The labour market of tomorrow –

jobs, skills, and the transition to a green economy…

Data Cymru

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This report is also available in Welsh.

Contents

1 Background

The UK government states that the low-carbon economy supported 430,000 jobs in 2019 and is predicted to grow by 11% per year to 2030. This is a rate that is four times faster than the usual average growth rate in the UK. It is estimated to be worth between £60 and £170 billion in 2030.

In Wales, the data shows that the low-carbon economy was estimated to consist of 9,000 businesses, employing 13,000 people and generating £2.4 billion turnover in 2016/17.[1]

Many policies outline how the UK and Wales can potentially transition to a low-carbon economy through changes in activity (for example, reducing emissions and waste, using new technologies). However, there has been less focus on the jobs and skills challenges associated with this transition. As these changes will have a great impact on economies, there is growing agreement that co-ordinated action is required from government, education providers and employers.

The New Economics Foundation describe the scale of changes needed in the labour market:

> ***"The challenge facing government and employers alike is therefore to:***
> ***a) upskill the existing workforce;***
> ***b) rapidly expand the workforce in green growth sectors, and***
> ***c) ensure accessibility of good quality jobs to all, including often 'left behind' communities and demographics."***
> *New Economics Foundation*

> ***"Shifting the economy towards less polluting and more resource-efficient activities by 2050 will lead to significant changes in jobs and skills requirements. These changes 'translate to new skill sets, updates of curricula or even new qualifications… The UK will need a new approach to both training young people and upskilling employees in the workforce to have sufficient capacity to compete in the green economy."***
> *NESTA*

> ***"There is no silver bullet solution for helping the people most affected by the transition to the net-zero economy. It will require using data more consistently so that workers and students understand what career opportunities to pursue, particularly when it comes to jobs that will grow or disappear under a net-zero economy."***
> *NESTA*

NESTA, an agency focused on innovation, comes to a similar position:

This report provides RSPs with an understanding of the challenge ahead. It brings together data, research, and intelligence. The next stage will be for RSPs and other public bodies who may use this report to build on the findings. This will help them to better understand the long-term and more specific implications on future generations and make sure a transition to a green economy is fair, equitable, and open to all. Welsh Government states[2]:

[1] https://gov.wales/sites/default/files/publications/2019-06/low-carbon-delivery-plan_1.pdf.

[2] https://gov.wales/sites/default/files/publications/2019-02/prosperity-for-all-economic-action-plan.pdf.

"We want an economy that increases both our wealth and our wellbeing through inclusive growth, leading to a fairer distribution of the benefits of economic growth against the challenge of spatial inequality, uncertainty and global pressures. Ensuring we have a low carbon society is central to this aspiration."
Welsh Government

With these changes in mind, the RSPs have a vital role to play. In Wales, the Welsh Government highlights the need for RSPs to collect data to shape policies at a national level. The Well-being of Future Generations Act (2015) forces public bodies to think about the long-term impact of their decisions. The Act encourages them to work more closely with people, communities, and each other to prevent and reduce persistent problems such as poverty, health inequalities and climate change.

"There is an opportunity for RSPs to review heat intensive industrial sectors at a regional level and make recommendations to help reduce greenhouse gas (GHG) emissions and improve energy efficiency. They also have a role to review skills gaps and shortages to help ensure a supply of suitably skilled candidates to meet the demand for skills in these sectors. Welsh Government will work closely with RSPs to identify low carbon related skills needs at a regional level working with employers. This information will be captured in the form of Annual Reports submitted to Welsh Government and used to inform the deployment of skills funding…"
Welsh Government

This report outlines the approach we have taken to understanding green jobs and skills, sets out the major publicly available data sources, and then assesses the green jobs and skills challenges within key sectors of the Welsh economy.

When reading the report, we find it helpful and practical to think of the green economy by using the following broad terms:

- **New green economic activity** – Using technologies or practices that previously did not exist. For example, the introduction of hydrogen fuel cells.
- **The 'greening' of existing jobs** – In which existing jobs are transformed entirely into green jobs. For example, oil drillers will have to retrain to become part of the renewable energy supply chain.
- **The part 'greening' of existing jobs** – Where a component of an existing job may need some new 'green' skills or knowledge. For example, automotive engineers will have to be skilled at servicing internal combustion-engined cars as well as electric cars.

2 Methodology

> ***"There is no widely accepted standard definition of green jobs, and it is not clear which industries make up the green sector, which can include different industries in different countries at different times."***
> *Nesta*

One of the main challenges when addressing questions about the green economy is defining what it is. What economic activity are we referring to? What jobs may be found in the green economy? Also, the timescales and changes associated with the transition to a green economy vary by industrial sector, geographic location, and technology.

