

Taking into account the above-mentioned assumptions, it is estimated that about 9,200 people will lose their jobs after the closure of the Kolubara basin. They will need retraining and / or assistance in starting their own business. It should be borne in mind that retraining will be a long-term process, which requires significant financial resources, and which should therefore be well thought-out in order to make the best use of skills and qualifications of employees in the Kolubara coal basin and thermal power plants.

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## **9 United Kingdom, Wales**

### **9.1 Current status of the region's workforce**

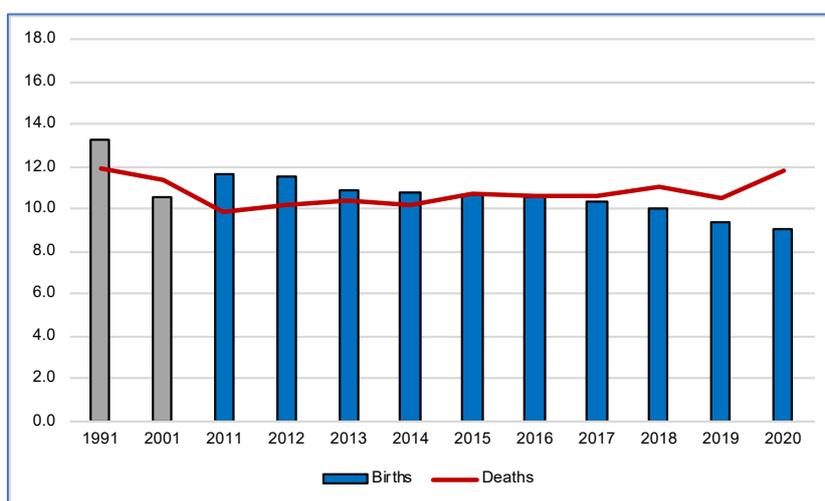
#### **9.1.1 Regional profile and specialisation**

Wales is the third-largest of the four constituent countries that comprise the UK in terms of population, with a population of approximately 3.17 million in 2020. Its population density (153 inhabitants per km<sup>2</sup> in 2020) is higher than that of Northern Ireland, and Scotland, and also than the European average. Nevertheless, the average population density for the UK overall (274) is higher due to highly populated England (434). There are population concentrations along the Southern coast, including the cities of Cardiff (369,000), Swansea (247,000) and Newport (145,700), and in the North-Eastern industrial areas of Flintshire (150,000) and Wrexham (133,000), which have close cross-border links with North-West England. Similarly to the UK overall, Wales shows a constant population growth over the last few decades (Table 9.16). Since 1971, the country's population has increased by around 430,000 (300,000 since 1991), with the Welsh population passing the 3 million mark for the first time in 2007 (Statista, StatsWales).

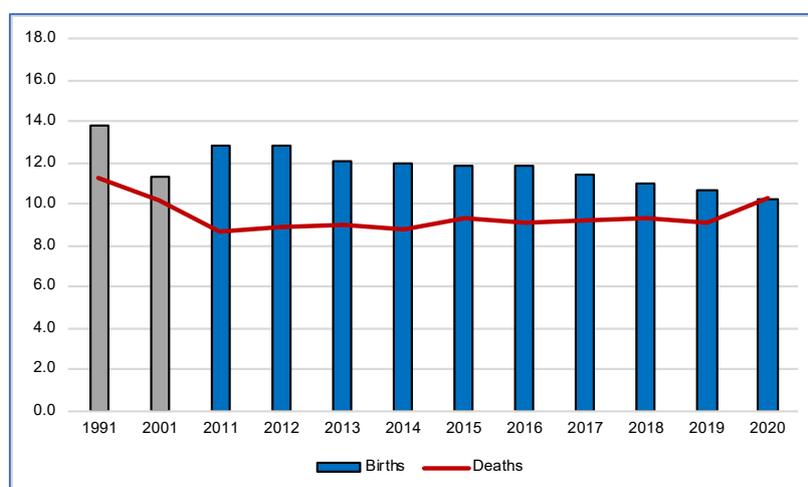
**Table 9.16: UK's and UK's countries population (in millions); 1991, 2001, 2011-2020**

	UK	England	Scotland	Wales	Northern Ireland
<b>1991</b>	57.44	47.88	5.08	2.87	1.61
<b>2001</b>	59.11	49.45	5.06	2.91	1.69
<b>2011</b>	63.29	53.11	5.30	3.06	1.81
<b>2012</b>	63.71	53.49	5.31	3.07	1.82
<b>2013</b>	64.11	53.87	5.33	3.08	1.83
<b>2014</b>	64.60	54.32	5.35	3.09	1.84
<b>2015</b>	65.11	54.79	5.37	3.10	1.85
<b>2016</b>	65.65	55.27	5.40	3.11	1.86
<b>2017</b>	66.04	55.62	5.42	3.13	1.87
<b>2018</b>	66.44	55.98	5.44	3.14	1.88
<b>2019</b>	66.80	56.29	5.46	3.15	1.89
<b>2020</b>	67.08	56.55	5.47	3.17	1.90

Source: Authors' own elaboration based on data from <https://statswales.gov.wales>

**Figure 9.2: Crude birth and death rate in Wales (per 1000 population)**

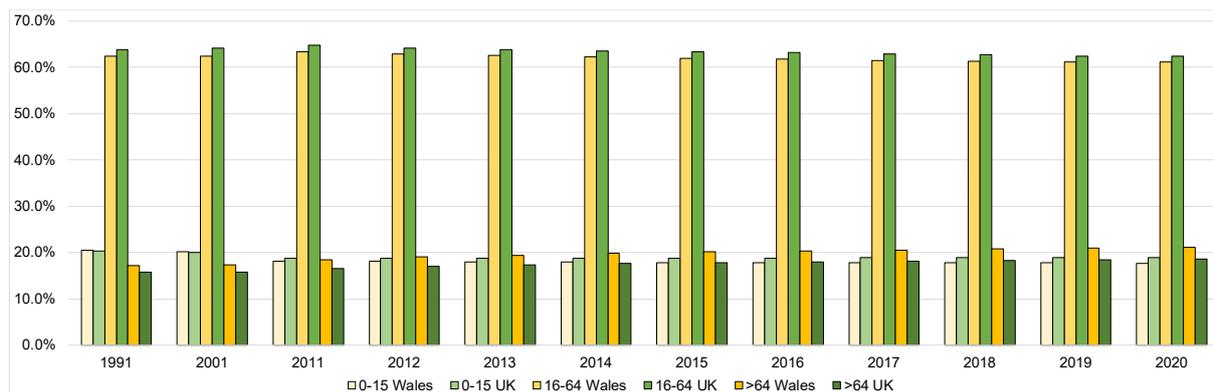
Source: Authors' own elaboration based on data from <https://www.ons.gov.uk>

**Figure 9.3: Crude birth and death rate in United Kingdom (per 1000 population)**

Source: Authors' own elaboration based on data from <https://www.ons.gov.uk>

Population growth in Wales has been a result of both natural population growth and international migration (Office for National Statistics). However, since 2016, Wales has had a negative natural population balance and population growth has been sustained by migration only. Figure 9.2 and Figure 9.3 illustrate crude birth and death rates per 1,000 inhabitants in Wales and in UK as a whole.

Aligned with European and UK's trends, Wales shows an aging model of society. As of 2020, just over 222,000 people in Wales were aged between 55-59, the largest of any age group quintile in that year (Statista). The country has a gender balanced population, with more male births, but longer life expectancy of females (Office for National Statistics). Figure 9.9.4 illustrates how the age structure in Wales has changed over three decades. The pre-active group (aged between 0-15) and post-active group (age >64) have switched proportions, which shows the population is aging faster than this process occurs in the UK in general.



**Figure 9.4: Age groups percentage share in Wales and UK: pre-active (0-15), active (16-64) and post-active (<64) in 1991, 2001 and 2011-2020**

Source: Authors' own elaboration based on data from <https://statswales.gov.wales>

Population projections are subject to uncertainty and are based on assumptions on future trends in fertility, mortality and migration. In addition, the impacts of the coronavirus pandemic on demographic behaviour are not yet clear and this contributes to greater uncertainty (Office for National Statistics). Welsh Government National 2020-based population projections foresee that:

- Between mid-2020 and mid-2030, the population of Wales is projected to increase by 2.6% from 3.17 million to 3.25 million.
- Between mid-2020 and mid-2045, the population of Wales is projected to increase by 4.2% from 3.17 million to 3.30 million.
- It is projected that there will continue to be more deaths than births, with a total of 77,000 more deaths than births between mid-2020 and mid-2030.
- The projected population growth is driven by migration, with total net migration of 159,000 between mid-2020 and mid-2030.

In 2019, according to OECD and Eurostat data, gross domestic product (GDP) in Wales was £77.5 billion, an increase of 3.3 per cent from 2018. GDP per head in Wales in 2019 was £24,586, an increase of 0.7 per cent on 2018 and just under 75% of the UK GDP per capita figure (Table 9.17 and Table 9.18).

