains Wales' largest source of renewable heat, accounting for approximately 55% of total renewable-heat capacity in 2023.[102]

[101] 1,184 GWh out of 7,798 and 1.291GW out of 3.663 respectively.
[102] Biomass capacity of 482MW out of renewable heat total of 869MW in 2023

3.23 Welsh Government has a target to install 580,000 heat pumps by 2035. Current progress stands at an estimated 22,000 installations, with 6,900 added in 2023.[103]

Figure 3.11: Renewable heat projects and generation have grown substantially in recent years

Total renewable heat generation (GWh)



Source: Energy Generation in Wales 2023

3.24 This section does not focus on individual domestic heat pumps, as this technology is covered in more detail further on in this chapter.

Locally owned

3.25 The Welsh Government has sought to encourage local ownership models in the production of renewable energy as a way of ensuring that communities themselves can benefit from the energy projects being delivered in their area.[104] Welsh Government has a target of 1.5 GW of locally owned renewable capacity by 2035. [105] In 2023, 900 MW of installed renewable energy capacity was locally owned.

[103] Welsh Government (2025). 'Energy Generation in Wales 2023'.
[104] Welsh Government (2020). 'Policy Statement: Local ownership of energy generation in Wales – benefitting Wales today and for future generations'
[105] Heat pumps are excluded from the Welsh Government's local ownership target since they are better quantified in numbers of installations rather than by capacity, and have their own uptake target.

Table 3.3: Locally owned renewable energy in Wales (2023)

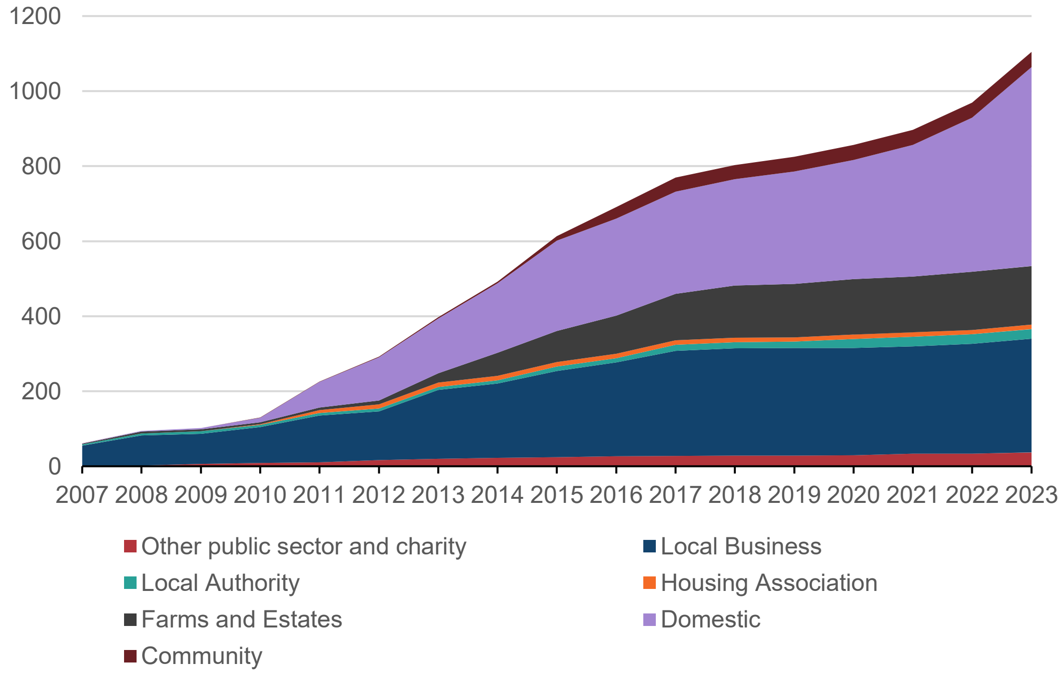
Ownership category	Total number of projects	Capacity (Mwe)	Capacity (MWth)	Estimated generation (GWh)
Community	202	39.7	0.5	55.4
Domestic	100,139	296.3	234.9	726.1
Farms and Estates	855	23.9	132.4	495.6
Housing Association	5,852	7.4	4.9	11.3
Local Authority	309	22.1	3.2	35.8
Local Business	1,881	286.4	17.0	822.4
Other public sector and charity	566	12.8	23.9	88.2
Total	109,804	688.5	416.8	2234.7

Source: Energy Generation in Wales 2023

3.26 Wales is now estimated to have more than 89,500/109,804 locally owned renewable electricity and heat projects, 90% of which are classified as domestic. These domestic projects are typically small-scale rooftop solar PV and biomass systems, so only account for 37% of all locally owned capacity (See **Figure 3.12**).

Figure 3.12: Local ownership of renewable energy has increased, achieving previous target of 1MW in 2023

Locally owned renewable capacity GW, by ownership type



Source: Energy Generation in Wales 2023

Storage and capacity

3.27 Energy storage will play an increasingly central role in delivering the flexible, low-carbon system required. Storage technologies provide essential services that support the stability and reliability of the electricity network, reducing reliance on high-carbon balancing options and enabling a greater contribution from renewable generation.

3.28 The growing share of variable renewable generation – particularly wind and solar – furthers the case for expanded grid-scale storage. Storage technologies can manage fluctuations in renewable output by shifting energy across the day, mitigating periods of oversupply and supporting demand during times of low generation, reducing the need for carbon intensive dispatchable power, like gas plants.

3.29 Wales has a mix of existing and emerging energy storage technologies. In 2023, Wales had 73 MW of operational battery storage and 2,088 MW of pumped-storage hydropower. Two large pumped-hydropower sites (Ffestiniog and Dinorwig) make up about three-quarters of the UK's total pumped-storage capacity, providing 2.1 GW of power and around 11 GWh of storage between them, with a further 100 MW pumped-hydro project in Gwynedd is also under development.

3.30 There are currently no large-scale low-carbon hydrogen storage projects operating in Wales, but hydrogen could play an important future role-for example in system balancing, seasonal storage, industrial uses, and wider decarbonisation. Welsh Government has stated that hydrogen "has the potential to play a significant role in achieving our stretching targets for greenhouse gas emissions to be reduced to net zero by 2050".[106]

Table 3.4: Storage capacity in Wales by technology (2023)

Storage	Number of projects	Electrical capacity (MW)
Battery storage	6	73
Pumped hydro	2	2,088
Hydrogen	-	-
Total	8	2,161

Source: Energy Generation in Wales 2023

3.31 The Climate Change Committee's Balanced Pathway highlights the scale of storage required to support a fully decarbonised electricity system, projecting that

[106] Welsh Government (2025). 'Written statement: Hydrogen preferred policy consultation'.

Wales will need around 11 GWh of storage capacity by 2033 – a level already achieved.[107]

Energy Interventions

Invention Rationale

3.32 Early-stage renewable and locally owned energy projects often face barriers such as high upfront development costs, long payback periods, and uncertainties around planning and grid connection. These factors can lead to under-investment, even where wider public benefits - such as lower emissions, reduced reliance on imported energy and strengthened local resilience - are significant. The Local Growth Fund (LGF) could help reduce these early-stage risks and enable projects that might not otherwise progress.

3.33 There are also coordination challenges that can limit renewable energy deployment. Increasing locally owned generation typically requires alignment between local authorities, communities, grid operators, landowners, and supply chains. Coordination at a regional scale can be challenging, which may mean that opportunities to decarbonise, strengthen local energy security and retain economic value within Welsh communities are not fully realised. Activity at the CJC level could help address these coordination gaps by supporting more strategic regional planning and unlocking projects that deliver multiple benefits.

3.34 While renewable generation and local ownership in Wales have grown, further progress is likely to depend on targeted action to overcome these early-stage investment and coordination barriers.

Developing Regional Heat Decarbonisation Corridors

3.35 Heat demand in Wales is highly clustered, creating clear opportunities for district heat networks and shared heat-pump systems. Communal heat pumps are shared systems serving a single block of flats or a row of terraced houses. They are particularly important for blocks of flats, where limited space can constrain the installation of individual heat-pump systems. In contrast, heat networks are larger, centralised systems that distribute heat to multiple buildings and often connect to non-residential properties to provide anchor loads.

3.36 These schemes often stall because the earliest steps – heat-zoning work, network masterplans, coordinating anchor loads and installing the first stretch of trunk pipework – carry long payback periods and are rarely taken on by the market alone.

[107] Welsh Government (2025). '[Energy Generation in Wales 2023](#)'.

To make the networks more viable for investment, public funding can be used to help support the planning stages of such projects.

3.37 For instance, the Cardiff Bay Heat Network (now nearing completion) was enabled by public co-funding - it will capture previously wasted steam from a local energy-from-waste facility and pipe it as useful heat into public and private buildings, yielding both economic and carbon benefits. [108] In rural or dispersed communities, where fully fledged heat networks may not be viable, CJCs could use LGF to pilot communal heat pump clusters or “micro” district schemes. A group of homes might be served by a shared ground source or air-source heat pump loop, improving efficiency and affordability compared to individual systems. International experience underscores the impact of harnessing waste heat at scale: for example, Facebook’s Odense data centre in Denmark recovers up to 100,000 MWh of waste heat each year to supply a citywide district heating network - enough to warm roughly 6,900 homes - all powered by renewable electricity. [109]

Scaling Locally Owned Renewable Generation and Storage

3.38 Many mid-scale wind, solar and storage projects in Wales face a development-stage funding gap. Costs linked to feasibility studies, environmental surveys, planning and grid work are often prohibitive for community groups or smaller developers, even when the projects are technically viable. LGF could help address some of these early-stage risks and may also be used as match-funding or low-cost capital at the build stage to support co-investment if aligned with regional energy plans.

3.39 Wales has a strong foundation of community-owned and locally owned renewable energy projects, yet the next wave of mid-scale schemes - such as medium-sized onshore wind, solar farms, and battery storage installations - faces a development risk and financing gap. Notably, in 2023 no new wind farms were commissioned for the first time since the 1990s. [110]

3.40 Development-stage funding could be used to support local energy projects led by councils, co-operatives or community enterprises. Such interventions might involve grants or recyclable loans to cover early-stage costs including feasibility studies, environmental assessments, planning applications and grid-connection work - expenses that are often too risky for community groups or smaller developers to take on alone. At the capital stage, further options such as

[108] Carbon Trust (2023). ‘Low carbon district heating with Cardiff Council’.
[109] Facebook Sustainability (202). ‘Denmark data center to warm local community’.
[110] RenewableUK Cymru (2025). ‘Wind, Solar and Tidal Stream: Unleashing the Full Value of Welsh Renewables’.

match-funding or low-interest loans could help close financing gaps and make co-investment from banks, co-operatives or community investors more achievable.

3.41 At a regional scale, there may also be opportunities to standardise or aggregate activity - for example through shared procurement frameworks for turbines, solar panels and batteries, or through common models for community benefit agreements and joint-ownership structures. These types of interventions could help reduce unit costs and support more consistent delivery across multiple projects.

3.42 Welsh examples highlight the potential: Awel Aman Tawe,[111] [112] a community wind co-operative in South Wales, raised over £2.5 million through local share offers (leveraged by a Welsh Government loan) to build two wind turbines totalling 4.7 MW - now generating around 12 GWh per year (enough to power ~2,500 homes) with profits reinvested in the community. Similarly, the Ynni Ogwen hydro scheme in Gwynedd combined a local share issue (approximately 85% of capital came from within the community) with seed funding from government programmes, enabling a 100 kW run-of-river hydro installation that now powers 185 homes and channels revenue into local projects. These cases show how modest public support can unlock significant local capital. Analysis by the UK Government has found that renewable projects with shared local ownership tend to deliver greater community benefits and enjoy higher public acceptance, underlining the value of this model. [113]

Supporting Smart Local Energy Systems (SLES) Across Key Community Assets

3.43 Smart Local Energy Systems integrate on-site generation (solar PV, small wind or CHP), battery storage, electric heat pumps, electric vehicle chargers, and advanced control technologies to intelligently balance supply and demand within a defined area - whether a campus, a neighbourhood, or a network of public buildings.