Clearly, there is no agreed definition of a green economy. Some pieces of work refer to it is as a low carbon economy (an economy in which little carbon is produced) or a net-zero carbon economy (an economy in which once carbon producing and capture activities have been considered no further carbon is added to the atmosphere). Some also refer to wider 'green' measures such as more ecologically sustainable practices that promote (or do not adversely affect) biodiversity, including activities such as waste reduction and recycling.

The Standard Industrial Classification (SIC) and Standard Occupational Classification (SOC), which usually form the basis of data on the economy and labour market, were not designed to identify green jobs. This means that even if there was agreement on the definitions and activity people wished to focus on, there would not necessarily be a reliable SIC or SOC classification code to identify that activity within the economy.

The challenges highlighted mean that there isn't a standard approach to tackling this issue. In this report, we have followed the data and include information from across a range of sectors, activities, and jobs. Therefore, **we do not use a single definition of 'green' or 'low carbon'**, as the current data landscape is not unified in its approach. We mainly focus on activities and jobs associated with either reducing or removing carbon emissions from the economy. However, we consider the use of wider green and low carbon activities, such as recycling, land, and waste management, when they are raised in literature or other research we have used. To be clear, we treat jobs in the nuclear industry as green due to the minimal carbon emissions associated with the technology. At the same time, we acknowledge that there are other potential environmental costs to this technology, including around the safe storage of spent fuel.

One other big dilemma is whether to focus on future jobs and then look to derive skills from them or to start by focusing on the skills that will be needed for those jobs. Some individual sectors provide a lot of detail about what future jobs may look like. This information is often provided directly but sometimes job breakdowns can also be deduced from the activity. Where possible, we have included skills information. However, there is typically more information on what jobs will be needed within a green economy than there is information on skills forecasts, so **we focus on jobs**. Nevertheless, the frequency and number of green skills being listed in job postings is growing and new data sources are becoming available.

As this report is intended to help the RSPs with their plans, our main goal is to provide data and insights at **a regional scale**. However, data sources do not always provide this level of detail. Therefore, in some cases we have used Wales-level projections. Given climate change is a global challenge, we encourage the RSPs and public bodies to think about the relationship between data for their own local area, Wales, the UK, and the rest of the world.

3 Datasets and sources

As the 'green economy' is a relatively new area, data availability is a challenge. Therefore, we have used several datasets in this report to paint as holistic a picture as possible. We outline the datasets we have used and explain how they are useful.

Emissions of greenhouse gases

Welsh Government publish data on StatsWales on emissions of greenhouse gases, by sector. The data shows the basket of 7 Kyoto greenhouse gases in kilotons of CO2 equivalent. It is then broken down by sector: agriculture, business, energy supply, industrial process, land use change, public, residential, transport, and waste management.

While these sectors do not directly reflect the frameworks used by the RSPs, they do demonstrate the main sources of emissions within Wales. Therefore, they give insights into areas which are likely to be affected by the shift to a low- or net-zero carbon economy. However, data on international shipping and aviation is not included in this data; land-based emissions only.

Workforce employment

Welsh Government publish data on StatsWales on workforce employment. This data contains estimates of the number of jobs within industries across the economy (including self-employment). It uses data from the Office for National Statistics (ONS) Annual Population Survey, the Business Register Employment Survey, and Welsh Agricultural Census to produce the estimates. Data is available at Wales and Nomenclature of Territorial Units (NUTS) geography levels.

It is useful as it shows which sectors of the economy people work within. It can be used to supplement other data sources, and allows users to deduce the magnitude of potential impacts on individual sectors in terms of jobs.

Low Carbon and Renewable Energy Economy Survey (LCREE)

The 'Low Carbon and Renewable Energy Economy Survey' (LCREE) by the ONS categorises jobs that can be found within the low-carbon economy. The LCREE survey is the only official survey that captures activity that is *directly* associated with the low carbon and renewable energy economy, and not indirect or spill-off activity. Low carbon activity does not have to be the main activity of a business for it to be counted as active in the LCREE economy.

This data is very useful as it shows how many businesses and jobs are related to specific green technologies within Wales and the UK. Crucially, it also shows the green technologies that are not found within Wales.

Further details about the methodology can be found on the ONS website.