**Table 9.17: Welsh GDP (£ billion)**

	GDP	GDP growth	GDP real growth	Share of UK's GDP (including Extraregio)
2001	£41,266	3.0%	1.8%	3.6%
2002	£43,252	4.8%	2.6%	3.6%

2003	£46,073	6.5%	3.9%	3.7%
2004	£48,678	5.7%	3.5%	3.7%
2005	£50,841	4.4%	1.9%	3.6%
2006	£53,715	5.7%	2.6%	3.7%
2007	£55,709	3.7%	1.1%	3.6%
2008	£55,905	0.4%	-2.9%	3.5%
2009	£54,874	-1.8%	-4.0%	3.5%
2010	£56,740	3.4%	3.0%	3.5%
2011	£59,479	4.8%	4.3%	3.6%
2012	£61,365	3.2%	0.6%	3.6%
2013	£63,676	3.8%	2.1%	3.6%
2014	£65,590	3.0%	1.3%	3.5%
2015	£67,863	3.5%	1.7%	3.5%
2016	£70,667	4.1%	1.5%	3.5%
2017	£72,607	2.7%	0.9%	3.5%
2018	£75,505	4.0%	2.0%	3.5%
2019	£77,517	2.7%	0.7%	3.5%

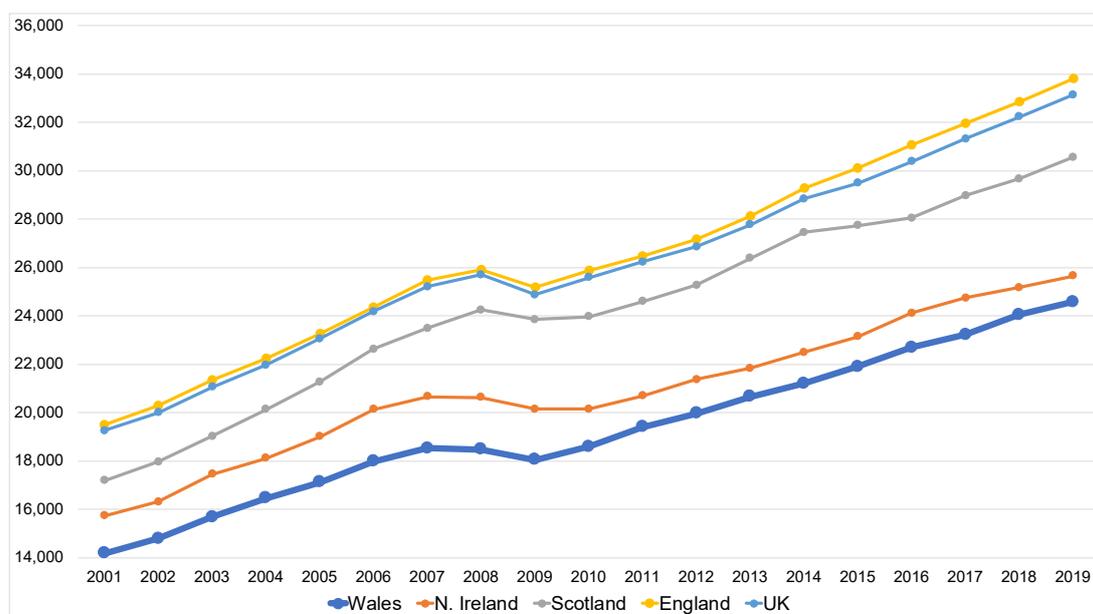
Source: Author's own elaboration based on data from <https://www.ons.gov.uk>

**Table 9.18: Welsh GDP per capita (£)**

	<b>GDP per capita</b>	<b>GDP per capita growth</b>	<b>GDP per capita real growth</b>	<b>Comparison to UK's GDP per capita</b>
<b>2001</b>	14,180	3.0%	1.7%	73.6%
<b>2002</b>	14,798	4.4%	2.2%	74.0%
<b>2003</b>	15,683	6.0%	3.4%	74.5%
<b>2004</b>	16,460	5.0%	2.8%	74.9%
<b>2005</b>	17,122	4.0%	1.5%	74.3%
<b>2006</b>	17,991	5.1%	2.0%	74.4%
<b>2007</b>	18,531	3.0%	0.4%	73.5%
<b>2008</b>	18,476	-0.3%	-3.5%	71.9%
<b>2009</b>	18,057	-2.3%	-4.4%	72.6%
<b>2010</b>	18,603	3.0%	2.6%	72.7%
<b>2011</b>	19,414	4.4%	3.9%	74.0%
<b>2012</b>	19,962	2.8%	0.3%	74.3%
<b>2013</b>	20,658	3.5%	1.9%	74.4%
<b>2014</b>	21,212	2.7%	1.0%	73.5%
<b>2015</b>	21,898	3.2%	1.4%	74.3%
<b>2016</b>	22,700	3.7%	1.1%	74.7%
<b>2017</b>	23,233	2.7%	0.9%	74.2%
<b>2018</b>	24,057	4.0%	2.0%	74.6%
<b>2019</b>	24,586	2.7%	0.7%	74.2%

Source: <https://www.ons.gov.uk>

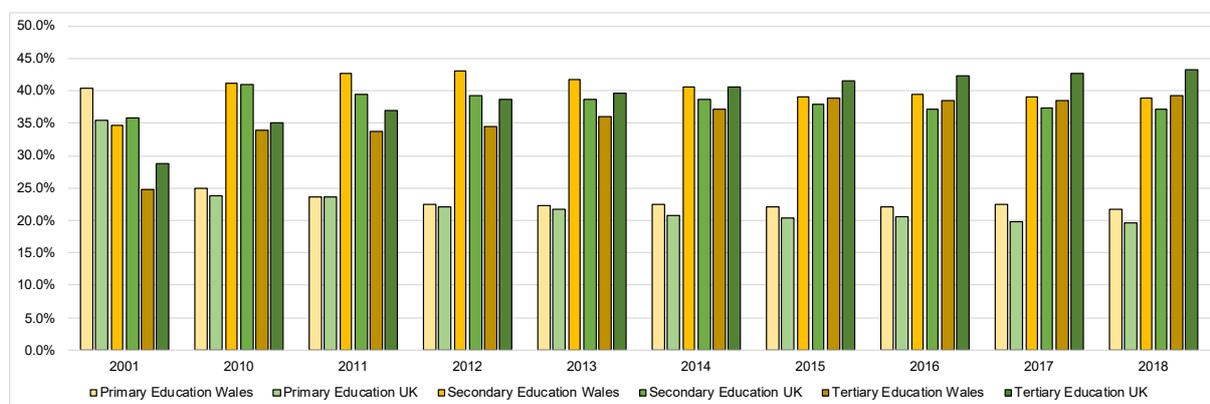
Following the general trend for all UK countries in last decades, there is an upward trend in GDP per capita, last interrupted at the end of '00s (Figure 9.5).



**Figure 9.5: GDP per capita in UK by country 2001-2019, by country**

Source: <https://www.statista.com>

Education in Wales is compulsory up to age 16. A curriculum and qualifications reform is currently underway, with a new national curriculum under development, with a timeline for rollout up to 2026.<sup>5</sup> The average PISA science score for Wales in 2018 was 488, 17 points lower than the average in 2006 (505) but 3 points higher than in 2015 (485). There was no statistically significant difference between Wales and Northern Ireland, Scotland, and the OECD average.<sup>6</sup> The proportion of 25-64 years olds progressing through tertiary education in Wales has risen in the last decades, as shown by data on percentages of 25-64 years olds whose highest level of education successfully completed is primary, secondary or tertiary education (Figure 9.6), although the percentage is lower than for the UK as a whole.



**Figure 9.6: Educational attainment for ages 25 to 64, primary, secondary and tertiary education, total per cent. Comparison: Wales and UK 2001-2018**

Source: Authors' own elaboration based on data from QoG Institute

Since the 1950s, the service sector has accounted for the majority of jobs in Wales, with c.10% in manufacturing, 7.4% in construction and only 0.4% in electricity and gas (Table 9.19).

<sup>5</sup> <https://gov.wales/sites/default/files/publications/2018-03/education-in-wales-our-national-mission.pdf>

<sup>6</sup> <https://gov.wales/achievement-15-year-olds-program-international-student-assessment-pisa-national-report-2018>

**Table 9.19: Workforce Jobs by Industry (SIC 2007) seasonally adjusted, September 2021**

Industry	Wales		UK	
	number	%	number	%
A: Agriculture, forestry and fishing	25,358	1.7	363,644	1.0
B: Mining and quarrying	2,752	0.2	58,064	0.2
C: Manufacturing	147,754	10.2	2,526,287	7.2
D: Electricity, gas, steam and air conditioning supply	5,864	0.4	142,960	0.4
E: Water supply; sewerage, waste management and remediation activities	14,255	1.0	236,248	0.7
F: Construction	107,212	7.4	2,224,865	6.3
G: Wholesale and retail trade; repair of motor vehicles and motorcycles	173,225	11.9	4,799,527	13.7
H: Transportation and storage	56,530	3.9	1,803,194	5.1
I: Accommodation and food service activities	126,351	8.7	2,403,486	6.8
J: Information and communication	38,326	2.6	1,521,254	4.3
K: Financial and insurance activities	28,831	2.0	1,088,825	3.1
L: Real estate activities	19,859	1.4	634,117	1.8
M: Professional, scientific and technical activities	74,715	5.1	3,221,486	9.2
N: Administrative and support service activities	108,015	7.4	3,065,109	8.7
O: Public administration and defence; compulsory social security	94,815	6.5	1,621,267	4.6
P: Education	134,404	9.3	2,954,784	8.4
Q: Human health and social work activities	216,696	14.9	4,583,648	13.0
R: Arts, entertainment and recreation	42,886	3.0	955,462	2.7
S: Other service activities	33,812	2.3	864,320	2.5
T: Activities of households as employers; undifferentiated goods-and services-producing activities of households for own use	1,129	0.1	62,172	0.2
<b>Total</b>	<b>1,452,789</b>	<b>100.0</b>	<b>35,130,719</b>	<b>100.0</b>

Source: Nomis official labour market statistics

### 9.1.2 Employment and unemployment status of the local workforce

Although the labour market in Wales was the most affected among UK countries by the crisis in the late '00s, it bounced back, and in 2019 the unemployment rate of 4.0% was very close to the UK average. A further decrease in 2020 to 3.6% gave Wales the second lowest unemployment rate in the UK, higher only than Northern Ireland (**Error! Reference source not found.**). It was also the lowest in the 21<sup>st</sup> century for Wales, at 0.7% lower than the UK average. Figure 9.7 illustrates changes in the unemployment rate 1999–2021 in Wales and other UK countries.

In December 2020, 72.7% of working-age adults were employed, compared to 75.2% across the UK as a whole. At both UK and Wales levels, work has been carried out (and is ongoing) on setting out the pathways and targets for economies to achieve net zero, including in terms of employment and skills requirements. There is still a fair degree of uncertainty and unknowns associated with these processes, with many at an early stage. As the independent Green Jobs Taskforce report to the UK Government in 2021 noted, “*There are still gaps across a variety of sectors. Further clarity of the UK’s decarbonisation pathways, investment timelines and location are required*”. The Taskforce found consensus among stakeholders that skills gaps can ultimately be met. However, it also highlighted that this would require “the diverse timelines

for green job creation and skills demands across the economy and country [to be] matched with those for training and education provision, infrastructure and technology build and roll-out time, the transitioning of the workforce from one sector to the other, and local capacity” (Green Jobs Taskforce 2021).