3.44 For example, Holywell Town Football Club in Flintshire recently upgraded its sports ground with an integrated smart energy system incorporating solar panels on site, battery banks, air-source heat pumps for the clubhouse, several EV charging points, and smart controls linking floodlights and appliances to an

[111] Welsh Government (n.d.) 'Awel Aman Tawe - a power case study'.
[112] Ynni Lleol/Local Energy (2019). 'Awel Co-op: Mynydd y Gwrhyd Wind Farm'.
[113] Department for Energy Security & Net Zero (2025). 'Community benefits and shared ownership for low carbon energy infrastructure: Analytical Annex'.

energy management platform. [114] This comprehensive SLES project, supported by a Welsh Government grant, is expected to supply roughly 80% of the club's annual energy needs, cutting its grid electricity consumption and energy bills by a similar margin. The tens of thousands of pounds saved each year on electricity are being redirected into the club's grassroots programmes, demonstrating the community benefits that flow from local energy self-sufficiency.

3.45 Research finds that SLES can enhance local energy resilience (by allowing communities or campuses to continue operating during wider grid outages) and promote energy justice by keeping investment and economic benefits local. [115]

3.46 Instead of providing ad-hoc funding for individual solar or battery installations, interventions could focus on developing coordinated regional Smart Local Energy System (SLES) initiatives. This could involve identifying groups of community centres, leisure facilities, educational settings or healthcare sites that may benefit from integrated packages combining renewable generation, storage and smart controls.

3.47 An emphasis on integration would help ensure that these technologies operate together to optimise energy use and share power where appropriate, rather than functioning as isolated assets. A regional programme could also support the standardisation of digital platforms and data-sharing protocols required for smart systems, as well as the aggregation of flexibility services - such as exporting stored power back to the grid at peak times. Piloting SLES models and scaling those that prove effective could help reduce costs and emissions across community sites, while supporting public engagement with more decentralised energy approaches.

Building Rural Energy Resilience Through Microgrids and Storage

3.48 In rural areas, grid constraints and vulnerability to outages can limit the ability of small businesses, farms and dispersed communities to electrify heat and transport. Microgrids - linking solar generation, battery storage, demand-response systems and, in some cases, small-scale wind or hydro-represent a potential intervention to improve local resilience and reduce reliance on costly grid upgrades. Funding could support the piloting of such systems, particularly where there is existing interest in local ownership, as well as the technical studies, legal arrangements and integration with local energy planning required for their development. Over time, microgrids can also be connected with

[114] Welsh Government (2025). '£10 million to support community-led energy projects across Wales'.

[115] Gupta and others (2025). 'Energy transition through community energy, local energy and smart local energy system initiatives'. Advances in Building Energy Research, Vol. 20, No. 1, 33–61

community-scale heat pumps or shared thermal storage to create more holistic energy systems tailored to rural areas.

3.49 Grid capacity constraints in Wales - particularly in rural areas - limit the ability to expand low-carbon technologies and act as a barrier to the electrification of heat and transport [116]. Rural microgrids - small-scale electricity systems capable of operating semi-independently of the main network - represent a potential intervention to enhance local energy resilience and support decarbonisation in off-grid or weak-grid areas. Microgrids can bring together renewable generation, battery storage and smart controls to manage supply and demand, with some configurations also incorporating backup generation or emerging technologies such as hydrogen storage. Funding for innovation or demonstration projects could be used to pilot such systems in hard-to-reach areas and assess their practical viability.

3.50 A current example is the HARVEST initiative in Mid Wales (part of the Welsh Government's climate innovation programme), which is prototyping a "virtual" rural energy system linking local farms and small businesses via shared renewables and storage. [117] In its second phase, HARVEST received roughly £500k from Welsh Government and an additional £660k through Ynni Cymru to install solar panels and batteries and to test smart grid controls in and around the town of Llanidloes. [118] This project will explore how a community-scale microgrid can allow peers to generate, share, and store energy locally, increasing resilience against grid interruptions and reducing the need for expensive network upgrades. International research reinforces the value of such approaches: studies have found that community microgrids enable decentralisation of energy supply and even peer-to-peer electricity trading within communities, while also improving reliability in areas with weak grids. [119] However, they also note that significant barriers persist - namely high upfront capital costs, regulatory complexity, and lack of tailored financing mechanisms for small-scale grids.

[116] UK Parliament (2022). 'Grid capacity in Wales'. Welsh Affairs Committee.
[117] Growing Mid Wales (no date). 'Innovating to Optimise Rural Grids Through Agricultural Communities'. [Accessed 30 January 2026]
[118] Powys County Council (2025). 'Mid Wales projects move into prototype stage to deliver real-world clean energy solutions'.
[119] Trivedi and others (2022). 'Community-Based Microgrids: Literature Review and Pathways to Decarbonise the Local Electricity Network'. Renewable Energy, 185: 1336–1350

Strengthening Regional Capability, Skills and Early-Stage Pipeline Development

3.51 Limited development-stage capacity within councils, community groups and other local actors is a constraint across many low-carbon technologies. Interventions aimed at regional coordination could include providing standard business-case templates, shared procurement and legal models, and technical support to reduce duplication and improve project quality. Skills programmes for heat-network engineers, heat-pump installers and battery technicians could also help expand local supply chains and support timely delivery. Strengthening these enabling conditions can contribute to a broader, self-sustaining pipeline of energy projects over time.

3.52 Studies of low-carbon transitions stress that supportive institutions and funding mechanisms are critical to overcome market failures in areas like community energy.[120] Providing grants and specialist expertise to bring projects to an 'investment-ready' stage can help unlock private and community finance, with such interventions also helping to establish a longer-term pipeline of local energy investments that extends beyond the initial funding period.

Summary of Energy Interventions

3.53 Taken together, these themes provide a flexible guide to how interventions could be used to accelerate locally owned renewable and low-carbon energy at a regional scale. This is not an exhaustive or prescriptive list, and the choice of interventions will depend on local context, governance arrangements and community priorities. However, focusing support on early-stage risks, system integration and the wider enabling conditions for long-term investment has the potential to strengthen local economies and help ensure that the benefits of the energy transition are retained within Welsh communities.

[120] Karimi (2025). 'Towards Sustainable Microgrids: A Review on the Integration of Renewable Energy and Energy Storage in Future Energy systems'. Journal of Future Energy Systems, 7(1): 55–70.

Transport and Digital Connectivity

3.54 Llwybr Newydd (2021) is Wales's 20-year transport strategy, structured around three core priorities: reducing the need to travel by bringing services closer to people; enabling the efficient, accessible and sustainable movement of people and goods through well-designed transport services and infrastructure - consistent with the principles of the Sustainable Transport Hierarchy; and encouraging a modal shift towards more sustainable forms of travel, including active travel and public transport.[121]

3.55 The Sustainable Transport Hierarchy guides future investment by prioritising the maintenance, management and climate-resilient upgrading of existing transport infrastructure, and, where new infrastructure is required, giving precedence to walking and cycling, public transport, and ultra-low-emission vehicles over private motor vehicles.

Emissions

3.56 In 2023 the emission contribution of the transport sector[122] represented 18% of Wales' 2023 emissions - approximately 6.0 MtCO2e and 14.6% lower than the baseline. Transport emissions remained largely unchanged for years until the COVID-19 pandemic triggered a sharp decline in 2020. Although emissions have partially rebounded, they are below 2019 levels, reflecting lasting changes in travel behaviour and increased home working.

[121] Welsh Government (2021). 'Llwybr Newydd: the Wales transport strategy'.
[122] The transport sector, as described here, is defined as the TESS 'Domestic Transport' plus 'International Aviation and Shipping' sectors respectively.

Figure 3.13: Transport emissions fell during COVID and have stayed below the baseline thereafter

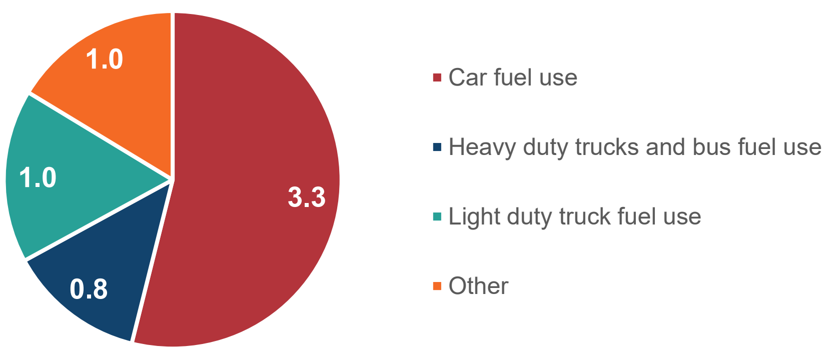
Emissions contribution (MtCO2e) of transport sector in Wales

Source: National Atmospheric Emissions Inventory

3.57 The emissions from the transport sector are dominated by land transportation with cars contributing 53.9% of the sector's total (3.3MtCO2e). After cars, light duty trucks (16.6%, 1.0MtCO2e) and heavy-duty trucks (13.1%, 0.8 MtCO2e) contributed the most towards emission levels, together representing 30% of the sector total (see **Figure 3.14**).

Figure 3.14: Emissions from cars account for over half of transport emissions

Wales Transport Emissions (MtCO2e) Breakdown in 2023



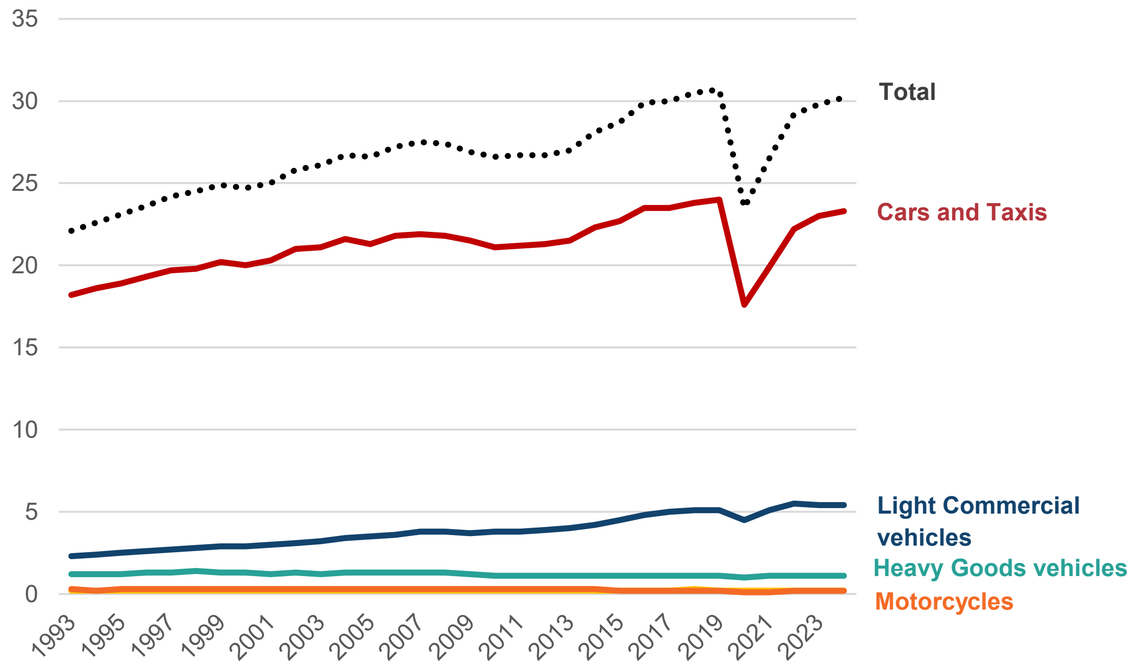
Note: Other includes Civil aviation, Railway, Waterborne, Other domestic transport total, and International aviation and shipping

Source: National Atmospheric Emissions Inventory

3.58 Consistent with this emissions profile, traffic-volume data indicate that cars overwhelmingly dominate road use in Wales (see **Figure 3.15**). The data shows that car and taxi traffic volumes are substantially higher than those of all other vehicle classes throughout the time series, with light vans forming the next largest category but still at a markedly lower level. Volumes for heavy goods vehicles remain comparatively small, and buses and coaches represent only a minimal share of total vehicle-kilometres travelled. This distribution of road activity reinforces the conclusion that cars are the primary driver of both transport demand and associated emissions, while modes such as buses and coaches account for only a marginal proportion of road traffic.