Emsi Burning Glass Job Vacancies

Emsi Burning Glass is a commercial labour market intelligence tool. It provides labour market estimates that are more detailed than those published by public sources. Emsi Burning Glass also has a Job Posting Analytics feature which gathers job postings from many websites and then provides real-time data on job postings in local authority areas. This data also shows the green skills that are being listed across the economy in job postings.

Emsi relies on a proprietary algorithm to identify and collect data. This methodology treats all live adverts as valid. Therefore, job posts that have been online for four days, four weeks, four months, or four years are included in the dataset. This approach casts the widest possible net but, over the course of the pandemic, the number of reported job postings has trended upwards significantly. This is driven by new job postings being added to existing longer-term job postings. Emsi Burning Glass is likely to change its methodology in early 2022 to a stricter set of criteria. This means that the significant increase in the latest periods seen under the

current methodology will be reduced. Therefore, we advise that all Emsi data in this report is interpreted with caution.

Sector led intelligence

Industrial sectors themselves have investigated, and continue to investigate, what a transition to a green or low-carbon economy would mean for them. In some cases, this work has quantified and qualified the need to produce detailed labour and skills requirements. In this report, we share these for sectors that have been highlighted in national policies as needing transformation such as construction, manufacturing, agriculture, and transport.

Wales Energy Service

The Wales Energy Service provided models on the role each RSP region in Wales can play in reducing greenhouse gas emissions and achieving a net-zero Welsh economy by 2050. This work examines the RSP regions' current emissions and where they come from, as well as data on a range of economic activities, the number of jobs that will be created over the period, and investments required.

This work is extremely useful as it provides a detailed picture of the differences between the RSP regions in Wales and how they will play different roles in delivering a net-zero economy. Using this information, in conjunction with other data in this report, it is possible to identify priority areas for individual RSPs.

However, the Welsh Energy Service modelling is based on just one scenario model. This model relies on assumptions around policy and behaviour, as well as an assessment of the feasibility of certain green technologies. Therefore, the modelling is unlikely to be 100% accurate.

Energy Generation in Wales

Welsh Government's report 'Energy Generation in Wales' provides data on the proportion of energy generated by fossil fuels and renewable energy sources. It also has more detailed breakdowns on individual technologies. The report also outlines the number of individual projects associated with technologies and shows how they are distributed across Wales.

This data shows how large the renewable energy sector is in different parts of Wales and can be used to help quantify and locate skills demands associated with new green jobs (such as wind farm engineers, solar photovoltaic (PV) engineers).

Forecasts by others - infrastructure

The Trade Union Congress (TUC) in Wales published information and data on potential infrastructure projects that could be invested in over the coming years. The report provides details on the economic activity associated with these projects, the number of jobs they are likely to create directly, and the jobs they are likely to create in the wider economy.

This information is very useful for RSPs, because should a similar investment be made in their region (or in Wales) they can use it as a baseline on the likely activity associated with it and the jobs it will create.

4 Carbon emissions and the economy in Wales

It is important to understand the current Welsh economy before examining the potential impacts and challenges associated with a transition to a green economy. This helps us to understand the baseline, the progress that has been made to date, and provides the wider context to which other findings can be related.

Carbon emissions

In Wales, over the past three decades, carbon emissions fell from 55,787 kilotonnes in 1990 to 38,489 kilotonnes in 2019. This has happened while the economy has grown. During the same period, carbon emissions in the UK also fell[3] but global annual emissions rose from 22 billion tonnes in 1990 to 36 billion tonnes in 2019.[4]

Data on where these emissions come from can be broken down into sectors. However, these differ to traditional industrial sectors that can be represented with SIC and SOC codes.

Table 1 shows that in 2019, the largest source of CO2 emissions in Wales was from the Energy Supply sector at 11,026 kilotonnes, which is a reduction from 20,163 kilotonnes in 2016. This was followed by the Business sector at 9,214 kilotonnes, Transport sector at 6,112 kilotonnes, and Agriculture sector at 5,297 kilotonnes.

Table 1 - Emissions of greenhouse gases, Wales, by sector, 2019

Sector	Kilotonnes
Agriculture	5,297.26
Business	9,213.73
Energy Supply	11,025.92
Industrial Process	1,892.54
Land Use Change	-245.99[5]
Public	324.28
Residential	3,716.37
Transport	6,112.11
Waste Management	1,152.28
Total	**38,488.50**

Source: StatsWales

Industrial sectors

In Wales, 20% of jobs are estimated to have direct exposure to the green transition. Of these, 150,000 (10.3%) are said to be 'transition aligned' (well positioned or ready to capitalise on a green transition). 140,000 (9.6%) are estimated to require some form of reskilling[6].