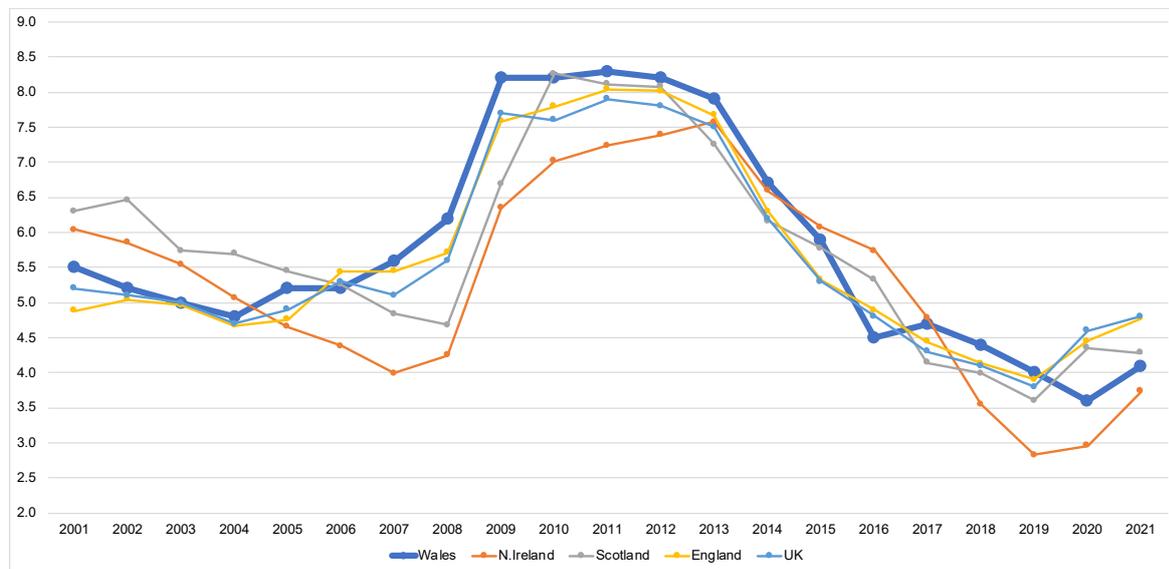


Figure 9.7: Unemployment rate (%) in UK 2001 – 2021<sup>7</sup>, by country.

Source: Authors’ own elaboration based on data from [www.ons.gov.uk](http://www.ons.gov.uk)

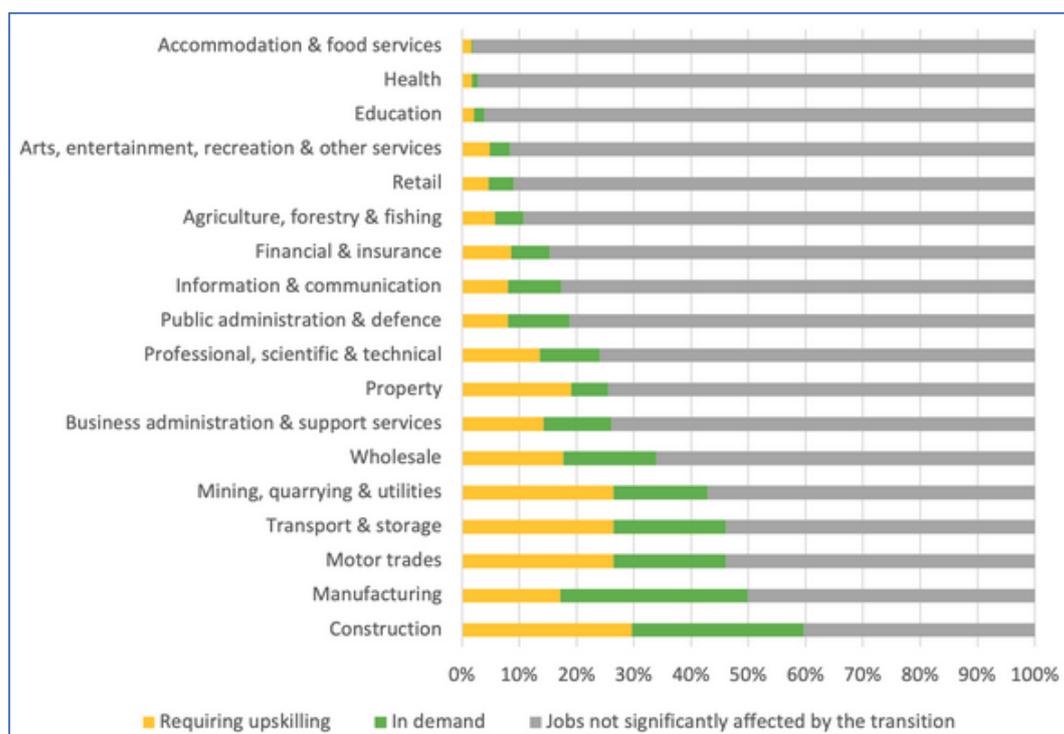


Figure 9.8: UK Jobs requiring upskilling, jobs in demand, and jobs not significantly affected by the transition, by sector

Source: Robins N, Gouldson, A, Irwin W and Sudmant A (2019) Investing in a just transition in the UK How investors can integrate social impact and place-based financing into climate strategies. London

<sup>7</sup> Based on data until September 2021

School of Economics. Available from: <https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2019/01/Investing-in-a-just-transition-in-the-UK.pdf>

The UK's Place-Based Climate Action Network (PCAN) tracker estimates that around 20% of existing UK jobs (c. 6.3 million workers) will be affected by transition, with around 3 million workers requiring upskilling and around 3 million in high demand.<sup>8</sup> The PCAN tracker identifies the construction industry, followed by manufacturing and transport, as the sectors where most focus is needed (see Figure 9.8). They estimate that as many as 25% of workers in these sectors are likely to require upskilling, with a similar proportion in high demand (Robins et al 2019).

A significant amount of retraining is expected to be required among the workforce in high carbon industries, but just 11% of high carbon workers participate in adult learning currently (Green Jobs Taskforce 2021).

Recent analysis highlights the skills transformation expected in the automotive (including EVs) and heating and cooling sectors (Green Jobs Taskforce 2021). For example, in the automotive sector, 50,000 will require reskilling in manufacturing by 2025, increasing to 100,000 by 2035/2040. Skill gaps could be partially filled by current energy workforce who are estimated to have high-medium skills transferability e.g. pipe fitters and designers, leak test technicians, and offshore barge operators in the oil and gas industry could be retrained for CCUS (Green Jobs Taskforce 2021). The Green Jobs Taskforce reported a reasonable level of interest by oil and gas workers in moving to offshore wind (53%), wider renewables (51%), and decommissioning (38%), if provided access to the right education and training. Increased demand is also expected for the cross-, multi- and interdisciplinary skills required by decarbonisation projects such as whole house retrofitting.

As a caveat to the potential for skills transferability, however, it is worth noting that labour mobility in the UK currently tends to occur *within* rather than *between* regions. The Confederation of British Industry found that only 3% of the working age population moved to another region within the country in a given year (Green Jobs Taskforce 2021). A regional breakdown of data on the expected impact of transition on UK jobs finds that in Wales, while most jobs will not be significantly affected by the shift to a green, zero-carbon, economy, c.127,000 existing jobs may require upskilling, with c.134,000 existing jobs being in high demand (see Table 9.).

**Table 9.5: Impact of transition on existing UK jobs, by country**

Country	Jobs requiring upskilling	Jobs in demand	Jobs not significantly affected by the transition	All jobs
England	2,802,943	2,739,876	20,765,181	26,308,000
Wales	<b>127,022</b>	<b>134,439</b>	<b>1,007,539</b>	<b>1,269,000</b>
Scotland	254,906	245,819	2,001,275	2,502,000
Great Britain	3,185,040	3,120,114	23,773,846	30,079,000

Source: Robins, N, Gouldson, A, Irwin, W and Sudmant, A (2019) *Investing in a just transition in the UK How investors can integrate social impact and place-based financing into climate strategies*. London School of Economics. Available from <https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2019/01/Investing-in-a-just-transition-in-the-UK.pdf>

This data is also referenced by the 2021 report for the Future Generations Commissioner of Wales (Chapman & Kiberd 2021) which suggests that of the 20% of jobs in Wales which are directly affected by transition: “an estimated 150,000 jobs (10.3%) are ‘transition aligned’ and

<sup>8</sup> <https://pcancities.org.uk/tracking-local-employment-green-economy-pcan-just-transition-jobs-tracker>

as such are already well positioned to capitalise on the green transition. An estimated 140,000 (9.6%) are thought to require some form of reskilling. This does not necessarily imply a sector shift or redundancy, only the need to adjust to new and unfamiliar working requirements. The sectors most affected by the green transition include construction (30%), transport (26%) and manufacturing (17%), which together account for 73% of the jobs in need of reskilling".

The impact on employability and skills needs will vary within the Welsh regions. At regional level, Regional Skills Partnerships (RSPs) play a key role in the skills ecosystem.<sup>9</sup> The RSPs were set up between 2007-2014 and tasked by Welsh Government with identifying the skills needed in the workforce at regional level. The four RSPs are:

- North Wales Regional Skills Partnership (NWRSP)
- South East Wales Cardiff Capital Region Skills Partnership (CCRSP)
- South West Regional Learning and Skills Partnership (RLSP)
- Mid Wales Regional Skills Partnership.

The RSPs are voluntary non-statutory bodies chaired by private sector employers; members include local employers, local government, employers' organisations, public sector bodies, higher and further education representatives and the third sector. The RSPs produce regular Regional Employment and Skills Plans, which are refreshed every three years and provide recommendations to Welsh Government to influence the prioritisation and deployment of skills funding, including apprenticeship courses and further education allocations. Current plans cover the period 2019-2022.