Figure 3.15: Cars and taxis account for the vast majority of road traffic and have followed a long-term upward trajectory

Volume of road traffic (Billion vehicle kilometres) by vehicle type and year, Wales



Note: 2000, 2001 and 2020-2022 respectively are affected by the September 2000 fuel protest, the impact of Foot and Mouth disease. And by the coronavirus (COVID-19) pandemic. Take caution when interpreting these data and comparing them with other time periods.
Source: Road traffic estimates (TRA), TRA0206, Department for Transport

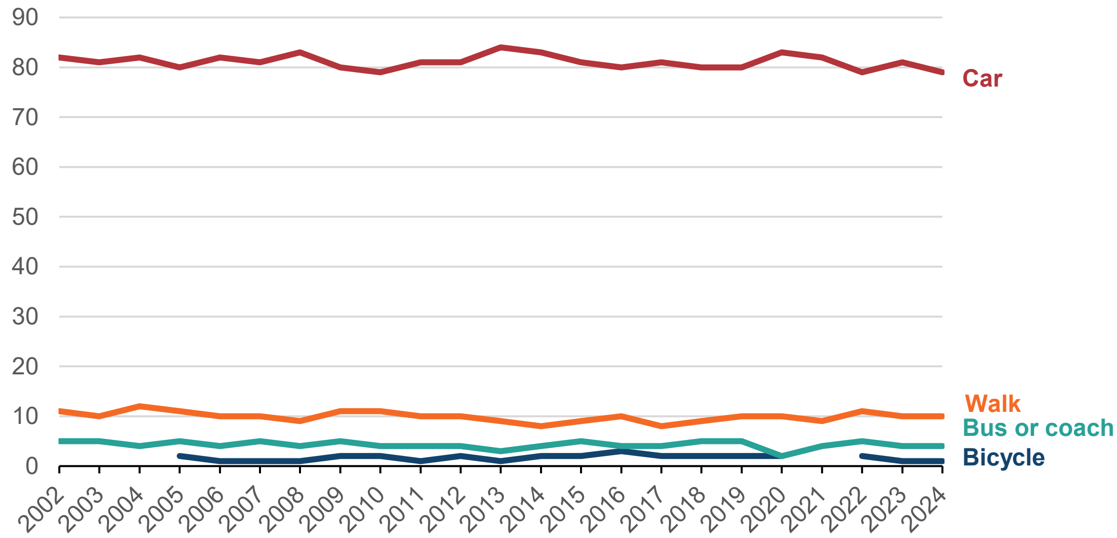
Modal trends

3.59 Looking at the modal trends of transport use, **Figure 3.16** provides an annual breakdown of the usual transport method that individuals who live in Wales stated they used to get to work. In 2023, an estimated 79% of Welsh workers used a car to commute - the highest proportion of any region in Great Britain (equal to the East Midlands). This compares with 67% for Great Britain as a whole.

3.60 A contributing factor to Wales' higher share of car commuters is its comparatively low population density and limited agglomeration, which increases the likelihood that individuals live further from employment centres with less extensive/frequent public transport provision.

Figure 3.16: Transport by car the dominant method of commuting in Wales

Usual method to travel to work for those who live in Wales (% of total)



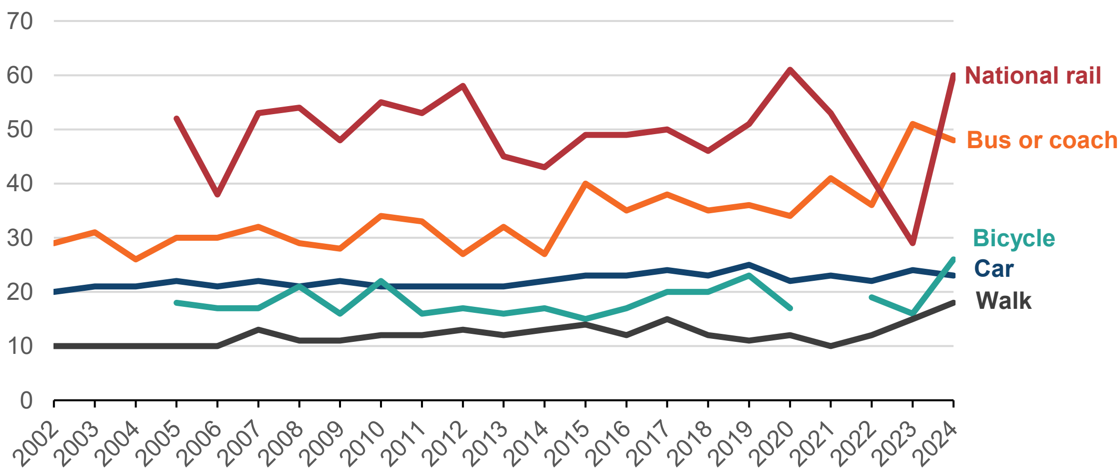
Source: TSGB0108, Department for Transport

3.61 Between 2002 and 2024, there has been no notable modal shift in Wales. The proportion of people travelling to work by car has remained broadly stable, changing only slightly from 82% to 79%, with year-to-year small fluctuations.

3.62 Average commute times in Wales have increased slightly since 2002, rising from 20 minutes to 24 minutes in 2024 across all modes of transport (see **Figure 3.17**). However, despite this modest increase, Wales' average commute in 2024 remained below the Great Britain average of 28 minutes.

Figure 3.17: Public transport typically

Average time taken to travel to work (minutes)



Source: TSGB0111, Department for Transport

3.63 In this context, the Welsh Government's Smarter Working strategy sets an ambition for 30% of the workforce to work remotely on a regular basis,[123] reducing the need for longer commutes and lowering overall travel demand. This aligns with Priority 1 of the Llwybr Newydd strategy, which emphasises increased home and remote working and greater use of active travel to reduce daily reliance on private cars.

Active Travel

3.64 Active travel is defined as walking (for at least 10 minutes) or cycling as a means of transport to get to a particular destination. It does not include walking or cycling done for pleasure, health reasons, or training.[124]

3.65 Wales was the first country to pass an Active Travel Act (2013), mandating authorities to plan for walking and cycling. Active Travel (Wales) Act 2013, the Welsh Government set out "to make walking and cycling the most natural and normal way of getting about".[125] Evidence from multiple UK longitudinal population studies has found that active travel helps maintain and improve both physical and mental health across an individual's life.[126] A 2022 World Health Organisation (WHO) report also found that active commuting is associated with around a 10% decrease in risk for cardiovascular disease and a 30% decrease in type 2 diabetes risk.[127]

3.66 Of course, active travel may not be possible for all individuals - those with mobility disabilities or who live in particularly remote locations - but where it is possible, it can have positive health and wellbeing impacts, including for those who do not currently achieve the recommended level of weekly physical activity. This is notwithstanding the effect that opting for active travel could have on positively reducing emission contributions from transport in Wales and creating generally healthier communities for people to live.

3.67 Welsh Government has set a target of 45% of journeys to be made by public transport, walking and cycling by 2040. This represented an increase of 13% on the 2019 estimated mode share of 32%.[128]

3.68 The Net Zero Wales ambition statement identifies three key mitigation pathways for transport: reducing demand and achieving modal shift (with targets of 35% of

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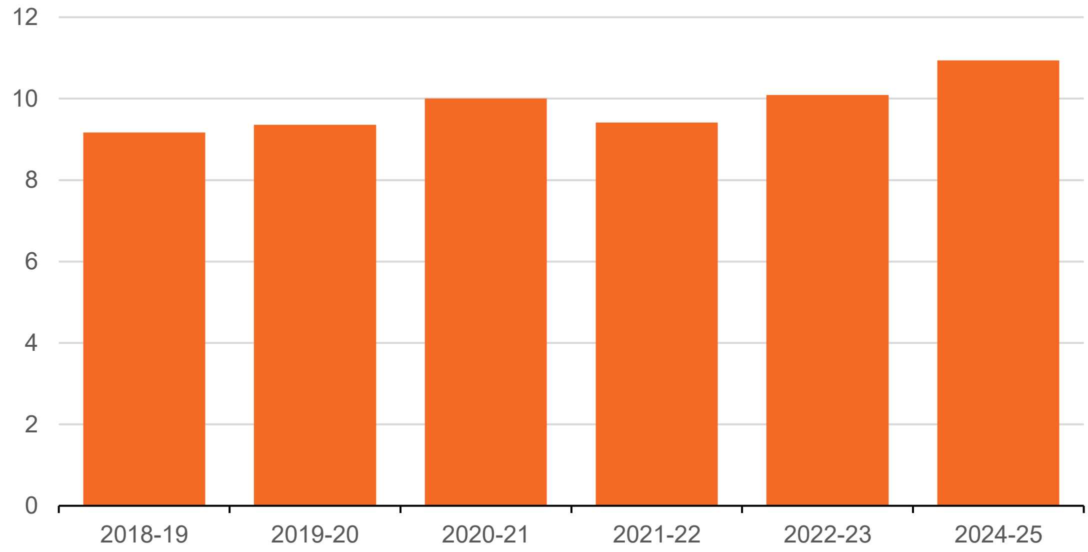
[123] Welsh Government (2022). 'Smarter working: a remote working strategy for Wales'.
[124] Welsh Government (2023). 'Active travel (walking and cycling): April 2022 to March 2023'.
[125] Senedd Research (2023). 'The Active Travel Act: 10 years on'.
[126] Closer (2023). 'Active Travel: evidence and insights from UK longitudinal population studies'.
[127] World Health Organization (2022). 'Cycling and walking can help reduce physical inactivity and air pollution, save lives and mitigate climate change'.
[128] Welsh Government (2023). 'National Transport Delivery Plan 2022 to 2027'.

journeys by public transport, walking and cycling by 2025, rising to 39% by 2030); accelerating the uptake of low- and zero-emission technologies; and improving the fuel efficiency of the remaining conventional vehicle fleet.[129]

3.69 In 2024-25, 11% of adults cycled at least once a month for active travel purposes. This is a modest 1.8 percentage point increase from 2018-19, with year-to-year fluctuations (see **Figure 3.18**)

Figure 3.18: Share of people who cycled at least once a month has remained increased slightly in recent years

Share of people that travelled by cycling at least once a month



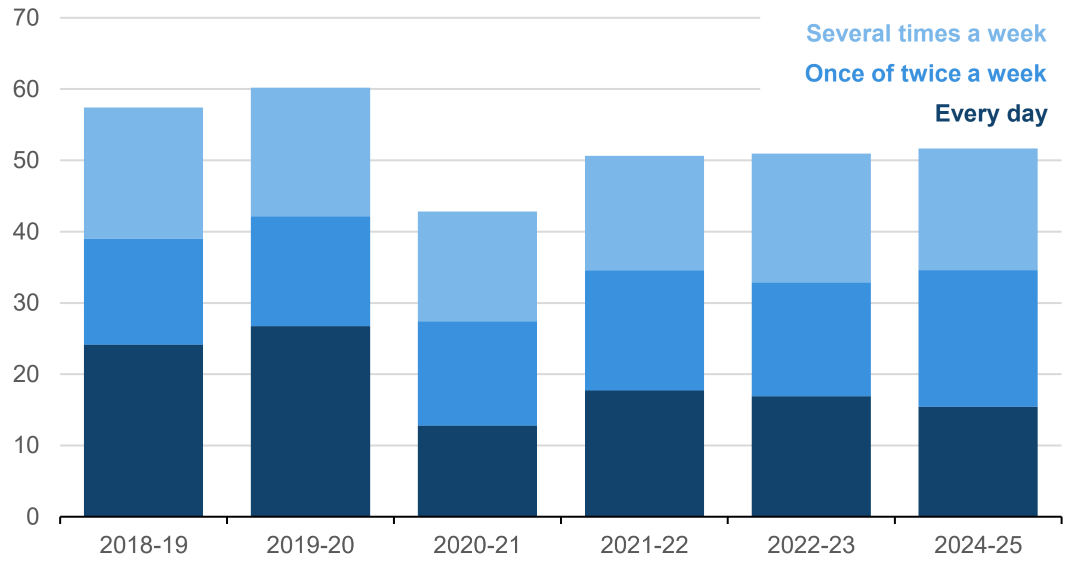
Source: National Survey for Wales.