The New Economics Foundation have outlined the traditional industrial sectors which are most impacted by the skills transition to a low carbon green economy. These jobs can be

[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957887/2019_Final_greenhouse_gas_emissions_statistical_release.pdf.

[4] https://ourworldindata.org/co2-emissions.

[5] This negative figure means carbon is being removed from the atmosphere though carbon removal based activities (such as planting of forestry) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/996062/lulucf-local-authority-mapping-report-2019.pdf.

[6] https://www.futuregenerations.wales/wp-content/uploads/2021/05/20-05-2021-ENG-NEF-Skills-report.pdf.

found in construction (30%), transport (26%) and manufacturing (17%), which account for 73% of the jobs in need of reskilling.[7]

Table 2 shows the number of people employed within Wales in individual industrial sectors.

Table 2 - Workplace employment, by industrial sector, Wales, 2019

Sector	Wales	Percentage (%)
Agriculture, forestry and fishing	44,600	3.1
Production	165,700	11.5
Construction	97,300	6.7
Wholesale, retail, transport, hotels and food	373,200	25.8
Information and communication	34,200	2.4
Finance and insurance activities	35,900	2.5
Real estate activities	19,600	1.4
Professional, scientific and technical activities; administrative and support service activities	175,400	12.1
Public administration, defence, education and health	425,300	29.5
Other service activities	72,800	5.0
Total	**1,444,100**	**100.0**

Source: StatsWales

Low Carbon and Renewable Energy Economy Survey (LCREE)

LCREE data shows the number of businesses and full-time equivalent jobs in the low carbon and renewable energy economy in Wales.

Table 3 and **Table 4** show there were an estimated 6,000 businesses and 9,700 jobs in the sector in Wales, in 2019. This compares to an estimated 66,500 businesses and 202,100 jobs in the sector in the UK, in 2019.

However, there has been some change over time within the sector in Wales. Between 2014 and 2019, the estimated number of full-time equivalent jobs in low carbon services dropped from 900 to 200. The number of full-time equivalent jobs in the low emission vehicles group rose from a number too small to be released to 700.

However, the LCREE dataset can be volatile as:

- the number of businesses sampled is still relatively low; and
- it attempts to capture economic activity that may not be the company's primary activity, increasing the risk of measurement error.

Therefore, we suggest you use this data with caution, when comparing year on year data.

Table 3 - Estimated number of low carbon businesses, by country and group, from 2014 to 2019

Country	Group	2014	2015	2016	2017	2018	2019

[7] https://www.futuregenerations.wales/wp-content/uploads/2021/05/20-05-2021-ENG-NEF-Skills-report.pdf.

Wales	Low carbon electricity	2,000	1,500	5,000	2,000	8,000	2,500
	Low carbon heat	~[8]	~	~	~	~	500
	Energy from waste and biomass	~	1,500	2,500	~	1,000	~
	Energy efficient products	2,500	2,000	3,000	4,500	2,500	3,000
	Low carbon services	2,500	~	~	2,500	~	~
	Low emission vehicles	~	~	~	~	~	~
	All groups	**7,000**	**4,500**	**9,000**	**9,000**	**11,000**	**6,000**
UK	Low carbon electricity	28,500	43,500	26,500	24,000	37,000	29,000
	Low carbon heat	6,000	6,000	4,500	4,000	3,500	7,500
	Energy from waste and biomass	6,500	9,000	8,000	4,500	8,500	7,500
	Energy efficient products	54,500	48,500	53,000	49,500	46,500	32,000
	Low carbon services	6,000	5,500	1,500	5,000	2,000	2,000
	Low emission vehicles	2,000	5,000	1,500	1,500	2,000	1,500
	All groups	**93,500**	**105,500**	**84,500**	**83,500**	**89,000**	**66,500**

Source: Office for National Statistics (LCREE)

[8] ~ indicates an estimate of less than 500.

Table 4 - Estimated number of Full-Time Equivalent (FTE) low carbon employments, by country and group, from 2014 to 2019

Country	Group	2014	2015	2016	2017	2018	2019
Wales	Low carbon electricity	1,500	800	1,200	900	1,500	1,100
	Low carbon heat	200	~[9]	c	400	500	600
	Energy from waste and biomass	c	500	900	500	600	500
	Energy efficient products	6,100	7,400	9,400	7,200	7,600	6,600
	Low carbon services	900	c	c	400	100	200
	Low emission vehicles	c	c	c	400	600	700
	All groups	**10,000**	**10,200**	**12,900**	**9,700**	**10,900**	**9,700**
UK	Low carbon electricity	40,800	33,500	29,600	32,600	31,600	36,800
	Low carbon heat	5,900	3,300	6,000	5,300	6,400	7,600
	Energy from waste and biomass	12,200	11,100	9,400	10,000	9,400	9,300
	Energy efficient products	154,900	128,800	147,000	146,400	146,900	126,800
	Low carbon services	11,800	8,900	4,400	11,100	5,100	4,700
	Low emission vehicles	10,200	14,800	13,800	11,800	16,300	16,900
	All groups	**235,900**	**200,500**	**210,200**	**217,200**	**215,800**	**202,100**