The RSPs reflect existing regional arrangements, including City and Growth Deals and cross-border collaborations (SQW, 2019). The City and Growth Deals, joint UK/Welsh Government funding programmes in which local government, the higher and further education sectors and the private sector are key partners, also provide a key focus for skills, for example, by implementing skills programmes related to the requirements of green transition investment projects. Other specific regional initiatives in Wales (e.g. the Energy Island initiative in North Wales, and the Tech Valleys initiative in the South Wales former coal mining valleys) also provide a focus for local government skills and training activities.

## 9.2 Vision for the Region

### 9.2.1 The path towards decarbonization

The decarbonisation pathway in Wales will require a combination of measures at UK and Wales levels, and to this end Welsh Government and UK Government (Department for Business, Energy and Industrial Strategy (DBEIS)) issued a joint call for evidence on decarbonisation readiness in July 2021.<sup>10</sup> The decarbonisation pathway for the energy sector reflects this dual approach (see Table ).

**Table 9.6: Decarbonisation of the energy sector pathways**

Vision and objectives for 2030	Vision and objectives for 2050
<b>UK level</b>	

<sup>9</sup> Welsh Government is the main body involved in developing, implementing and monitoring skills-related policies in Wales, working with UK Government, local government, the further and higher education sectors, apprenticeship training providers, work-based learning providers, the third sector and the private sector. The higher education sector consists of eight universities, funded by Welsh Government through the Higher Education Funding Council for Wales; the further education sector consists of c.15 colleges, which provide mainly vocational studies and work-based learning courses.

<sup>10</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1001949/decarbonisation-readiness-call-for-evidence.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1001949/decarbonisation-readiness-call-for-evidence.pdf)

<ul style="list-style-type: none"> <li>• Remove coal from electricity mix by 2025, and no more new direct support for UK thermal coal mining or coal-fired power plants;</li> <li>• At least one new large-scale nuclear project;</li> <li>• Support the deployment of Carbon Capture and Storage in four industrial clusters;</li> <li>• Phase out use of fossil fuels in off-grid homes, businesses and public buildings;</li> <li>• No new unabated gas plants to be built after 2030;</li> <li>• Hydrogen grid conversion trials in the 2020s;</li> <li>• 5 GW low-carbon hydrogen production;</li> <li>• End of the sale of new petrol and diesel cars in the UK.</li> </ul>	<ul style="list-style-type: none"> <li>• Hydrogen grid conversion from gas;</li> <li>• Patchwork large-scale conversions starting from 2030 to 2050 near industrial clusters, with some buildings in these areas switching to hydrogen;</li> <li>• Build a commercially viable fusion power plant by 2040;</li> <li>• Create the world's first net zero emissions industrial zone by 2040;</li> <li>• Unabated gas-fired electricity generation to end by 2035.</li> </ul>
<p><b>Wales level</b></p>	
<ul style="list-style-type: none"> <li>• 70% of electricity consumption from renewable energy (51% in 2019);</li> <li>• 1 GW of renewable energy capacity to be locally owned (83% achieved by 2019);</li> <li>• All renewable energy projects to have an element of local ownership from 2020;</li> <li>• Establish at least one renewable hydrogen production site by 2023-24, preparing for scale-up and commercial deployment from 2030;</li> <li>• Reducing consumption of high-carbon meat and dairy products by 20%;</li> <li>• Halving avoidable food waste by 2025 and 60% reduction by 2030;</li> <li>• Electric/low-carbon cars, vans and boiler replacements;</li> <li>• Target of 43,000 hectares of new mixed woodland;</li> <li>• Net zero public sector;</li> <li>• Clean Air Wales Bill to ban indoor burning of solid fuels (house coal and wet wood) after 2023;</li> <li>• Phase out of sales of oil boilers by 2028 in residential homes and by 2025-26 in commercial properties.</li> <li>• Piloting smart, flexible and digitalised systems to help reduce demand.</li> </ul>	<ul style="list-style-type: none"> <li>• Net zero emissions;</li> <li>• Increase housing and energy performance standards achieve at least a 95% decarbonisation target for power sector;</li> <li>• Target of 180,000 hectares of new mixed woodland.</li> </ul>

Source: Authors' elaboration based on UK and Welsh Government strategy documents (HM Government, 2020; UKCCC, 2020; Welsh Government, 2020a; Welsh Government 2019a; Welsh Government, 2021).

Fossil fuels will play a declining role in the energy mix in Wales in future. At UK level, the UK Government has committed to removing coal from the country's electricity mix by 2024.<sup>11</sup> In Wales, the last coal-fired power plant for commercial energy generation closed in March 2020, making Wales coal-free four years ahead of the UK target. An estimated 2% of the 1.35 million homes in Wales use solid fuel (coal, wood or biomass) as the main heating fuel, particularly in rural areas that are off the gas grid.<sup>12</sup> The UK Government launched a consultation in 2021 on proposals to phase out the installation of fossil fuel heating systems in homes off the gas grid.<sup>13</sup>

<sup>11</sup> <https://www.gov.uk/government/news/end-to-coal-power-brought-forward-to-october-2024>

<sup>12</sup> Data from the Welsh Housing Conditions Survey 2017.

<sup>13</sup> <https://www.gov.uk/government/consultations/phasing-out-fossil-fuel-heating-in-homes-off-the-gas-grid>

In Wales, the proposed Clean Air (Wales) Bill would ban the indoor burning of solid fuels (traditional house coal and wet wood) after 2023 (Welsh Government 2020b). Decarbonisation of these homes would require use of options such as heat pumps and smart storage heating (UKCCC 2020). The 2030 energy mix is projected to include installation of increasing numbers of heat pumps (a recommended 52,000 heat pump installations per year in Wales by 2030, rising to 75,000 by 2050 (UKCCC 2020)).

The UK is expected to continue to rely on natural gas for 'some years' (HM Government 2020).. In Wales, gas fuelled power stations accounted for almost 70% of electricity generated in 2019 (Welsh Government 2020a). UKCCC recommend that Welsh Government work with the UK Government to deliver a phase-out of the burning of unabated gas for electricity generation by 2035, ensuring that existing gas plants in Wales are given opportunities to switch to low-carbon hydrogen or fit CCS within their economic lifetime (UKCCC 2020). Natural gas is prominent in fuelling gas boilers in households and other buildings.

A gradual move away from fossil fuel boilers is planned through a combination of energy efficiency measures and lower carbon replacement boilers. UKCCC recommends the phase out of sales of oil boilers in Wales by 2028 in residential homes and by 2025-26 in commercial properties, and of gas boilers by 2033 in residential homes, and by 2030-33 in commercial properties. Further, the UK Government has also announced the end of the sale of new petrol and diesel cars in the country by 2030.

In terms of renewable energy and other energy generation technologies, Welsh Government has a target of meeting the equivalent of 70% of Wales' electricity demand from Welsh renewable electricity sources by 2030. Offshore and onshore wind are likely to continue to play an important role in renewable energy generation in Wales; they accounted for 29% and 38% of renewable generation respectively in 2019. On marine and tidal energy, two demonstration zones have been assigned in Wales to test wave and tidal stream technologies.<sup>14</sup> Planning policy in Wales is explicitly supportive of renewable generation. Additionally, the Welsh Government has developed an energy efficiency strategy for the period up to 2026 (Welsh Government 2016).

Hydrogen is seen as a vital component of Wales' shift to the net zero goal. To facilitate the development of hydrogen activities and opportunities, Welsh Government set out a pathway for hydrogen development during the current carbon budget period (2021-25). The next stage is to develop a long-term plan to make hydrogen zero-carbon, after which hydrogen could also play a role in decarbonising the power system (Welsh Government, 2021b). The UK Government also published a UK Hydrogen Strategy in 2021, with an ambition of 5 GW low-carbon hydrogen production at UK level by 2030.<sup>15</sup> Additionally, UK Government plan to support the deployment of CCUS in four as yet unspecified industrial clusters to be operational by 2030.

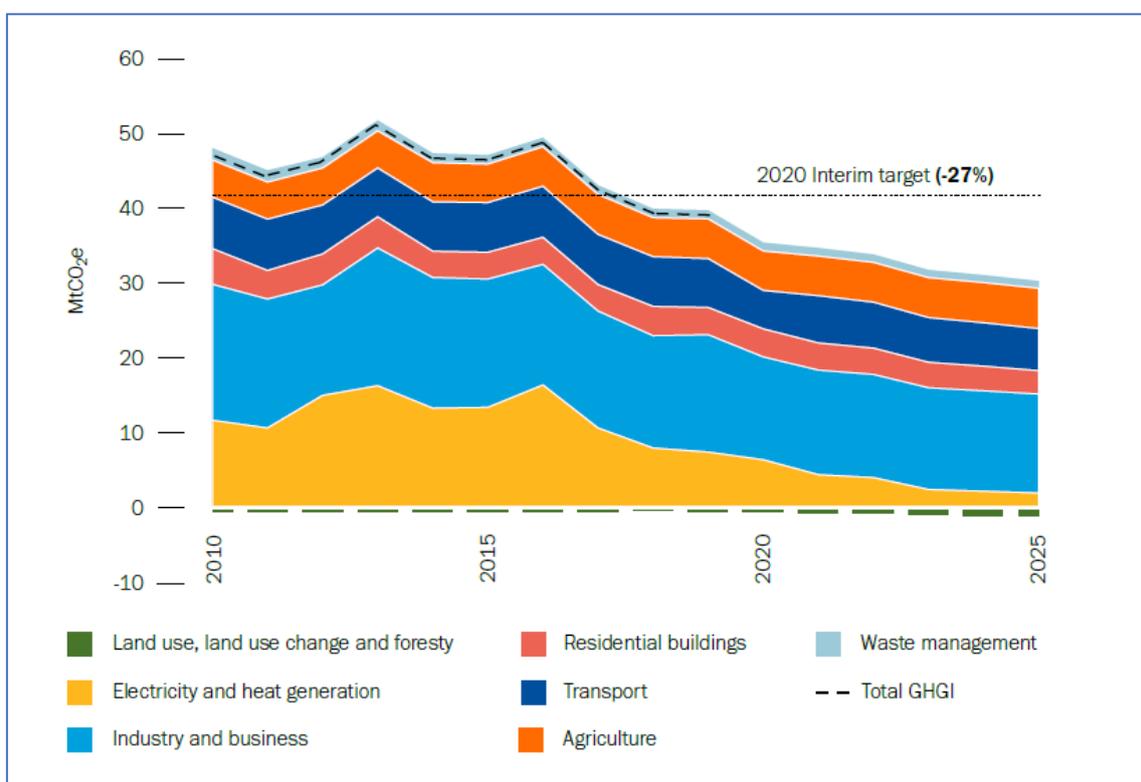
The UK Government aims to bring at least one new large-scale nuclear project to the point of Final Investment Decision (FID) by the end of the current UK Parliament term and aims to build a commercially viable fusion power plant by 2040. Investment (up to £385m) has been promised to develop Small Modular Reactor (SMR) design and Advanced Modular Reactor (AMR) demonstration. There are no nuclear power stations currently operating in Wales, but the potential nuclear site at Wylfa Newydd is regarded as the best in the UK for large new nuclear. In addition, a site development company (Cwmni Egin) is being created by Welsh Government to unlock the potential of the former nuclear Trawsfynydd station site in North-West Wales (Welsh Government 2020a).