3.70 The proportion of people who walked for at least 10 minutes as a form of active travel remains substantially higher than the proportion who cycled. In 2024–25, 52% of respondents reported walking once or twice a week for active travel, broadly consistent with 2021–22 and 2022–23 (both 51%), though below pre-pandemic levels, which were 57% in 2018–19 and 60% in 2019–20.

[129] Welsh Government (2023). 'National Transport Delivery Plan 2022 to 2027'.

Figure 3.19: The share of adults walking for active travel has declined since 2018–19, with a marked fall in those walking every day

Share (%) of adults who engage in active travel by walking, by frequency



Source: National Survey for Wales.

Electric Vehicle

3.71 Notwithstanding the Sustainable Transport Hierarchy, active travel and public transport will not be appropriate for all journey types. Given the continued high reliance on cars in everyday travel patterns, a significant proportion of future emissions reduction in the transport sector is therefore expected to come from increased uptake of lower-emitting and zero-emission vehicles.

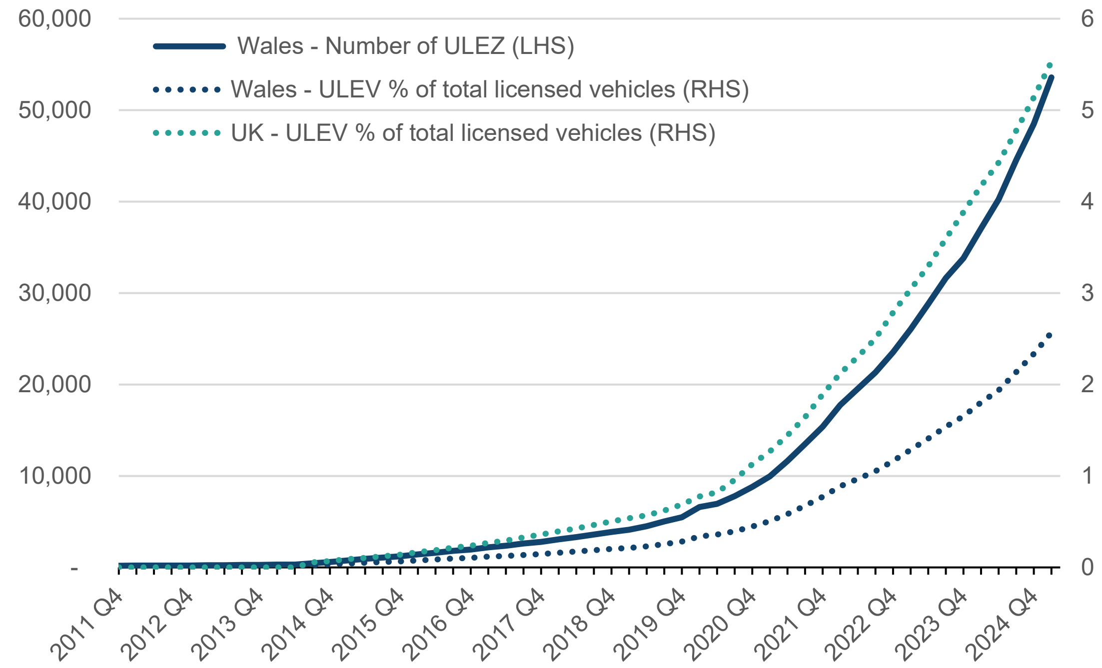
3.72 Indeed, under the CCC Balanced Pathway, the transition from internal combustion engine vehicles to battery-electric vehicles (BEVs) is projected to deliver the vast majority of transport-sector decarbonisation in Wales over 2025–2050. BEV uptake accounts for an estimated 87.8 $MtCO_2e$ of the total 98.0 $MtCO_2e$ surface transport reduction, compared with 5.1 $MtCO_2e$ attributed to demand-reduction measures, defined here as reducing total vehicle-kilometres travelled. While the CCC pathway is not intended to be prescriptive, it highlights the central role of electrification in achieving long-term emissions reductions from surface transport.

3.73 As **Figure 3.20** shows, the percentage of licensed vehicles on the road that are currently classed as ultra-low-emission vehicles (ULEVs) is approximately 5.5% in the UK and 2.6% in Wales. While electric vehicles currently represent a relatively small proportion of vehicles on the road in both Wales and the UK, the proportion has increase significantly over recent years.

3.74 The UK Government has committed to rapid decarbonisation of road transport through a combination of phase-out dates and regulatory mandates. The sale of new petrol and diesel cars will end in 2030, with hybrids permitted until 2035, while Internal Combustion Engine (ICE) vans may continue until 2035. These phase-outs are enforced by the Zero Emission Vehicle (ZEV) Mandate, which requires manufacturers to meet rising annual targets for zero-emission car and van sales – the figure in 2024 of 24.3% for cars surpassed the 22% target; the figure for vans reached 9.3%, just under the 10% target set.[130]

Figure 3.20: ULEV uptake has continued to accelerate in recent years but trend in Wales trails that seen in the UK

Ultra-low-emission vehicle (ULEV) trends in Wales and UK



Source: TSGB0108

3.75 A comprehensive network of publicly accessible electric vehicle chargers is necessary to support the large-scale uptake of battery electric vehicles in Wales. The rate of deployment of charge points will depend largely on investment from the private sector and may be influenced by the cost of upgrading grid connections and Wales' rural landscape.

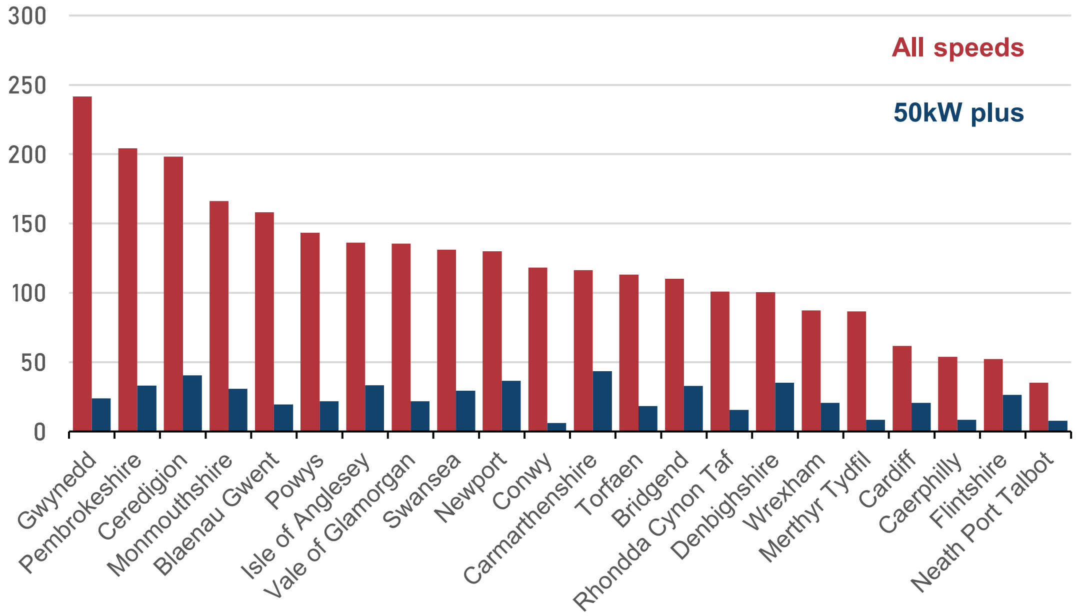
3.76 Charging infrastructure coverage in Wales remains uneven. For example, Gwynedd has 242 public charging devices per 100,000 residents, compared with just 36 in Neath Port Talbot (see **Figure 3.21**). There is also significant variation in

[130] Department for Transport (2025). '[Phasing out sales of new petrol and diesel cars from 2030 and supporting the ZEV transition: summary of responses and joint government response](#)'.

high-powered (50kW+) provision, with Carmarthenshire hosting 43 such chargers per 100,000 people, while Merthyr Tydfil has only nine.

Figure 3.21: There is substantial variation in public charging device provision across Wales

Public charging devices per 100,000 population in 2025, by charging speed



Source: TSGB0108

Access to services and connectivity

3.77 Food shops, schools, post offices, libraries, leisure centres, GP surgeries and dentists are examples of essential services that people in Wales need to access with reasonable frequency or urgency to support their day-to-day lives. When discussing "access", it is important to recognise that multiple dimensions contribute to whether a service is genuinely accessible - some of which are often overlooked. While this section focuses on travel time as the primary measure of accessibility (typically used as a proxy for distance), other factors—such as the times at which services are available, and the ease with which appointments or visits can be arranged - also play a significant role for individuals. However, in many cases, these wider aspects of accessibility fall outside the scope of regional investment interventions.

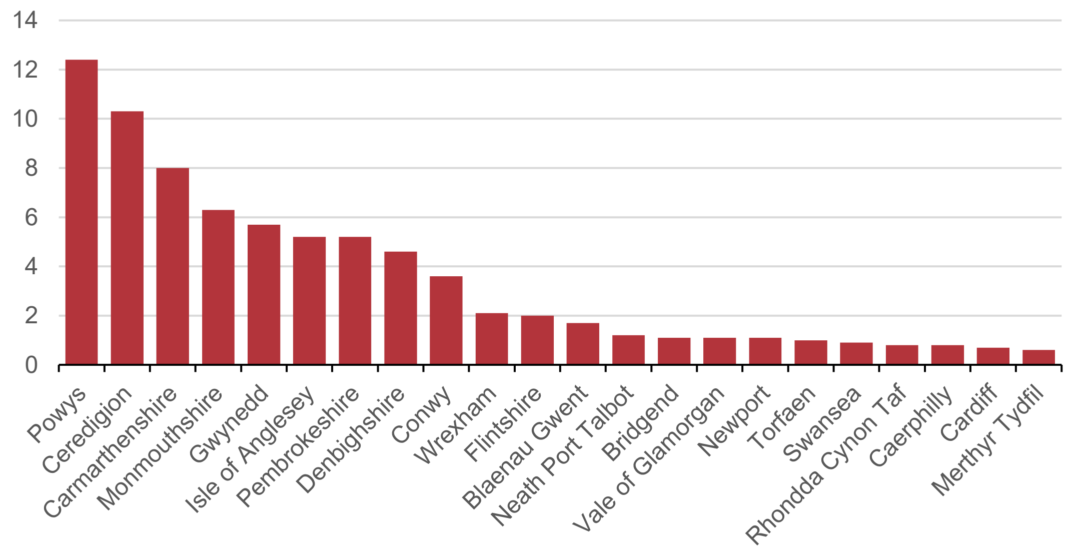
3.78 As could be predicted, the expected travel time to access various services is longer for individuals the smaller the settlement type in which they live (cities, towns, villages, etc.); with how densely populated the larger surrounding area is also a factor. However, the time it takes to access services when dependent on public transport rises by a much higher rate for smaller settlement sizes, as opposed to those who have access to a private vehicle (which is relatively low in every settlement type).

3.79 Settlement size, as opposed to area sparsity, is a larger factor in increasing the time it takes to access services. While the majority of the population of Wales live in large towns, around 30.2% of Wales's population resides in Output Areas classified as rural.[131] This is still a sizable minority that are severely disadvantaged should they not have access to a private vehicle.