Source: Office for National Statistics (LCREE)

Table 5 shows the estimated number of Full-Time Equivalent (FTE) employees working in traditional industrial sectors in the UK. This is particularly useful as it shows the sectors of the economy which can be easily categorised, and which make up current low carbon and renewable energy activity.

The sectors with the largest number of people employed in low carbon and renewable energy include Manufacturing (69,300 jobs), Construction (62,800), Wholesale and retail; repair of

[9] ~ indicates an estimate of less than 100 and c indicates that estimates have been suppressed for confidentiality reasons.

motor vehicles and motorcycles (11,100), and Professional, scientific and technical activities (23,800).

Table 5 - Estimated number of Full-Time Equivalent (FTE) low carbon employments, by sector, UK, from 2014 to 2018

Sector	2014	2015	2016	2017	2018	2019
Agriculture, forestry and fishing	1,700	600	1,300	900	1,300	c[10]
Mining and quarrying	~	~	~	~	200	c
Manufacturing	66,900	68,100	69,400	65,700	78,700	69,300
Electricity, gas, steam and air conditioning supply	13,300	11,400	13,700	16,000	16,400	16,800
Water supply; sewerage, waste management and remediation activities	1,700	3,500	4,100	6,200	2,800	2,400
Construction	97,300	73,700	73,300	80,700	79,900	62,800
Wholesale and retail trade; repair of motor vehicles and motorcycles	11,300	8,900	13,900	6,000	3,200	11,100
Transportation and storage	200	200	400	200	300	c
Information and communication	1,200	100	400	800	2,300	1,800
Real estate activities	500	300	400	500	300	200
Professional, scientific and technical activities	36,100	28,300	30,500	34,100	22,700	23,800
Administrative and support service activities	4,300	2,600	2,700	5,300	7,100	8,700
Education	400	2,600	100	300	300	4,000
Other activities	1,000	100	~	400	300	c
All	**235,900**	**200,500**	**210,200**	**217,200**	**215,800**	**202,100**

Source: Office for National Statistics (LCREE)

Table 6 *and*

[10] ~ indicates an estimate of less than 100 and c indicates that estimates have been suppressed for confidentiality reasons.

Table 7 show the number of businesses and Full-Time Equivalent (FTE) employees working with low-carbon technologies. The development, roll out, and feasibility of these technologies varies. Additionally, the labour demands associated with some of these technologies has not always been quantified elsewhere.

Also note that the number of businesses sometimes exceeds the number of employees, for example, solar photovoltaic. This is because some solar companies may contain just the solar panel(s) and will not have employees.

Additionally, the LCREE dataset does not classify nuclear decommissioning or waste processing of nuclear facilities to be part of the low carbon economy, so these activities are excluded. Most of the activity at Trawsfynydd and Wylfa nuclear facilities is related to decommissioning, hence the low number of nuclear-related jobs shown below. However, this may change in future years, as Welsh Government has recently announced a plan to install Small Modular Reactors (SMRs) as part of a redevelopment of the Trawsfynydd site.

Table 6 – Estimated number of low carbon businesses, Wales, from 2014 to 2019

LCREE Sector	2014	2015	2016	2017	2018	2019
Offshore wind	~[11]	~	~	~	~	~
Onshore wind	~	~	~	~	~	~
Solar photovoltaic	1,000	1,500	4,500	1,500	6,500	1,500
Hydropower	~	~	~	~	1,000	~
Other renewable electricity	~	~	~	~	~	~
Carbon capture and storage	~	0	0	0	0	~
Nuclear	~	~	~	~	~	~
Renewable heat	~	~	~	~	~	~
Renewable combined heat and power	~	~	~	~	~	~
Bioenergy	~	1,000	2,500	~	1,000	~
Alternative fuels	~	~	~	~	~	~
Energy efficient lighting	1,000	1,000	1,500	1,500	1,000	1,000
Other energy efficient products	1,000	1,500	1,000	3,500	1,500	1,500
Energy monitoring, saving or control systems	~	1,500	~	500	~	1,000
Low carbon financial and advisory services	2,500	~	~	2,500	~	~
Low emission vehicles and infrastructure	~	~	~	~	~	~
Fuel cells and energy storage	~	~	~	~	~	~
All sectors	**7,000**	**4,500**	**9,000**	**9,000**	**11,000**	**6,000**

Source: Office for National Statistics (LCREE)

[11] ~ indicates an estimate of less than 100.