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<sup>14</sup> <https://www.wavehub.co.uk/our-projects/pembrokeshire-wave-zone>; <https://www.morlaisenergy.com/>

<sup>15</sup> <https://www.gov.uk/government/publications/uk-hydrogen-strategy>

Welsh Government's second Low Carbon Delivery Plan (Net Zero Wales Carbon Budget 2) outlines the path to decarbonisation for Wales (see Figure 9.9) (Welsh Government 2021b).



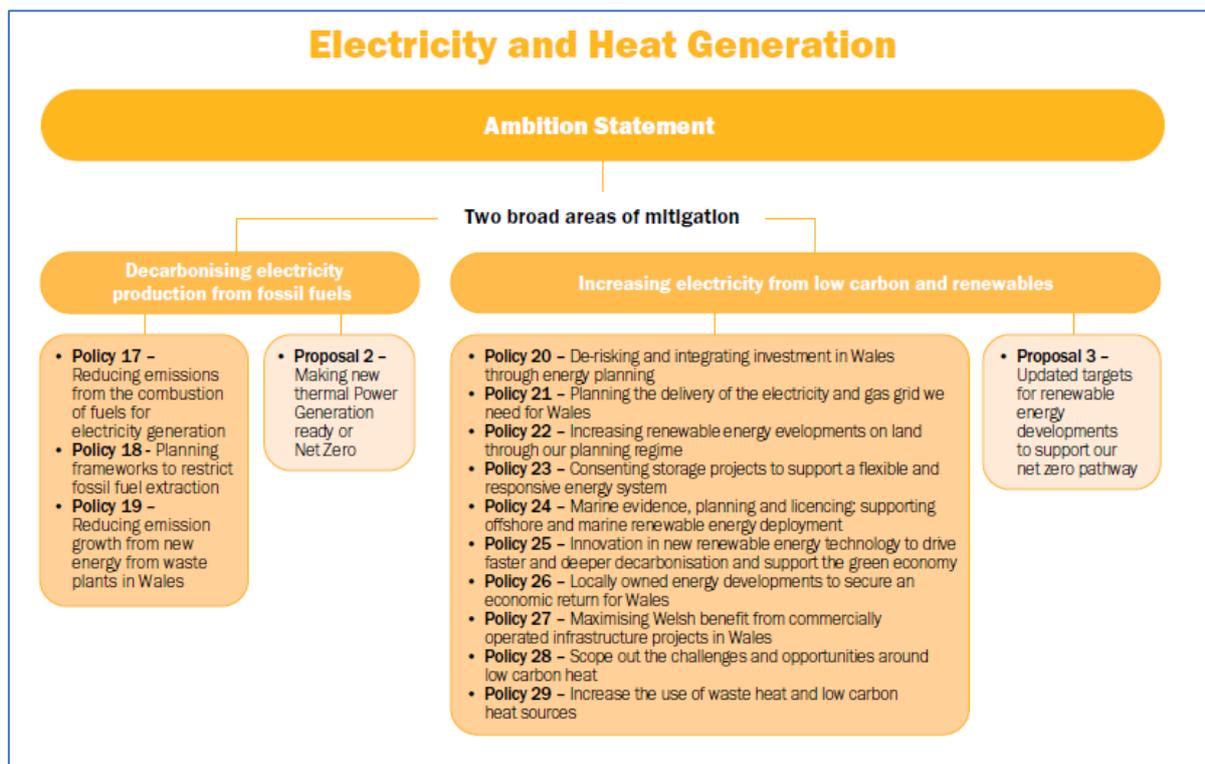
**Figure 9.9: Welsh Government Carbon Budget 2 Pathway**

Source: Welsh Government (2021b) *Net Zero Wales Carbon Budget 2 (2021-25)*. Wales' commitment to tackling climate change. OGL. Digital ISBN 978-1-80391-158-8. <https://gov.wales/sites/default/files/publications/2021-10/net-zero-wales-carbon-budget-2-2021-25.pdf>

The plan seeks to take a “whole-system” approach to approach to net zero carbon transition, and sets out 123 policies and proposals to achieve decarbonisation in Wales. This includes achieving a decarbonisation target for the power sector of at least a 95%. A framework and pathways supported by specific planned policy interventions are set out for each sector (see Figure 9.10 for the framework for the electricity and heat generation sector).

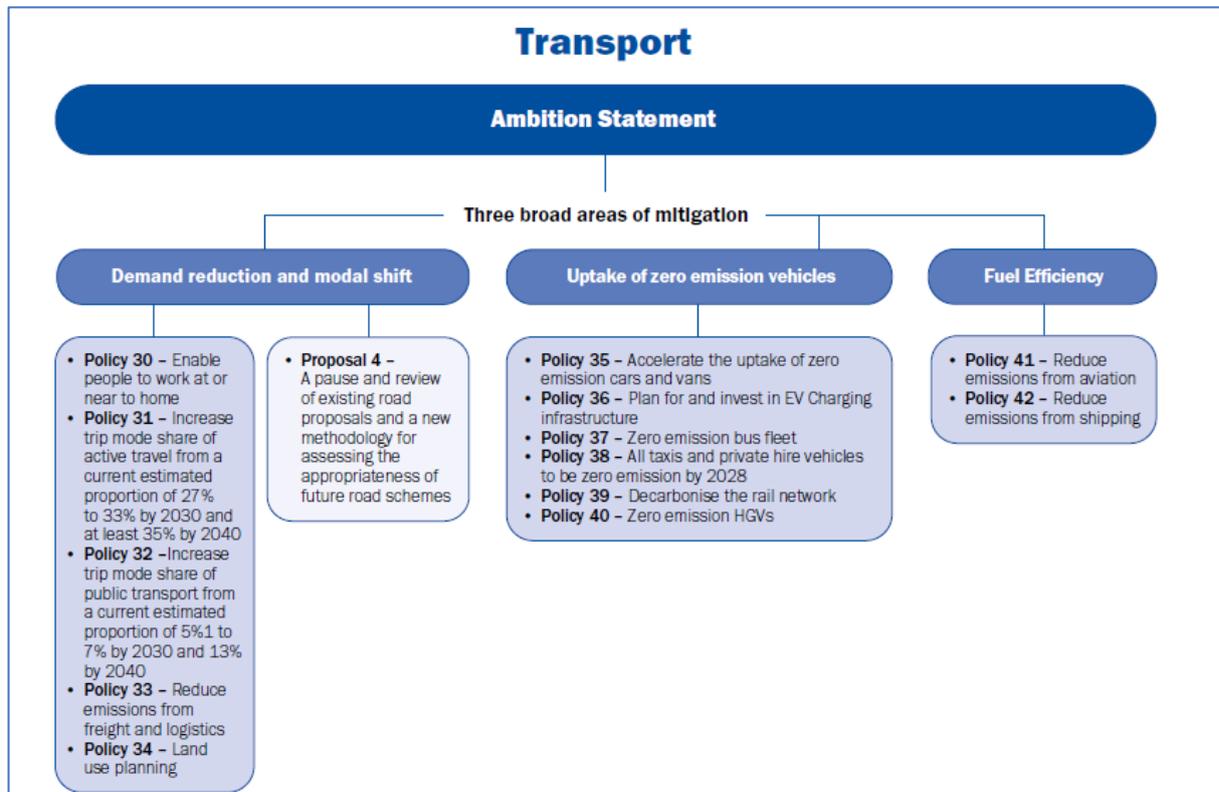
Ambition statements and policy interventions are similarly outlined for transport, residential buildings, industry and business, agriculture, land use land use change and forestry, waste management and the public sector (see **Figure 9.11** for examples for transport and residential buildings). Decarbonisation of the public sector encompasses local government, health and social care, Welsh Government, higher education, tourism, culture and natural resources. Areas emphasised in the decarbonisation of this sector include:

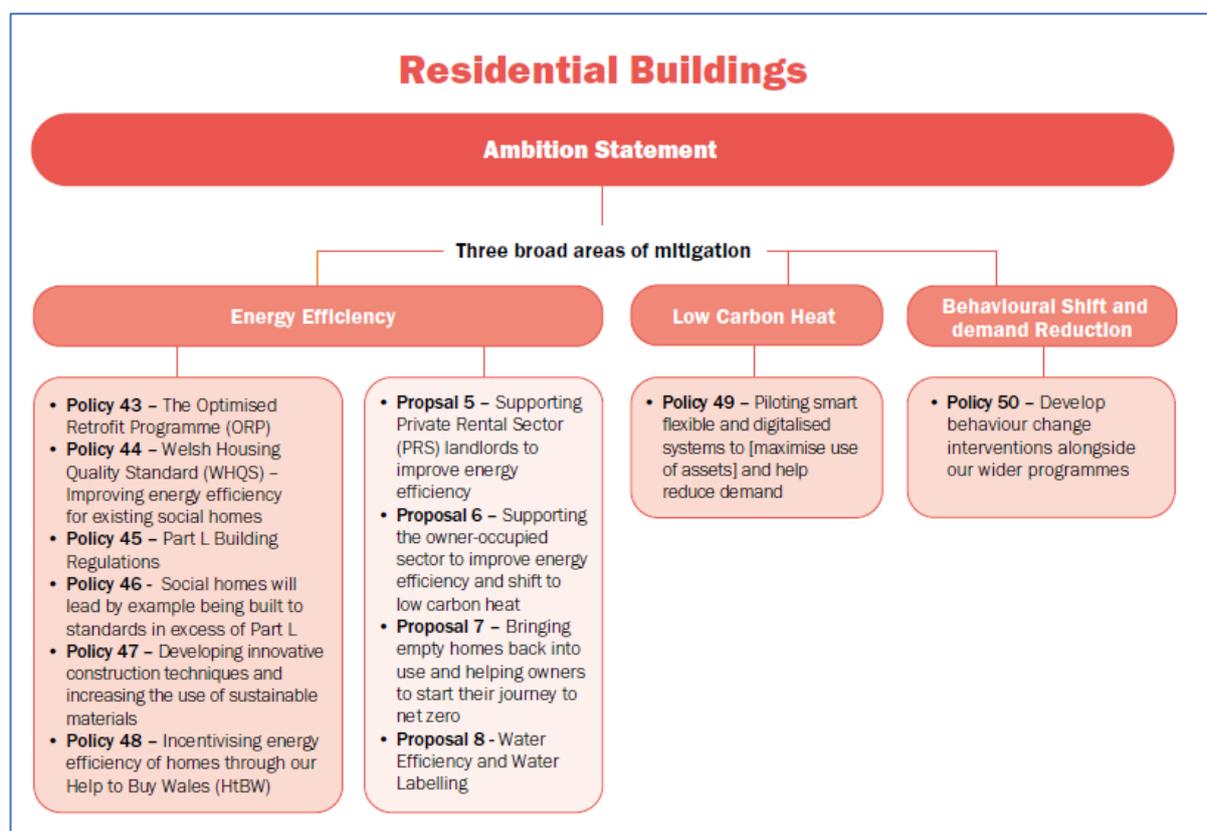
- Mobility and transport, particularly aiming towards an integrated sustainable transport system that can reduce emissions and improve connectivity;
- Buildings, namely regarding housing retrofit, the implementation of energy saving measures and the reduction of the carbon footprint of buildings, particularly aimed at more disadvantaged communities;
- Land use, with carbon sequestration, natural resources and touristic potential of land;
- Procurement, with criteria and rules having the potential to help drive emissions reductions by requesting suppliers for low carbon options in several areas.



**Figure 9.10: Decarbonisation pathway Wales – electricity and heat generation**

Source: Welsh Government (2021b) Net Zero Wales Carbon Budget 2 (2021-25). Wales’ commitment to tackling climate change. OGL. Digital ISBN 978-1-80391-158-8. <https://gov.wales/sites/default/files/publications/2021-10/net-zero-wales-carbon-budget-2-2021-25.pdf>





**Figure 9.11: Decarbonisation pathway examples – transport and residential buildings**

Source: Welsh Government (2021b) *Net Zero Wales Carbon Budget 2 (2021-25)*. Wales' commitment to tackling climate change. OGL. Digital ISBN 978-1-80391-158-8. <https://gov.wales/sites/default/files/publications/2021-10/net-zero-wales-carbon-budget-2-2021-25.pdf>

Net Zero Wales also discusses skills, referring to the provision of a “competent green skills workforce for Wales”, for example, with new build and retrofit skills for housing (with a focus on upskilling people already engaged in current housing retrofit activity, as well attracting new entrants into the green skills arena).

In terms of the circular economy, and its links to the foundational economy, Welsh Government aims to maximise the economic benefits which transition presents to Welsh supply chains, in areas such as electric buses, low carbon homes and heat pumps, supporting businesses to develop future green skills and attain relevant accreditations. The plan mentions exploring ways to upskill local actors (e.g. builders' merchants) across Wales to offer energy efficiency advice. Skills for hydrogen development and research and development, addressing the skills gap for industrial fuel switching and the wider scale use of hydrogen as a fuel for industry are specifically mentioned as an element of the hydrogen pathway.

Collaborative approaches between industry and careers advisory services are proposed as means of addressing youth unemployment, to showcase new occupations and supporting children and young people with the needed skills. The need for active engagement of business and industry is also emphasised: “*Without active engagement from businesses (training apprentices, being vocal about the demand for new training where none exists, upskilling themselves and become advocates for decarbonisation) ... objectives will not be achieved*” (Welsh Government 2021b).

### 9.2.2 New jobs to be created through the decarbonization process

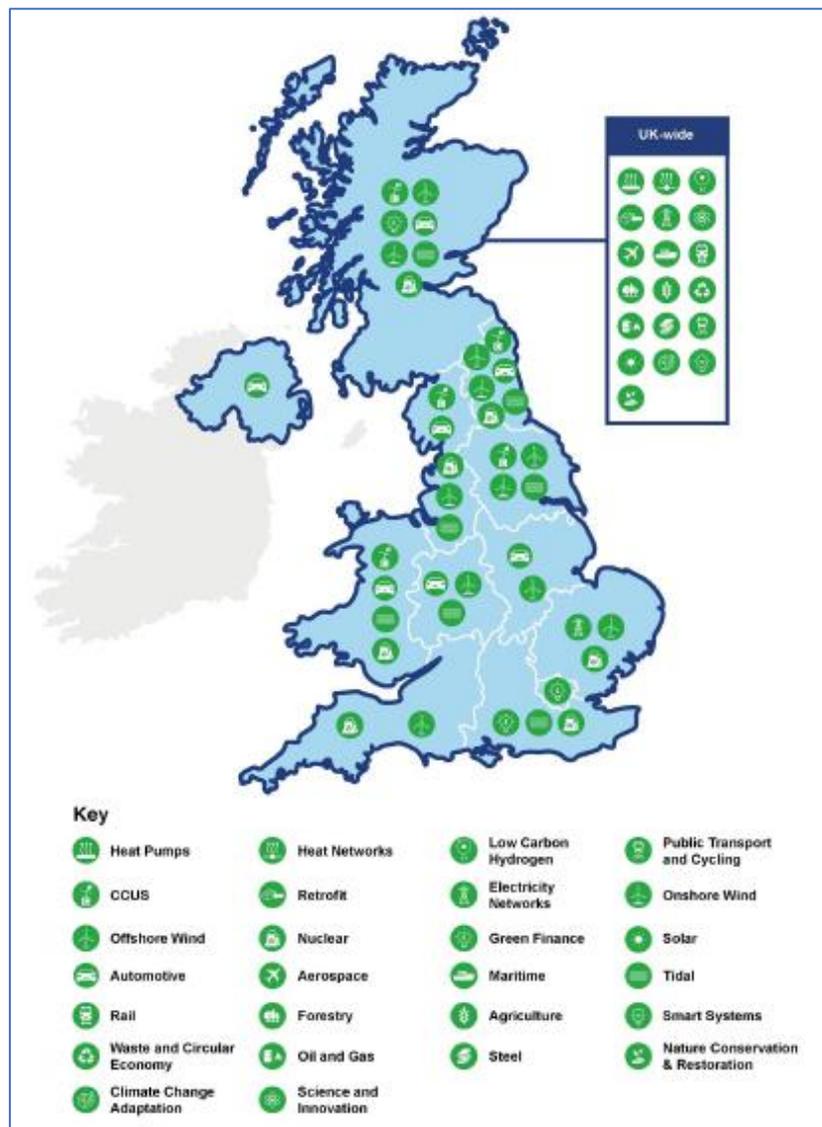
The UK Government has set an ambition for two million green jobs in the UK by 2030 (Green Task Force 2021). The Energy Innovation Needs Assessment (EINA) identifies £27bn of GVA opportunity in 2050 from decarbonising the UK domestic market by 80% compared to 1990 emissions levels, supporting around 300,000 jobs. The EINA suggests that the UK could also capture export-related opportunities, potentially adding £26 billion to UK GVA and supporting approximately 200,000 jobs in 2050. Nuclear, road transport, and CCUS are identified as offering the largest job opportunities, along with offshore wind (BEIS 2019).

The Climate Change Committee (CCC) commissioned research that modelled economic opportunities emerging from accelerating the pace of emissions reduction to meet the UK's sixth carbon budget and net zero. The research found that this will result in an increase in UK GDP of around 2-3%, and about 300,000 additional jobs by 2050. These opportunities are linked to investment in green technology stimulating the use of spare capacity, reduced leakage from ongoing spending on imported oil and gas in favour of low carbon domestic investments, and dynamic innovation (CCC 2020).

According to the Green Jobs Taskforce report, the following employment growth linked to decarbonisation is foreseen at UK level:

- the UK's offshore wind sector could employ c.70,000 workers (40,000 direct jobs and 30,000 jobs in the supply chain) by 2026, compared to c.26,000 at present;
- there is an estimated need to recruit for 400,000 jobs in energy networks by 2050 (with 260,000 being new roles and 140,000 replacing those leaving the workforce);
- the UK domestic market for smart systems and flexibility solutions could support c.10,000 jobs by 2050;
- improving the building fabric energy efficiency of every building in the UK in need of retrofit will require 12,000 workers to be trained every year for about the next four years, followed by the need to increase annual recruitment by up to 30,000 workers between 2025-30;
- up to 78,000 new jobs in EVs, with 24,500 in battery manufacturing, 43,500 in the battery supply chain, and c.10,000 in EV manufacturing. Of the current 182,000 vehicle technicians, it is estimated that c.21,000 are already EV qualified, and c.50,000 workers in automotive manufacturing will need retraining or upskilling by 2025. An additional 7,500-10,000 workers will also be needed in battery cell manufacturing by 2030;
- by 2050 the heat network sector could create between 20,000-35,000 direct jobs. In 2019, there were c.900 heat pump installers in the UK; there may be a need for between 7,500-15,000 heat pump installers a year to be trained within the next seven years, resulting in around 60,000 workers needed for heat pump installation in domestic and non-domestic buildings;
- circular economy sectors such as repair, remanufacture and refill could create between 54,000 to 102,000 net jobs across all UK regions;
- sectors such as oil and gas will also undergo transformation, and workers will need to adapt and potentially transition to new sectors. Between 2014-2017, the UK oil and gas sector lost over 70,000 direct jobs as well as those in the supply chain. Another 80,000 workers are expected to leave the sector between 2018-35 due to natural attrition, without taking into account the impact of COVID-19. On the other hand, there could be a net increase of 40,000 direct jobs connected to the transition to a net zero North Sea energy industry.