3.80 Broadband connectivity is essential for everyday life, underpinning how people work, learn, access services, communicate, and participate in the modern economy. Across Wales, however, access to fast and reliable broadband varies significantly, with Powys – the most sparsely populated local authority – having over 12% of residential premises unable to receive superfast broadband (see **Figure 3.22**).

Figure 3.22: There is substantial variation in superfast broadband provision across Wales

Percentage of residential premises unable to receive superfast broadband (30Mbit/s), by Local Authority (2025)



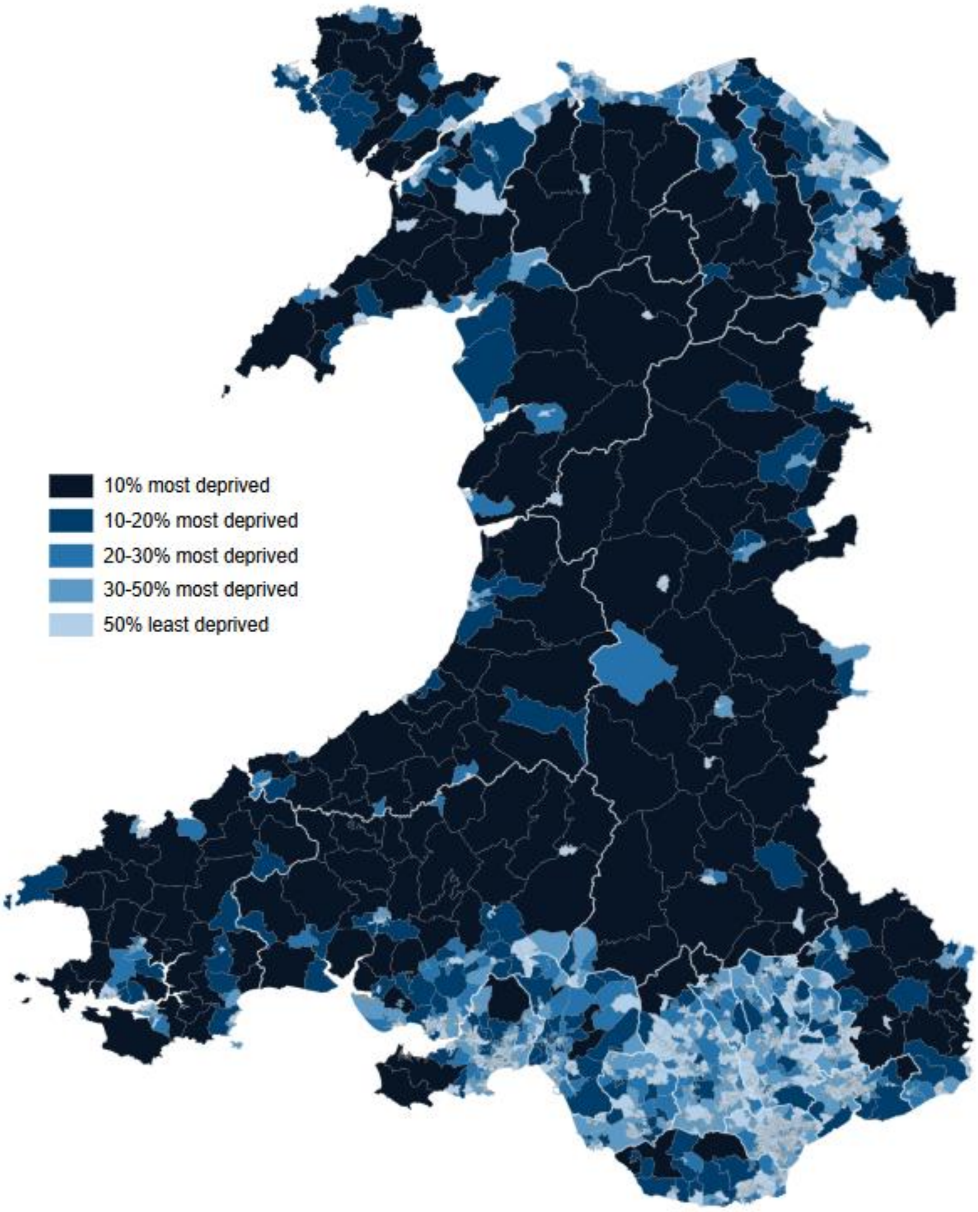
Source: Welsh Index of Multiple Deprivation (WIMD) 2025 indicator data by Lower layer Super Output Area (LSOA) and local authority - access to services domain

3.81 The Access to Services Domain map of Wales from the Welsh Index of Multiple Deprivation below shows how much of the geographic area of Wales is covered by the 10% most deprived lower super-output areas (LSOAs) – areas in dark blue. This

[131] Population shares are calculated by combining the Rural–Urban Classification for England and Wales (Table 1D: 2021 Local Authority Districts (LAD21) – Rural-Urban Classification Supplementary Table) with Census 2021 usual resident population counts (P02: Usual resident population by five-year age group, local authorities in England and Wales)

shows how much of an issue access to services is for rural parts of Wales where the population density is lower and, therefore, the LSOAs cover larger areas.

Figure 3.23: Access to service deprivation is evident in most regions of Wales
Access to services deprivation across LSOAs, WIMD (2025)



Source: Welsh Index of Multiple Deprivation (2025)

Transport Interventions

Invention Rationale

3.82 Investments in transport infrastructure have long been recognised as potential drivers of local economic growth. By improving connectivity and reducing travel times, such interventions can enhance productivity and strengthen access to employment, services and markets. Although evidence on project-level welfare impacts continues to evolve, aggregate-level meta-analyses consistently identify a significant positive relationship between transport infrastructure and economic activity at regional and national scales, particularly in the long term and at higher levels of geographical aggregation.[132] The UK Government's Eddington Transport Study (2006) similarly notes that the performance of national networks is an important enabler of productivity and competitiveness, estimating that a 5 per cent reduction in business travel time on the road network could yield cost savings of around £2.5 billion-approximately 0.2 per cent of GDP.[133]

3.83 The underlying economic logic is that improved transport links support more efficient matching of workers to jobs and enable firms to reach suppliers and customers at lower cost. These mechanisms help generate agglomeration economies - productivity gains that arise when economic activity becomes more geographically concentrated.[134,135] While such agglomeration effects can strengthen productivity in urban centres, the distribution of these benefits is not uniform.[136] Rural and sparsely populated areas may experience more limited gains, reflecting lower densities of economic activity and reduced potential for clustering effects.

3.84 More broadly, reliable and efficient transport networks facilitate access to essential services and support participation in employment, education, healthcare and everyday activities, contributing to overall wellbeing. The largest productivity or economic gains are typically realised where an intervention addresses a clear connectivity gap or resolves a bottleneck. In areas already well served by transport infrastructure, additional investment may deliver more limited returns.

3.85 Decarbonising transport remains a central challenge for Wales, where the sector accounts for around 17-18 per cent of emissions. A mix of interventions is required, ranging from measures that reduce or avoid the need for travel to those that shift activity towards more sustainable modes or improve the efficiency and emissions performance of remaining transport activity (the Avoid-Shift-Improve

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132 Välila (2025). 'The economic impact of transport infrastructure: a review of project-level vs. aggregate-level evidence'. Transport Reviews, Volume 45, Issue 4, 4 July 2025, Pages 459-481
133 HM Treasury (2006). 'The Eddington Transport Study The case for action: Sir Rod Eddington's advice to Government'.
134 Graham (2007). 'Agglomeration, productivity and transport investment'. Journal of transport economics and policy (JTEP), 41(3), 317-343
135 What Works Centre for Local Economic Growth (2023). 'Understanding Agglomeration'.
136 Independent Commission on Social Mobility (2023). 'Spatial Agglomeration, Productivity and Inequality'.

framework).[137] The Welsh Government already has avoid- and shift-related targets for surface transport, including for 39% of journeys to be made by sustainable modes and for 30 % of the workforce to work remotely by 2030.

Active Travel Infrastructure

3.86 Enabling more walking and cycling can help reduce car dependency while also supporting public health. Interventions could include planning and funding safe active-travel networks - such as segregated cycling routes, improved footpaths and safe road crossings - to connect residential areas with key destinations like town centres, schools and transport hubs. Funding can also be used to close gaps for projects including new footbridges or street-level redesigns. Infrastructure improvements are most effective when complemented by education and community engagement, helping residents to feel confident in adopting new travel options.

3.87 For example, a £30 million active travel scheme in Waltham Forest (London) built cycle lanes and pedestrian zones; as a result, car traffic fell by over 50% in parts of the borough while walking and cycling increased markedly.[138,139] Similar transformations in Welsh towns - adapted to local needs - could make urban centres more accessible and attractive, though in rural villages more creative solutions (e.g. safe village walking routes) are needed given longer distances.

Electric Vehicles and Charging Infrastructure

3.88 Expanding electric vehicle usage is an important element of reducing road transport emissions. Interventions could include investing in EV charging infrastructure, particularly in locations where private-sector deployment has been slower - such as smaller towns or key strategic corridors. Support could also be directed towards the electrification of public and shared fleets, including buses and local authority vehicles, by contributing to the development of charging depots or assisting with vehicle procurement. Such measures can help ensure that the transition to EVs is accessible across regions and transport users.

3.89 Range anxiety remains a notable concern among both current and prospective battery-electric vehicle (BEV) users, reflecting uncertainty about whether a vehicle's remaining charge is sufficient to complete longer or unplanned journeys. Addressing this barrier requires not only increasing the overall availability of

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[137] Wales Centre for Public Policy (2024). '[Net Zero 2035: Lessons from International Initiatives to Decarbonise Transport]'.
[138] Air Quality News (2023). '[Waltham Forest Sees Health Benefit from Cycling and Walking Scheme]'.
[139] Dajnak and Walton (2018). '[Waltham Forest study of life expectancy benefits of increased physical activity from walking and cycling]'.

charging infrastructure but also optimising its spatial distribution,[140] including expanding workplace charging given that cars are the most common commuting mode (see **Figure 3.16**). A denser and more accessible charging network - particularly one that provides reliable options at home, at work, and across key travel corridors - has been widely recognised as central to alleviating range anxiety. By reducing the real and perceived risk of being unable to recharge when needed, expanded and better-located charging infrastructure can significantly boost confidence in EV use and support wider uptake.

Low Emission Public Transport

3.90 Investing in clean public transport options can help shift travellers away from private car use and reduce emissions from essential journeys. Interventions could include funding the transition to low-emission buses and trains—for example, through support for electric or hydrogen bus fleets, associated charging or refuelling infrastructure, and improved coordination of routes and timetables. Work with operators to introduce electric buses on key corridors, alongside measures such as integrated ticketing, can make public transport more convenient and accessible. Targeted capital support can also help address the higher upfront costs of zero-emission buses and depot infrastructure, with these initial investments offset over time by lower operating costs and wider health and environmental benefits.

3.91 Electric buses become lower-carbon than diesel buses when the electricity grid emits less than around 750g CO_2e per kWh.[141] In 2025, the United Kingdom's average grid emissions were approximately 170g CO_2e/kWh,[142] indicating that electric buses already deliver a substantial carbon advantage under current conditions. As electricity systems continue to decarbonise – particularly through increased renewable generation – this advantage will strengthen further.