Table 7 - Estimated number of Full-Time Equivalent (FTE) low carbon employments, by sector, Wales, from 2014 to 2019

LCREE Sector	2014	2015	2016	2017	2018	2019
Offshore wind	300	c[12]	500	~	300	200
Onshore wind	300	200	500	400	500	300
Solar photovoltaic	500	200	100	200	500	400
Hydropower	200	~	c	~	200	100
Other renewable electricity	c	~	~	~	~	~
Carbon capture and storage	c	c	c	0	0	~
Nuclear	100	c	~	100	~	~
Renewable heat	~	~	300	300	400	500
Renewable combined heat and power	~	~	c	~	~	100
Bioenergy	400	c	c	300	500	400
Alternative fuels	c	c	c	200	~	~
Energy efficient lighting	500	2,000	4,000	800	500	800
Other energy efficient products	4,800	4,800	5,000	6,000	6,500	5,100
Energy monitoring, saving or control systems	800	600	400	400	600	700
Low carbon financial and advisory services	900	c	c	400	100	200
Low emission vehicles and infrastructure	c	c	c	400	600	700
Fuel cells and energy storage	c	c	c	~	~	~
All sectors	**10,000**	**10,200**	**12,900**	**9,700**	**10,900**	**9,700**

Source: Office for National Statistics (LCREE)

[12] ~ indicates an estimate of less than 100 and c indicates that estimates have been suppressed for confidentiality reasons.

5 Energy generation in Wales

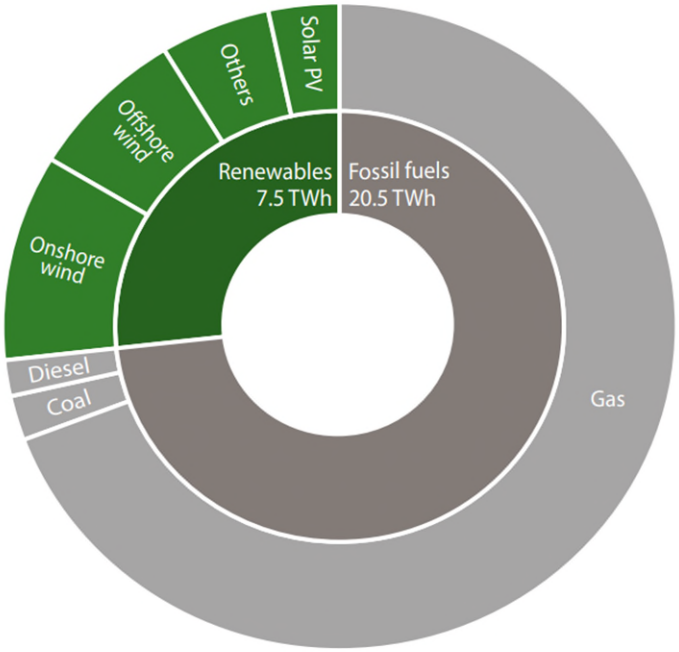
The deployment of renewable energy infrastructure and the shift from producing energy with dirty forms of fossil fuels has played a vital role in reducing carbon emissions in Wales.

Wales is a net exporter of electricity, having consumed approximately 14.7 teraWatt hours (TWh) of electricity in 2019, while generating approximately 27.9 TWh.

About, 27% of electricity generation in Wales is from renewables, with much of the rest generated by gas fuelled power stations. Renewable energy sources include the mixed sources and technologies of onshore wind, offshore wind, solar photovoltaic, and others.

We encourage RSPs to relate the findings in this section to **Appendix B - The most common jobs and skills in the green energy sector**, to better understand the skills associated with renewable energy generation technologies.

Figure 1 - Electricity generation in Wales, 2019



Source: Welsh Government

As shown in **Table 8**, there were 56,860 renewable electricity generation and storage projects in Wales, in 2019, compared to 102 fossil fuel projects. This suggests that renewable energy is generated in many small-scale projects. For example, for solar photovoltaic - a single project may be a single solar panel installation on a house or a large farm with hundreds of panels. However, it is unclear from this work exactly what constitutes a 'project' and so the data should be interpreted with some caution.