Workers and skills in some of these sectors will be concentrated in specific regions (see Figure 9.12), with opportunities in Wales forecast in the tidal, automotive, CCUS and nuclear sectors.



**Figure 9.12: Potential regional employment opportunities and skills needs as UK sectors transition to net zero**

Source: Green Jobs Taskforce (2021) Report to Government, Industry and the Skills Sector, <https://www.gov.uk/government/publications/green-jobs-taskforce-report>

Several recent Wales-level analyses forecast numbers of potential jobs in decarbonisation-related sectors, contingent on specific investment packages or measures being put in place. A 2021 report to the Future Generations Commissioner for Wales estimated that the level of new jobs created could be very significant in proportion to existing jobs numbers, with jobs more than doubling in some sub-sectors (Chapman & Kiberd 2021). These figures are based on a £6 billion green investment package proposed by Wales TUC which would create a total of 45,519 direct jobs across a range of sectors (see Table 9.7) (Transition Economics 2020). This work was considered to provide a reasonable indication of the investment and jobs in infrastructure required for a green recovery and decarbonisation in Wales (Chapman & Kiberd 2021).

A total of 60% of all jobs created would be in construction (approximately 27,300 jobs), with a further 14% in offsite manufacturing of housing, 7.5% in R&D, 7% in forestry and 6% in energy efficiency assessments. The remainder would be in engineering, environmental restoration and agronomic consulting (Chapman & Kiberd 2021).

**Table 9.7: Wales TUC proposed green recovery investment package: jobs associated**

Sector	Projects	Direct term creation Wales	short-job in
Digital	Broadband upgrade	1,014	
Manufacturing	R&D for decarbonising heavy industry – experimental technology (e.g. cement, petrochemicals, CCS demonstration, hydrogen)	3,426	
Transport	Expand and upgrade rail network	5,870	
	Build battery factories for EVs	3,960	
	Electric car charging points rural	1,077	
	Build cycle lanes and pedestrianisation	2,725	
Buildings	Build social housing (using domestic offsite manufacture)	9,370	
	Retrofit social housing	7,882	
	Energy efficiency assessments	2,731	
	Retrofit public buildings	572	
Energy	Upgrade ports and shipyards for offshore wind supply chain	1,668	
	Build manufacturing facilities for offshore (incl. floating) wind turbines	240	
	District heating	1,051	
Land	Reforestation schemes	2,895	
	Environmental restoration (incl. flood defences)	709	
	Support farmers to switch to organise agriculture	327	
<b>Total</b>		<b>45,519</b>	

Source: Minio-Paluello M and Markova A (2020) Job creation in Wales from a Covid recovery infrastructure stimulus, Transition Economics, <https://www.tuc.org.uk/sites/default/files/2020-08/Wales%20TUC%20-%20Transition%20Economics%20-%20Job%20Creation%20Just%20Recovery.pdf>

The Institute of Welsh Affairs<sup>16</sup> vision for a Wales with 100% renewable electricity by 2035 includes job creation forecasts of c.20,150 jobs annually across Wales during a 15-year investment period:

- 9,500 annual FTE jobs related to energy efficiency measures;
- 1,800 annual full-time equivalent (FTE) jobs in solar PV;
- 2,000 annual FTE jobs in onshore wind;
- 1,300 annual FTE jobs in offshore wind;
- 5,200 annual FTE jobs in the tidal range, tidal stream, wave and floating wind sectors;
- 50 annual FTE jobs in in-stream hydropower;
- 300 annual FTE jobs in fuelled technologies (biomass, anaerobic digestion, energy recovery);

Looking specifically at retrofit, an estimated 26,500 new jobs could be created by a retrofit programme for housing in Wales (Brown et al 2021).

<sup>16</sup> [https://www.iwa.wales/wp-content/media/2019/03/IWA\\_Energy\\_WP6\\_Digital-2.pdf](https://www.iwa.wales/wp-content/media/2019/03/IWA_Energy_WP6_Digital-2.pdf)

### 9.2.3 Reskilling / retraining needs of the local workforce

As noted in previous TRACER report D3.4 on the social challenges and re-skilling needs of the workforce in TRACER target regions, further reductions to already low levels of coal employment in Wales are anticipated. Nevertheless, the old coal-mining areas of the South Wales Valleys (and to a lesser extent North Wales) continue to be marked by the legacy of coal and related industries, with below-average income and wage levels, a prevalence of lower skilled and more precarious employment, and poorer quality of life (e.g. on health indicators).

A range of socio-economic, political and technological changes whose specific impacts are not yet clear will shape the future of the workforce structure in Wales up to 2030/2050.<sup>17</sup> These include demographic shifts and population ageing, as well as the impact of emerging technologies (including AI and digitalisation) on working patterns and practices, as well as the long-term impacts of both Covid-19 and Brexit. The end of access to EU Cohesion policy funding poses a risk that public investment for structurally weaker areas, such as the Welsh Valleys, will diminish over time, leading to poorer quality infrastructure, training, and support for business investment and innovation.

The anticipated skills needs for transition-related growth sectors have been outlined at UK level (Green Jobs Taskforce 2021). For example, continued development of the offshore wind sector is expected to require a broad range of skills, including asset management, project management, engineering and technical skills (e.g. mechanical, electrical and control and instrumentation, blade and turbine technicians), science (e.g. marine biology, geophysics, hydrography, oceanography), advanced first aid and rescue, and offshore-specific skills (e.g. confined spaces, working at heights). For housing retrofit, a current critical shortage of retrofit designers and co-ordinators is highlighted, together with the issue that education and training mostly being focused on new-build using traditional on-site techniques, with not enough emphasis being placed on low carbon systems (see **Table 9.8**).

**Table 9.8: Skills requirements/reskilling needed in green transition (UK wide, extract from longer table)**

<b>Sector</b>	<b>Skills requirements/reskilling needed</b>
<i>Offshore wind</i>	Manufacturing (L2-6), electrical engineering (L3), welders (L3-4), engineering (L4-5), project managers (L4), product development managers (L5), offshore technicians and seamen
<i>Onshore wind</i>	Welders (L3-4), engineers (degree level) and construction workers (L1-3)
<i>Solar</i>	Electricians (L4), roofers (L2) and engineers (degree level)
<i>Tidal</i>	Manufacturing (L2-6), electrical engineering (L3), welders (L3-4), engineering (L4-5), project managers (L4), product development managers (L5), offshore technicians and seamen
<i>Nuclear power</i>	An updated forecast of skill requirements expected 2021 from the Nuclear Skills Strategy Group.
<i>Electricity networks</i>	Grid infrastructure operatives (L3-8), civil and mechanical engineers (L3-7), data analytics (L3-7), modellers and programmers (L4-8), cyber security (L4-8), environmental scientists (L3-7), overhead lines people & general grid electric system installers (L2-7), integration of electric vehicle charging / microgeneration / domestic storage / demand side response, smart metering (L3-8)

<sup>17</sup> Fawcett J and Gunson R (2019); Universities Wales (2019); Welsh Government (2015); Welsh Government (2018); Welsh Government (2019c); Welsh Government (2019d).

<i>Smart systems</i>	Skill development will be needed in smart systems specific supply chains (e.g. energy storage, smart product design), plus in existing more mature supply chains (energy assessors, housing retrofit, network infrastructure). Electricians (L4), electrical engineering (L3), data analytics (L3-7), modellers and programmers (L4-8), electronic engineering (L3-8), control engineering (L3-8), cyber security (L4-8), integration of electric vehicle charging / microgeneration / domestic storage / demand side response, smart metering (L3-8)
<i>New home build and retrofit</i>	Currently, there is a critical shortage of retrofit designers and co-ordinators. Within domestic buildings, skilled workers needed include energy efficiency installers and assessors (L2-4), retrofit co-ordinators (L5). For larger non-domestic buildings, higher level qualifications for design and sign-off, e.g. architects, chartered passive house designers, chartered surveyors, and building management systems installations qualifications (BEMS Level 3 NVQ)
<i>Heat networks</i>	Specialist skills required for three stages of a heat network project. (1) Design: project management, design engineering and supporting professions (legal, financial, commercial). (2) Build: project management, construction and commissioning. (3) Operations & Maintenance: engineering, operator, and technician skills
<i>Waste/circular economy</i>	Sorting and reprocessing (L1-3), repair and manufacturing (L3-6), circular economy business planning/development (masters level – engineers, material scientists, managers) plus lifelong learning building on existing business skills
<i>Automotive sector</i>	Skills needed will include: charge point installers, operators, smart charging services, engineering, manufacturing, purchasing, material planning and logistics, vehicle scrappage and recycling, vehicle recovery operations, emergency services personnel, quality assurance and operations quality involved with batteries

Source: Green Jobs Taskforce (2021) Report to Government, Industry and the Skills Sector, <https://www.gov.uk/government/publications/green-jobs-taskforce-report> Note: 'L' refers to qualification levels, these are explained here: <https://www.gov.uk/what-different-qualification-levels-mean/list-of-qualification-levels>

Within Wales, recent work on skills shortages (linked to Wales TUC's proposed green recovery investment package) has found that the majority of the skills shortages identified are in areas relating to construction, heating, and electrical installation (see **Figure 9.13**) (Chapman & Kiberd 2021). However, specific reskilling needs will depend on both UK and Welsh Government investment priorities and decarbonisation pathways, and many key issues have not yet been decided.<sup>18</sup>

The current Welsh Government Programme for Government (Welsh Government 2021a) outlines a range of objectives related to employment and skills which are relevant to the skills needs of energy transition, including:

- promoting parity of esteem between vocational and academic routes in Welsh education;
- reviewing adult education to increase the numbers of adults learning in Wales;
- reforming qualifications and expand the range of 'made in Wales' vocational qualifications;
- exploring how to strengthen professional learning communities; and
- strengthening the Regional Skills Partnerships.