3.92 Beyond greenhouse gas reductions, electric buses also offer significant air-quality benefits. They produce zero tailpipe NOx (nitrogen oxide and nitrogen dioxide) emissions, whereas diesel buses remain a major source of NOx pollution. Evidence from a 2024 study on electric school buses demonstrates the scale of these benefits: reduced exposure to $PM_{2.5}$ (Particulate Matter with a diameter of 2.5 micrometres or smaller) and NOx - pollutants associated with asthma, cardiovascular disease, and other adverse health outcomes - was shown to provide sizeable public-health gains. The study estimated that replacing a single

[140] Shrestha and others (2022). '[Measures to resolve range anxiety in electric vehicle users]'. International Journal of Low-Carbon Technologies, Volume 17
[141] Nordelof and others (2019). '[Life Cycle Assessment of City Buses Powered by Electricity, Hydrogenated Vegetable Oil or Diesel]'. Transportation Research Part D, Volume 75, pages 211-222
[142] Nowtricity (no date). '[CO2 emissions per kWh in United Kingdom]'. [Accessed 10 February 2026]

diesel school bus with an electric equivalent could yield up to $247,600 in combined climate and health benefits over its lifetime.[143]

3.93 Newport now operates 50+ electric buses, projecting an 11,500 tonne CO_2 reduction (and elimination of 4.5 tonnes NOx) over 15 years by replacing diesel buses.[144] This shows how regional support for e-bus fleets yields climate and air quality gains. In smaller rural towns, inventions might focus on low-emission minibuses or community transport, ensuring cleaner transit beyond major city networks.

Digital Connectivity for Smart Mobility

3.94 Digital infrastructure and data-driven mobility services can optimise transport networks and improve connectivity, especially in areas where conventional services are sparse. Potential interventions could include advancing "smart mobility" solutions such as intelligent traffic-management systems, open data platforms and on-demand transport services.

3.95 For example, they might fund the deployment of smart traffic signals that adapt to real-time conditions, reducing congestion and idle emissions. A European Commission meta-analysis (2019)[145] found that adaptive traffic signal control systems typically reduce delays by 10–20% and a Surtrac Pilot in Pittsburgh US trial have cut delays ~25% and emissions ~20% with AI-driven signals. [146]

3.96 Another intervention is demand-responsive transport: Wales' Fflecsi service demonstrates a successful model, using a smartphone app and algorithms to dynamically route minibuses instead of fixed lines. [147,148] It only runs vehicles when and where needed, improving public transport coverage in sparsely populated areas while cutting empty bus miles.

3.97 CJCs can expand such digital-enabled services regionally (in partnership with Transport for Wales), ensuring rural and urban communities alike benefit from smart mobility innovations.

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[143] Harvard (2024). '[Electric school buses may yield significant health and climate benefits, cost savings]'. TH Chan School of Public Health.

[144] Newport Bus (2023). '[Our Electric Buses]'.

[145] Qadri and others (2020). '[State-of-art review of traffic signal control methods: challenges and opportunities]'. European Transport Research Review, Volume 12, Article number 55

[146] Govlaunch (2023). '[Pittsburgh, PA reduces traffic congestion with AI]'.

[147] Transport for Wales (no date). '[Fflecsi bus]'. [Accessed 10 February 2026]

[148] Transport for Wlaes (2022). '[flecsi – the experience of Demand Responsive Transport in Wales]'.

Mobility-as-a-Service Platforms

3.98 Mobility-as-a-Service (MaaS) refers to digital platforms that integrate multiple transport modes - such as public transport, car hire, bike share and other shared-mobility options - into a single service that users can plan and pay for seamlessly. By making multimodal travel easier and more convenient without relying on a private car, MaaS has the potential to encourage mode shift. Interventions could include developing integrated journey-planning and ticketing applications, supporting the creation of physical mobility hubs where several transport options are co-located, and providing funding to expand car-sharing clubs, e-bike hire schemes, park-and-ride facilities and integrated ticketing systems covering bus, rail and rental services.

3.99 European examples show the potential: Bremen (Germany) established prominent mobility hubs combining car-share, bikes, and transit access – resulting in over 6,500 fewer private cars on its streets and saving 25,850 tonnes of CO_2 within a few years.[149,150]

3.100 For Welsh regions, a MaaS platform could help link rural and urban mobility options, enabling a traveller in a village to seamlessly book a demand-responsive bus to a town, followed by a train and a bike-hire service for the final leg. By investing in integrated services of this kind, accessibility can be improved and reliance on single-occupancy vehicles reduced.

Green Freight Corridors

3.101 Freight transport is a significant emitter, and decarbonising freight movement is vital for regional and national climate goals, with Heavy duty trucks and bus fuel use emitting 793 kt CO2e in 2023. [151]

3.102 "Green freight corridors" could be develop by investing in infrastructure that enables low-carbon haulage. Practically, this means supporting the installation of high-power charging stations or hydrogen refuelling hubs at regular intervals along major truck routes (such as the M4 in South Wales or A55 in the north). As an example, Sweden's e-highway pilot[152] equipped a motorway stretch with overhead electric lines for hybrid trucks - this halved the trucks' energy consumption on that route and eliminated tailpipe emissions while under electric power.

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[149] ComoUK (no date). '[Mobility hub case study - Bremen]'. [Accessed 10 February 2026]
[150] European Commission (2019). '[SHARE-North: Fostering shared mobility solutions for a low-carbon North Sea Region]'.
[151] Disaggregated freight-only fuel data are unavailable, heavy-duty truck fuel use is taken as a proxy indicator of road freight, recognising that the measure also captures bus fuel consumption.
[152] Siemens (2016). '[World's first eHighway opens in Sweden]'.

3.103 In Wales, while an overhead line system would require action at the national level, interventions could focus on ensuring that regional freight hubs and distribution centres are equipped with appropriate charging infrastructure and on supporting enhancements to rail freight to shift heavy goods off the road where possible. Urban freight challenges could also be addressed through measures such as enabling electric van fleets and cargo-bike deliveries for last-mile logistics.

Housing / Fuel Poverty

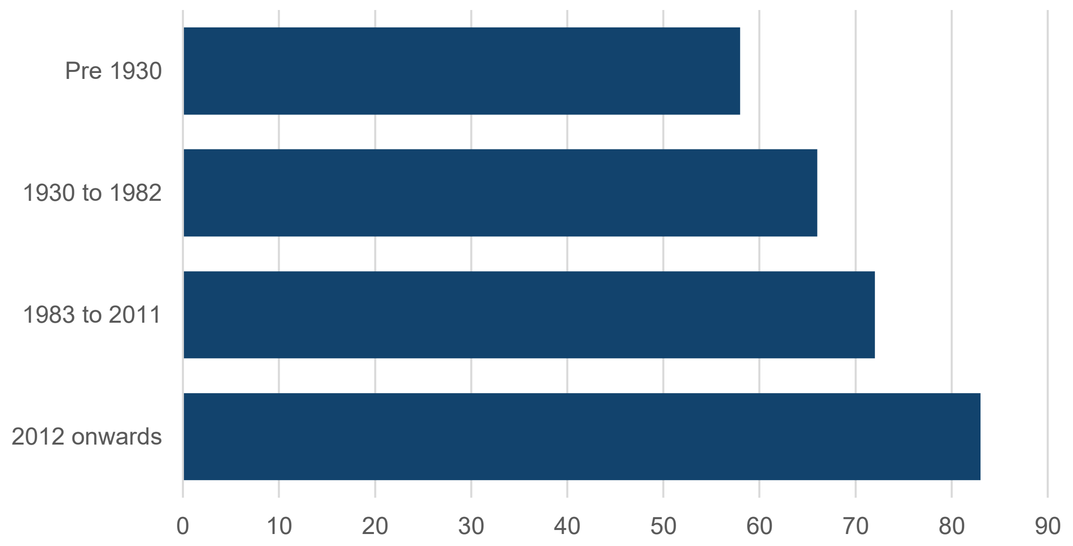
Building Stock

3.104 Wales has some of the least energy efficient housing stock in Western Europe. This is partly due to the age profile of Welsh homes: around 30.3% were built before 1919, while only 19.8% were constructed after 1992.[153] The proportion varies significantly across local authorities - for example, nearly half of homes in Rhondda Cynon Taf (49.7%) pre-date 1919, compared with just 15.3% in Flintshire. The UK has the oldest housing stock in Europe, and Wales has the oldest housing stock in the UK. [154]

3.105 On average, older properties generally record lower energy efficiency scores (see **Figure 3.24**), therefore property age can be used as an - albeit imperfect - proxy of quality.

Figure 3.24: Older houses typically have worse energy efficiency levels

Median energy efficiency score, by property age, Wales, 21 March 2021



Source: ONS Census 2021, Energy efficiency of housing in England and Wales: 2023

3.106 Semi-detached homes are the most common housing type, making up 31% of the housing stock. Detached homes account for 28%, while terraced houses and bungalows together represent 26%. Flats, maisonettes or apartments make up

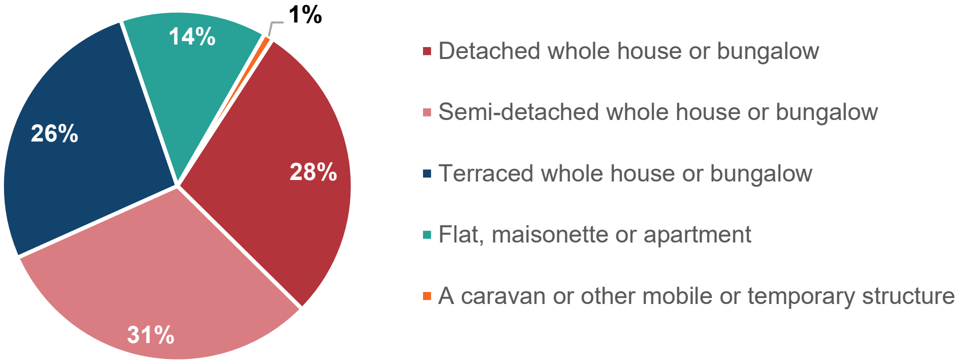
[153] Valuations Office Agency (2024). '[Council Tax: stock of properties background information]'. Table CTSOP4.1: Number of properties by Council Tax band, property build period, local authority, and lower and middle layer super output area, 2024

[154] The Health Foundation (2024). '[Proportion of properties built before 1919 by local authority]'.

14%, and other mobile or temporary structures comprise the remaining 1% (see **Figure 3.25**).[155]

Figure 3.25: Semi-detached homes are the most common housing type in Wales, followed by detached and terraced properties, with flats making up a smaller share

Percentage split of accommodation types for all dwellings Wales, 21 March 2021



Source: ONS Census 2021, Housing in England and Wales: 2021 compared with 2011

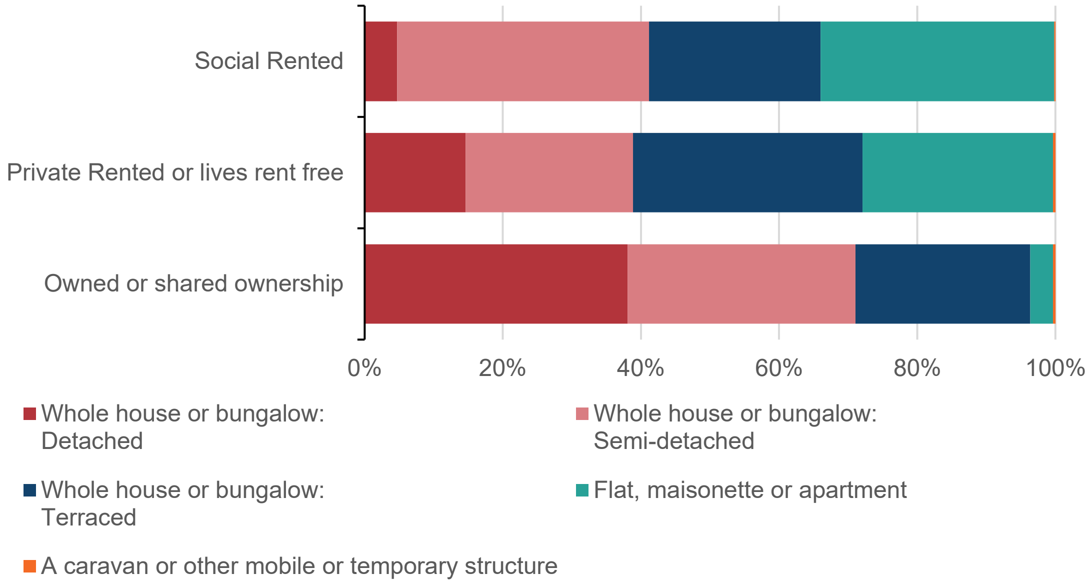
3.107 In 2021, there were 120,450 unoccupied dwellings in Wales, making up 8.2% of dwellings.[156]

3.108 For occupied dwellings, in Wales, terraced dwellings had the highest proportion of private-rented dwellings (33.2%), while semi-detached dwellings had the largest proportion of social-rented dwellings (36.5%). For owner-occupied dwellings, the largest proportion in Wales were detached (38.1%) - see **Figure 3.26**.