In 2019, the largest renewable electricity development was a 27-turbine wind farm development in Clocaenog Forest on the border between Denbighshire and Conwy. This will be the second largest onshore wind farm after Pen y Cymoedd in Rhondda Cynon Taf.

Table 8 – Number of electricity generation and storage projects, Wales, 2019

Energy technologies	Number of projects	Electrical capacity (MegaWatts)	Estimated electricity generation (GigaWattHours)
Fossil fuels	102	7,419	20,461
- *of which coal*	1	1,586	631
- *of which diesel*	13	184	643
- *of which gas*	88	5,650	19,187
Storage	209	2,088	-[13]
- *of which battery storage*	207	29	-
- *of which pumped hydro*	2	2,088	-
Renewables	56,860	3,372	7,470

Source: Welsh Government

Hydropower

As shown in **Table 9**, hydropower capacity was a total of 182 MegaWatts (MW) from 363 projects in Wales, in 2019. The largest hydropower station, Rheidol Power Station, is in Ceredigion. However, Gwynedd has by far the most hydropower projects at 144 of the 373 projects. Over half of Wales' hydropower is generated by the three largest projects.

Welsh Government states that hydropower is a mature and proven technology. However, the high upfront cost and lack of cost reduction potential means the technology is likely to see limited future growth without support. Also, ending of support such as the Feed-In-Tariff[14] and a rise in business rates means the construction of new hydropower infrastructure is not as attractive a proposition as it once was.

Offshore wind

All three of Wales' offshore wind projects are based off the coast of North Wales in Liverpool Bay. They generate a total capacity of 726 MW. The largest wind farm is Gwynt y Môr which has a capacity of 576 MW from 160 turbines and is one of the world's top ten largest offshore wind farms. The other two wind farms are North Hoyle and Rhyl Flats which generate a combined capacity of 150 MW.

Welsh Government state that offshore wind has been a success story and over time the price has reduced as the technology has matured. There are strong prospects for further developments and the most recent round of seabed leasing includes a development area in North Wales. The Crown Estate has granted seabed rights for a 576 MW extension to the Gwynt y Môr wind farm.

Onshore wind

The total onshore wind capacity in Wales is 1.2 GigaWatts (GW). Onshore wind capacity has increased in recent years with an additional 133 MW deployed in 2019. Two new large-scale projects are situated in Clocaenog Forest Wind Farm on the border of Denbighshire and Conwy and the 32.8 MW Mynydd Y Gwair Wind Farm in Swansea.

Onshore wind is spread across Wales with between 160-240 MW of energy being generated in Neath Port Talbot, Powys, and Rhondda Cynon Taf. Neath Port Talbot has the highest

[13] - indicates that no estimate was provided.

[14] The Feed-in-Tariff was a UK Government scheme that paid domestic and commercial green energy producers for the energy they provide back to the national grid. This came to an end in March 2019. https://www.power-technology.com/features/end-feed-tariffs-uk-mean-small-scale-renewables/.

capacity of onshore wind at 230 MW. Ceredigion, Carmarthenshire and Denbighshire all have between 80 and 160 MW of energy.

Welsh Government state that with a supportive planning environment and strong wind resources, Wales has the potential for further onshore wind developments.

Solar Photovoltaic (PV)

In 2019, the total Welsh solar PV capacity was 989 MW, of which nearly 20% is located in Pembrokeshire. Ceredigion, the Vale of Glamorgan, and Flintshire follow with between 70-140 MW of capacity. All other local authority areas have projects under 70 MW of energy.

Welsh Government state that widespread deployment of this technology has been limited since the closure of the Feed-in-Tariff in March 2019. However, several new measures such as the Smart Export Guarantee[15] (introduced in January 2020) may lead to more projects. There are currently applications for ground-mounted solar PV projects in the planning system across Wales.

[15] "The Smart Export Guarantee (SEG) launched on 1 January 2020 and is a government-backed initiative. The SEG requires some electricity suppliers (SEG Licensees) to pay small-scale generators (SEG Generators) for low-carbon electricity which they export back to the National Grid, providing certain criteria are met." https://www.ofgem.gov.uk/environmental-and-social-schemes/smart-export-guarantee-seg.