Commitments include guaranteeing all young people under 25 the offer of work, education, training, or self-employment; creating 125,000 all-age apprenticeships; and delivering quality jobs, training and innovation by decarbonising more homes through retrofit, using local supply

<sup>18</sup> <https://committees.parliament.uk/committee/517/industry-and-regulators-committee/news/161468/uk-will-miss-net-zero-target-without-urgent-action-warns-lords-committee/>

chains. Welsh Government's second Carbon Budget Delivery Plan (Welsh Government 2021b) recognises that this is a pivotal moment to develop green skills for the jobs of the future:

*“The need to re-position skills within the net zero agenda must take place alongside other structural challenges impacting on the labour market including digitalisation, automation and the long-term response to Covid. These disruptive forces complicate public policy responses, but they also offer a window in which we can improve the skills of people in declining or vulnerable sectors of employment. The transition to net zero and the structural challenges offer us an opportunity to actively tackle inequalities.”*



**Figure 9.13: Skills and training for a green recovery in Wales**

Source: Chapman A and Kiberd E (2021) *Skills Through Crisis. Upskilling and (Re)Training for a Green Recovery in Wales*, New Economics Foundation and Future Generations Commissioner for Wales

Consequently, work is currently underway to develop a *Net Zero Wales Skills Action Plan* by Spring 2022 (Welsh Government 2021b). Welsh Government is working with stakeholders to:

- Build on labour market intelligence from the Regional Skills Partnerships, including in relation to job quality, asking them to highlight skills gaps and shortages and work with the further and higher education sectors in Wales to help inform supply and meet the needs of employers;
- Define and achieve acceptance of industry requirements. The Skills Action Plan will build on existing work to map the skills base and understand demand for key sectors;
- Develop National Occupational Standards (NOS) responding to the low-carbon agenda (see **Box 1**);
- Review qualifications for future skills needs (see **Box 2** on the ongoing work on the Credit and Qualifications Framework for Wales);
- Develop government incentives or legislation/regulation to stimulate skills demand.

**Box 1: National Occupational Standards (NOS) in Wales responding to the low-carbon agenda**

National Occupational Standards (NOS) are reviewed and developed in consultation with a representative sample of employers from across the whole of the UK. In Wales, Regional Skills Partnerships reports are used to identify occupational trends, helping the NOS system to respond quickly during periods of economic adjustment. Green recovery and the net zero agenda are already being given priority by NOS developers, although there is no single generic NOS suite that relates to low/zero carbon. However, it may be possible to identify and map NOS which, on a cross-sectoral basis, relate to low or zero carbon, sustainability and the green agenda. Relevant products which have recently been commissioned/reviewed or which are in development include:

- Environmental Technology (Zero Carbon) NOS for the Building Services sector (e.g. Air Source Heat Pumps, Biomass/Bio Fuels (Gas/Liquid), Fuel Cell Technology, Grey Water Recycling, Micro Wind Energy, Rainwater Harvesting)
- Vehicle Recycling
- Construction Site Management and Supervision (links to energy efficiency retrofit and assessing/evaluating the sustainability and environmental impact of construction developments)
- Sustainable Food Production
- Green Deal Energy Assessment and Advice.

Source: Welsh Government

Welsh Government has also recently awarded £2 million to six further education colleges in Wales to deliver part-time and flexible courses training courses for jobs in the green economy (Levels 2-5), designed to match skills gaps identified in priority sectors.

At regional level, the new *regional energy strategies* in Wales along with the new *regional economic frameworks* (currently in draft form) should play a key role (alongside the Regional Skills Partnerships Regional Skills and Employment Plans) in creating route maps and identifying regional priorities for reskilling, upskilling and new skills development. Skills and employment related to energy transition and decarbonisation have been given high priority in the emerging strategies e.g. related to offshore wind and marine energy in North Wales.

**Box 2: Credit and Qualifications Framework for Wales (CQFW) Green Recovery and Transition to Net Zero**

The CQFW framework offers parity of esteem for qualifications and helps learners to see progression routes, particularly where they are following non-traditional pathways. Wales maintains a policy position on retaining common UK-wide underpinning standards to aid alignment to other UK qualifications frameworks and to facilitate transferability/portability of learning across borders.

The recognition of prior learning and experience (RPL/RPEL) to ensure that the content of continuous professional development (CPD) remains robust and to avoid duplication in training programmes is of particular importance to the skills of people in declining or vulnerable sectors of employment, as some of these skills might transition into net zero related or other emerging roles. Through adopting RPL measures, individuals can be helped to recognise their existing competencies to ensure they do not have to duplicate training to move to a new job. Research is currently underway looking at examples of where the existing skills of people in declining or vulnerable sectors of employment in Wales have been recognised through RPL processes, and how some of these skills might transition into net zero roles. A key message from recent RSP reports has been that employers may move away from lengthy and costly regulated learning programmes, meaning that individuals should be encouraged to build up “bite-size” elements of qualifications through unitised accredited learning (UAL).

Source: Welsh Government

The stakeholder consultation carried out under TRACER WP 5 identified areas of need and opportunity related to the impact of energy transition on skills and the labour market in Wales (see **Table 20.9**). These sit alongside Wales’ recognised strengths, including ongoing high level research on renewable energy technologies and decarbonisation, a well-regarded academic

and research sector with strong international links, and existing collaboration with industry on decarbonisation. The Regional Innovation Scoreboard 2021 (European Commission 2021) also highlighted Wales' strong performance in tertiary education, lifelong learning and digital skills.

**Table 20.9: Vision for R&I in the energy transition in Wales based on TRACER stakeholder consultation (extract)**

	Areas of Need	Areas of Opportunity
Labour market, skills and community support	<ul style="list-style-type: none"> <li>Public ownership of energy transition;</li> <li>Promote local infrastructure and wealth creation;</li> <li>Access to education and training and skills development;</li> <li>Creating good quality jobs;</li> <li>Effective communication of transition benefits for energy literacy;</li> <li>Identify locational dynamics (e.g. job &amp; residence location);</li> <li>Address deprivation, especially in former coal mining areas.</li> </ul>	<ul style="list-style-type: none"> <li>Digitalisation;</li> <li>Large scale initiatives;</li> <li>Connecting training providers with businesses and policymakers;</li> <li>Create and/or promote "centres of excellence" in energy;</li> <li>Community energy projects;</li> <li>Co-creation of internationally recognised skills, qualifications and progression frameworks for energy and environmental work.</li> </ul>

Source: Michie, R., den Hoed, W. & Fonseca, L. (2021) Report setting out a vision and future-oriented priorities in Wales. Deliverable 5.3. Smart Strategies for the transition in coal intensive regions. TRACER Project, No: 836819.

Key priorities identified in the TRACER stakeholder consultation included the need for:

- a clearer path to help planning for the future, including for jobs and skills;
- high quality jobs and fair work practices;
- synergies between action in innovation policy, education and skills and energy policy;<sup>19</sup>
- prioritisation of connectivity to create employment in areas where well paid jobs are less readily available; and
- provision of training for more deprived communities, especially those previously reliant on the coal industry

Alongside Welsh Government's work on the net zero skills agenda, other actors in Wales are currently prioritising green skills issues in parallel, including:

- the Green Industries Wales Hybrid Green Skills Council, which was launched in October 2021 with a focus on connecting organisations and individuals to highlight existing green skills-based projects, ventures and schemes across Wales identifying collective challenges and opportunities and exploring areas for knowledge share and collaboration;<sup>20</sup> and
- representatives of the renewable energy industry sector, who are launching a network on skills development to support a Net Zero Wales.<sup>21</sup>

<sup>19</sup> For example, it would be important to link work on net zero skills to developments such as the Wales Infrastructure Investment Plan, the Digital Strategy for Wales, the new Wales innovation strategy, and proposals such as Unnos, a Welsh national construction company, and Ynni Cymru, a publicly-owned energy company for Wales.

<sup>20</sup> <https://www.nptcgroup.ac.uk/2021/10/08/why-addressing-the-need-for-green-skills-in-wales-is-imperative/>; <https://businessnewswales.com/green-skills-council-the-first-step-for-green-action/>

<sup>21</sup> <https://tocyn.cymru/en/event/a5242887-94b4-4feb-8463-990be657ee08>

Following on from the TRACER WP 4 meeting in December 2021, stakeholders in Wales have been meeting regularly to further discuss the skills issues raised, recognising both the potential to pursue future funding opportunities, and also identifying a sense of urgency and need for immediate joint action on common issues.

Swansea University is currently developing the SWITCH-On Skills project, which builds on their 'triangle of training' to develop a demand-led multi-level training academy to support transition to net zero in the industrial, transport, buildings, homes and communities sectors in Wales (see Figure 9.14). SWITCH-On Skills will work in partnership with HE/FE and industry to provide the skills required for low carbon living, skills pipelines, upskilling and retraining. This may provide another forum for discussing and promoting the green skills agenda (including reskilling and upskilling) within Wales.



**Figure 9.14: Swansea University's SWITCH-On Skills project**

Source: Swansea University SWITCH-On Skills project

It is clear that there is motivation within Wales to address the skills needs of energy transition, including reskilling and upskilling needs. However, to do this at the pace needed is extremely challenging, especially as some major decisions have yet to be taken at UK and Wales levels about the decarbonisation and energy transition pathways. At the same time, Wales and the UK are dealing with important contextual changes such as Covid and Brexit, where the long-term impact on relevant factors such as population, migration, employment and economic activity are not yet clear.

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