[155] Office for National Statistics (2023). 'Housing in England and Wales'.
[156] Office for National Statistics (2023). 'Housing in England and Wales'.

Figure 3.26: Accommodation types vary sharply by tenure: whole houses and bungalows make up only a small share of social rented homes, but are the predominant types within owner-occupation

Percentage split of accommodation type by tenure of occupied dwellings Wales (2021)



Source: ONS Census 2021, Housing in England and Wales: 2021 compared with 2011

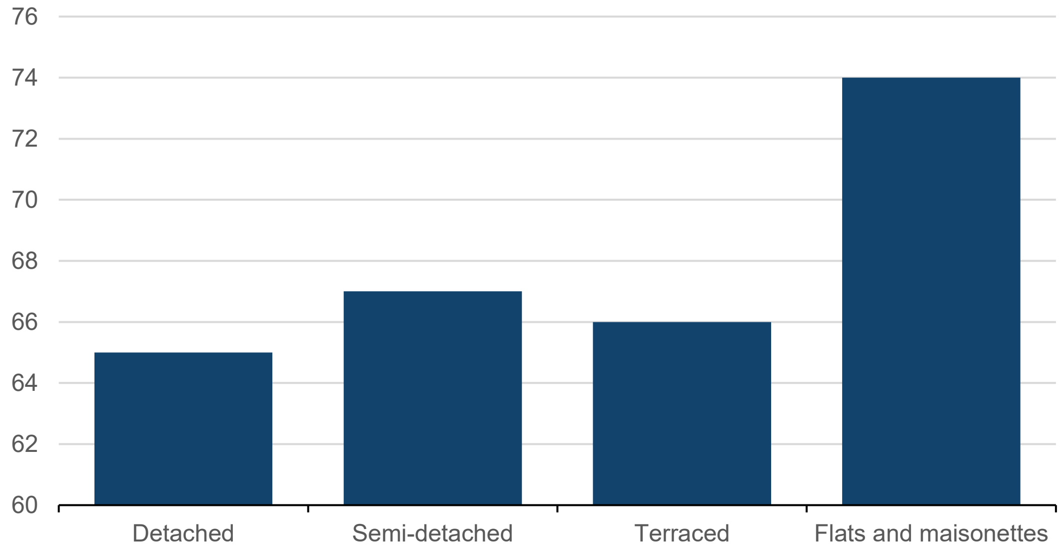
3.109 The median Energy Performance Certificate (EPC) score for houses in Wales in 2025 was 68 (equivalent to a band D), with homes in urban areas typically having a higher score than in rural areas - this compares to England rating of 69 (band C).[157]

3.110 Flats and maisonettes were the most energy-efficient property type in Wales, with a median energy efficiency score of 74 in 2024-5 (see **Figure 3.27**)

[157] Office for National Statistics (2025). '[Energy efficiency of housing in England and Wales: 2025](#)'.

Figure 3.27: Flats tend to be more energy efficient than other property types

Median energy efficiency score by property type, Wales 2024-25, non-zero axis

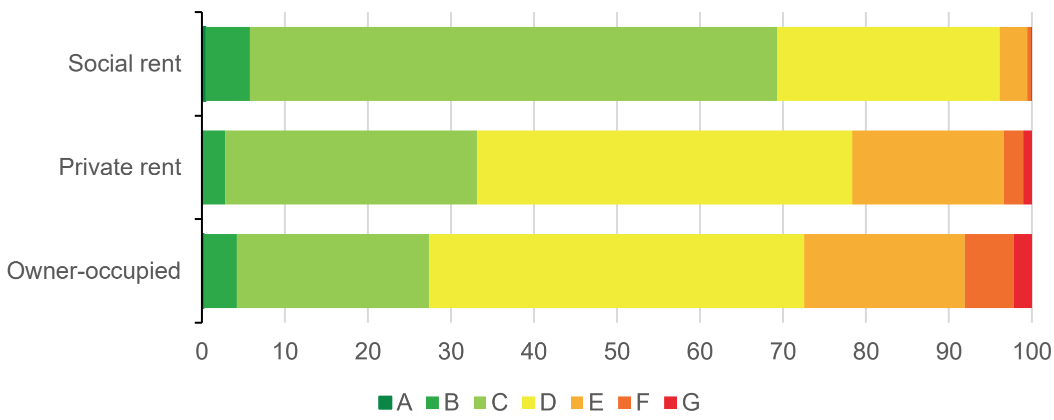


Source: ONS, Median energy efficiency score, England and Wales, 2025

3.111 Social housing in Wales tends to be more energy efficient than owner-occupied or privately rented homes. Around 69% of social housing has an EPC rating of A–C, compared with 33% in the private rented sector and 27% of owner-occupied homes (see **Figure 3.28**). This difference is in part driven by the regulatory requirements placed on different tenures.

Figure 3.28: Social housing in Wales tends to be more energy efficient than owner-occupied or privately rented homes

Composition of EPC bands by tenure in Wales (2021)



Source: ONS Census 2021, Energy efficiency of housing in England and Wales: 2023

3.112 One of the main contributors to energy use in the home is central heating, with different sources of central heating seen as more or less energy efficient. Mains gas was the most common source of central heating fuel in Wales with 79% of dwelling using main gas. Currently, for those properties with EPCs, 1.5% in Wales have heat pumps. Out of all England and Wesh local authorities, Ceredigion in Wales had the second highest proportion at 9.5% (behind Mid-Suffolk with 10.6%).[158]

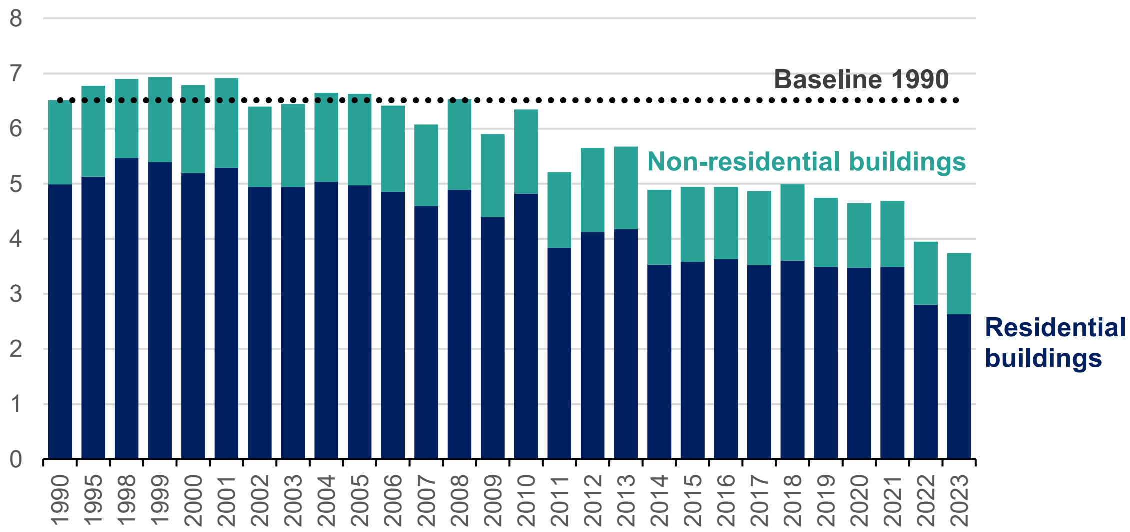
3.113 New dwellings are more likely to have a heat pump installed than existing dwellings. Of new dwellings in Wales, 5.5% have heat pumps installed, while 1.0% of existing dwellings do.[159] The Welsh Government has a target to install 580,000 heat pumps by 2035. Current progress stands at an estimated 22,000 installations, with 6,900 added in 2023.[160]

Building Emissions

3.114 In 2023, buildings emissions were 3.7MtCO2e, equal to 11% of total emissions. The sector has reduced emissions by 42.9% from the base year, with notable declines in 2011 and 2022, whilst changes in levels have otherwise been small.

Figure 3.29: Building emissions in Wales have remained below the baseline for over a decade and have fallen further in recent years

Emissions contribution (MtCO2e) of buildings sector in Wales



Source: National Atmospheric Emissions Inventory

3.115 Residential buildings account for 70.4% of total building emissions, equivalent to 2.6 $MtCO_2e$. This represents the lowest share on record, though it remains broadly comparable to the peak level of 79.2% observed in 1998.

3.116 The bulk of emissions reductions by the building sector (residential and non-residential) can be delivered primarily by a combination of energy efficiency

[158] Office for National Statistics (2025). 'Energy efficiency of housing in England and Wales: 2025'.
[159] As above.
[160] Welsh Government (2025). 'Energy Generation in Wales 2023'.

measures and the installation of low-carbon heating systems – namely heat pumps. It will be important to ensure low-carbon heating systems are economically viable and accessible for households and firms alike, especially given high upfront capital costs associated with the technology (which can be a barrier to adoption).

3.117 Energy efficiency is a cross-cutting issue as it not only increases our ability to reduce energy demand and wastage, but it could also help to alleviate fuel poverty. However, the installation of heat pumps alone will not address these challenges, as their effectiveness depends on complementary measures such as adequate insulation and broader improvements to the thermal efficiency of homes.

Fuel poverty

3.118 The Tackling Fuel Poverty 2021–2035 strategy sets out the Welsh Government's long-term ambition to eliminate severe or persistent fuel poverty as far as reasonably practicable, limit overall fuel poverty to no more than 5% of households at any given time, and reduce by more than half the number of households considered "at risk" relative to 2018 levels.[161] The most recent modelled estimates for 2024 indicate that Wales remains some distance from these goals, with around 340,000 households (25%) currently in fuel poverty, including approximately 63,000 households (5%) experiencing severe fuel poverty and a further 215,000 (16%) assessed as being at risk. [162]

3.119 The Welsh Government has sought to increase the energy efficiency standards of energy-inefficient homes across multiple tenures through a suite of programmes. This includes Green Homes Wales, which targets able-to-pay owner-occupied households to support improvements that enhance energy performance, and the Warm Homes Programme, comprising both the Nest and former Arbed schemes. [163] The Nest scheme provides free home energy-efficiency improvements for low-income households to reduce fuel poverty and support decarbonisation, while Arbed operated as the Government's flagship area-based retrofit initiative, delivering insulation, efficient heating systems and other fabric upgrades in some of Wales' most deprived communities. Since 2011, the Nest scheme alone has delivered free energy-efficiency measures to over 60,000 households.[164] The aims of these programmes are to reduce fuel poverty, boost economic regeneration, and reduce emissions.

[161] Welsh Government (2021). 'Tackling fuel poverty 2021 to 2035'.
[162] Welsh Government (2025). 'Fuel Poverty: Modelled Estimates for Wales: as of October 2024'.
[163] Welsh Government (2023). 'Next iteration of the Warm Homes Programme: review and recommendations report'.
[164] Welsh Government (no date). 'Nest Warm Homes Programme'. [Accessed 10 February 2026]

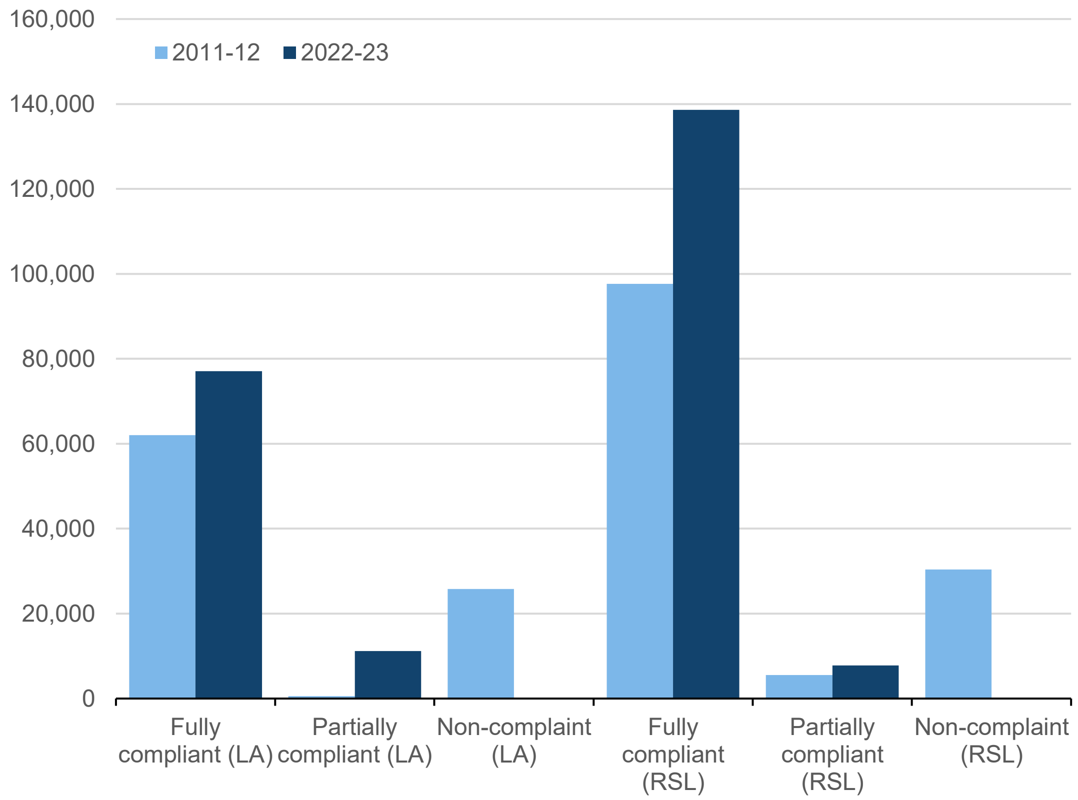
3.120 Another area where the Welsh Government has assisted in decarbonising the residential sector is social housing, supported primarily through the Optimised Retrofit Programme (ORP). ORP funds social landlords to plan and deliver whole-home, fabric-first retrofit pathways, supporting long-term decarbonisation of the sector.[165] Social housing is required to meet the Welsh Housing Quality Standard (WHQS), a set of indicators defining what constitutes a good-quality home, and the Welsh Government has made funding available to local authorities and registered social landlords to help them maintain and improve their stock in line with this standard.[166] One of the requirements to meet the WHQS is that homes are affordable to heat and have minimal environmental impact. Under WHQS 2023, this includes achieving a minimum energy-efficiency level equivalent to EPC Band C (SAP 75) for all dwellings by 2030. [167]

3.121 Monitoring of WHQS compliance included collecting data on the energy performance of social homes, with some assessments using a SAP rating of around 65 as an indicative benchmark for energy efficiency.[168] Compliance has improved substantially over the past decade. By 2022-23, all 88,211 local-authority-owned social housing units were assessed as partially or fully compliant, a substantial rise from 20,531 of 88,353 dwellings (23%) in 2011-12. Similarly, stock owned by registered social landlords reached 100% partial or full compliance in 2022–23, compared with 54% in 2011-12 (71,623 of 133,562 dwellings) - see **Figure 3.30**. Social housing consistently demonstrates higher energy-efficiency performance than other tenure types (see **Figure 3.28**).

[165] Welsh Government (2021). 'Optimised RetroFit Programme'.
[166] Welsh Government (2019). 'Welsh housing quality standard: overview'.
[167] Welsh Government (2024). 'Welsh Housing Quality Standard 2023'.
[168] Welsh Government (2023). 'Compliance with Welsh Housing Quality Standard components by provider and measure'.

Figure 3.30: Social housing energy efficiency has improved, with no dwellings below SAP 65 in either local authority or RSL stock in the latest data.

Social housing stock that has an SAP rating of 65 or above, Split by local authorities (LA) and Registered Social Landlords (RSL)



Source: Welsh Government (Compliance with the overall Welsh Housing Quality Standard by provider and measure)

Housing Interventions

Invention Rationale

3.122 Improving the energy efficiency of homes and alleviating fuel poverty in Wales is vital for both public health and environmental goals. Inadequate housing conditions - such as cold, damp, or poorly insulated homes - are strongly linked to negative health outcomes, including respiratory and cardiovascular illnesses and excess winter mortality. At the same time, inefficient homes contribute to climate change: residential buildings emitted 3.7 $MtCO_2e$ in 2023. About 25% of Welsh households currently live in fuel poverty – meaning they cannot afford to keep their homes adequately warm – a situation that results in both hardship for residents and higher energy use (and emissions) due to outdated heating and insulation.[169]

[169] Welsh Government (2025). 'Written Statement: Fuel Poverty'.

3.123 Tackling these issues is a national priority. Wales aims to eliminate severe fuel poverty and halve the overall number of fuel-poor households by 2035, while making strides toward net-zero housing emissions. Achieving these targets requires capital investment in housing upgrades where market forces alone are failing to deliver.

House Retrofit Programmes

3.124 Housing retrofit programmes that improve energy efficiency can support the goals of economic stimulus programmes by supporting existing workforces and creating new jobs, boosting economic activity in key labour-intensive sectors, and delivering longer-term benefits such as increased competitiveness, reduced greenhouse gas emissions, improved energy affordability and lower bills.[170]

3.125 Area-based or targeted schemes can be used to deliver comprehensive upgrades to building fabric and heating systems - including insulation, ventilation and low-carbon heating - to reduce energy demand and improve thermal comfort. Such programmes can help address capital and coordination barriers by funding early-stage planning, subsidising high-cost measures (for example, solid-wall insulation), and supporting delivery infrastructure such as regional retrofit agencies, supply-chain development and skills. These interventions can also de-risk investment in hard-to-treat homes and enable the aggregation of demand to lower unit costs, either through new funding streams or by leveraging existing programmes.

3.126 The Welsh Government Arbed programme retrofitted over 1,000 homes in 2020–21, achieving average energy reduction of 39,682MJ, annual bill savings of £327 and 2.37 tCO_2 reductions per property.[171] Evaluations noted improved comfort and health outcomes, though full alleviation of fuel poverty was limited by energy price volatility and behavioural rebound effects.[172]

Individual Household Heat Pumps

3.127 Heat pumps provide a highly efficient low-carbon alternative to conventional heating, operating at around three times the efficiency of traditional fossil-fuel boilers. Their deployment involves replacing existing gas or oil systems with air- or ground-source heat pumps, enabling substantial reductions in domestic emissions.

[170] International Energy Agency (2020). 'Energy efficiency and economic stimulus'.
[171] Welsh Government (2022). 'Arbed annual report 2020/21'.
[172] Atkinson and others (2015). 'Did ARBED I Save Energy in Wales' Deprived Dwellings'. Energy Procedia, v83 p444-453

3.128 To support uptake, the UK Government offers a £7,500 installation grant, as well as interest-free loans available through Green Homes Wales.[173] Further inventions could support existing schemes by targeting installations in low-income or off-gas-grid households, supporting wider social housing retrofit programmes, and encouraging adoption within the private rented sector. Funding can also be used for demonstration projects and to strengthen supply-chain capacity through skills development and early-stage market support.

3.129 A practical illustration of the impact of targeted retrofit support in Wales comes from an ECO4-funded intervention in Conwy. Under the UK Government's Energy Company Obligation, which finances energy-efficiency upgrades for low-income households, a fuel-poor property received a comprehensive, fully funded retrofit package comprising an air-source heat pump, enhanced insulation measures, and rooftop solar PV. This intervention increased the home's EPC rating from Band F to Band B, delivering projected annual energy bill reductions of £2,230, alongside a marked decrease in carbon emissions and improved thermal comfort.[174]

Solar PV and Battery Storage for Low-Income Homes

3.130 Installation of rooftop solar panels and battery systems to enable low-income households to generate and store renewable electricity, reducing reliance on grid energy and improving resilience.

3.131 Interventions may include support for capital costs and bulk procurement - reducing prices and integrating PV and storage into wider retrofit programmes. Partnerships with energy providers and social landlords can also be facilitated to scale deployment.

3.132 Under the Welsh Government's Optimised Retrofit Programme, PV-only installations in social housing achieved approximately 65% on-site self-consumption, reducing annual energy costs by around £430. [175] When battery storage was added, self-consumption increased to roughly 95%, with annual savings rising to £650. Pilot projects demonstrate that combined PV-battery systems can substantially reduce reliance on the grid and enhance affordability for low-income households.

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[173] Welsh Government (2025). 'Getting a heat pump'.
[174] North Wales Retrofit (no date). 'Abergele Home Benefits from ECO4 Energy Makeover'.
[175] Welsh Government and Urban Robotics and Analytics (2025). 'ORP Retrofit CASE STUDY - PV and battery systems'.

Smart Controls and Energy Management

3.133 Deploying smart thermostats and energy management systems to optimise heating schedules can reduce energy waste, and provide real-time data to residents and landlords. Smart thermostats have saved Brits £325 million on energy bills over 10 years. [176]

3.134 Interventions can include funding large-scale rollouts in social housing, integrating smart controls into retrofit packages, and supporting data platforms for monitoring housing conditions. Support can also be directed towards community-led distribution models and training initiatives.

3.135 Switchee smart thermostats provide social housing providers with a data-driven tool to monitor property conditions while supporting tenant comfort and reducing energy costs. [177] Using an integrated mobile SIM rather than Wi-Fi, the devices learn occupancy patterns to reduce unnecessary heating, delivering estimated energy savings of 10–15%. They also issue early alerts for under-heating and mould risk, enabling timely preventative action.

Pilot Novel Approaches e.g. Waste Heat Reuse

3.136 There are increasingly innovative approaches to low-carbon heating, including systems that capture and repurpose waste heat from distributed data centres and digital infrastructure to provide low-cost domestic heat. Deployment could be accelerated through interventions that fund novel pilot projects, de-risk early trials, and convene partnerships between technology providers, housing organisations and regulators, alongside support for feasibility assessments and integration with local energy systems.

3.137 SHIELD is a UK Power Networks initiative aimed at facilitating a more inclusive transition to Net Zero by supporting low-income households - particularly those in social housing or other vulnerable tenures - who face barriers to affording adequate heating or accessing low-carbon technologies. [178] A pilot under development in Essex demonstrated the potential of distributed data centre heat reuse: a household reduced monthly heating costs from approximately £375 to £40 by hosting a micro data centre, with the waste heat redirected into the home's heating system. [179] This model is now being further explored through the SHIELD programme as a scalable approach to delivering low-cost, low-carbon heat to fuel-poor households.

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[176] Centrica (2023). '[Smart thermostats save Brits £325 million on energy bills over 10 years]'.
[177] Ashen (2017). '[Switchee / Helping landlords cut costs and fight fuel poverty]'.
[178] UK Power Networks (no date). '[SHIELD]'. [Accessed 28 January 2026].
[179] BBC News (2025). '[I heat my Essex home with a data centre in the shed]'.

Summary

3.138 These interventions address market failures in the housing sector by enabling capital investment that reduces fuel poverty and supports the decarbonisation of residential energy use. By focusing activity in areas where private investment is limited by risk, cost or coordination barriers, such measures can facilitate large-scale deployment of solutions that deliver equitable, low-carbon and cost-effective outcomes. This, in turn, contributes to wider goals such as eradicating fuel poverty, decarbonising homes and generating broader benefits including green job creation and improved public health through warmer, safer housing.