Table 9 – Number of renewable energy and heat production projects, Wales, 2019

Renewable energy technologies	Number of projects	Electricity		Heat	
		Capacity (MegaWatts)	Estimated generation (GigaWattHours)	Capacity (MegaWatts)	Estimated generation (GigaWattHours)
Anaerobic digestion	46	19	103	8	49
Biomass	3,450	-[16]	-	449	1,375
Biomass electricity and CHP	50	132	712	120	662
Energy from Waste	1	30	162	-	-
Heat pump	7,817	-	-	86	165
Hydropower	363	182	347	-	-
Landfill gas	24	31	115	-	-
Offshore wind	3	726	2,200	-	-
Onshore wind	748	1,255	2,874	-	-
Sewage gas	5	9	30	10	64
Solar PV	55,634	989	924	-	-
Solar thermal	4,693	-	-	13	8
Grand total	**72,834**	**3,372**	**7,469**	**686**	**2,323**

Source: Welsh Government

[16] - indicates that no estimate was provided.

Table 10 – Number of renewable energy production projects, by local authority, 2019

Local authority area	Number of projects	Renewable heat and electricity	
		Total capacity (MegaWatts)	Estimated generation (GigaWattsHours)
Isle of Anglesey	2,399	88	160
Gwynedd	3,394	126	236
Conwy	2,053	107	222
Denbighshire	2,325	183	432
Flintshire	3,859	227	779
Wrexham	4,942	86	185
Powys	6,994	388	980
Ceredigion	4,143	266	634
Pembrokeshire	5,429	255	344
Carmarthenshire	6,119	316	608
Swansea	3,100	98	162
Neath Port Talbot	1,944	352	959
Bridgend	2,655	110	226
The Vale of Glamorgan	2,407	106	169
Cardiff	3,663	65	259
Rhondda Cynon Taf	3,956	258	548
Merthyr Tydfil	769	22	61
Caerphilly	2,963	77	122
Blaenau Gwent	982	28	70
Torfaen	2,022	15	25
Monmouthshire	4,429	98	262
Newport	2,284	62	149
Offshore	3	726	2,200
Unknown	2	0	1
Total	**72,834**	**4,058**	**9,793**

Source: Welsh Government

6 Construction

Sectors most impacted by the transition to a green economy need to be given particular attention. Sometimes we focus on the negative aspects of these sectors (such as potential job losses and their carbon emissions). But it is just as important to understand that these can and will play an important role in driving down carbon emissions by producing or using new technologies and skills.

Therefore, we have used intelligence and data directly from these sectors.

Construction and manufacturing has a much larger role to play in Wales than other sectors, contributing almost double the proportion of greenhouse gas emissions (24%) compared to the UK as a whole (12%).[17] The construction sector employs 73,300 people in Wales[18].

Retrofitting involves making changes to existing buildings. The current retrofit agenda is focused on introducing green technologies, such as heat pumps, better insulation, and solar to buildings across Wales. To meet the net zero targets by 2050, the Construction Industry Training Board (CITB) states that 50,000 homes in Wales will need to be retrofitted with green home technologies and systems from 2020 onwards.

> "Each such project requires the skills of a surveyor to assess current condition and any requirements for repair, an energy specialist to model current performance and design an upgrade solution, a project manager to supervise the retrofit programme, and various different trades people are required to implement all the recommendations."
> *CITB*

Therefore, the skills requirements for RetroFit are immediate and urgent. The number of new workers needed is projected to peak in 2028. The CITB stresses that jobs are likely to be created not just in the installation and maintenance of the green technologies – such as heating systems – but jobs associated with all parts of the construction process.

Electric trades, heating engineering and air-conditioning engineers, labourers, building envelope specialists, project managers, and construction supervisors are all forecast to see sharp rises in the number of required jobs.

The CITB have produced Full-Time Equivalent (FTE) job projections for RetroFit activity from 2020 to 2050 for occupations within the construction sector.

By 2028, the CITB forecasts that Wales will need:[19]

- 2,500 Construction Project Managers (including RetroFit Coordinators)
- 2,800 Plumbers and HVAC Trades
- Just under 900 Building Envelope Specialists
- 1,400 Labourers.

Specialist training requirements:

- 1,600 Asbestos awareness training
- 800 Trustmark Approved RetroFit Co-Ordinators
- 700 Trustmark Approved Retrofit Designers.

[17] https://gov.wales/sites/default/files/publications/2021-03/the-path-to-a-net-zero-wales-advice-report.pdf.

[18] https://statswales.gov.wales/Catalogue/Business-Economy-and-Labour-Market/People-and-Work/Employment/Jobs/Whole-Workforce/workplaceemployment-by-industry-area.

[19] CITB presentation to Cardiff Capital Region Skills Partnership 'Building Skills for the future' March 2021.

The CITB also provides information on the kinds of activities and skills that may be associated with RetroFit. However, the main challenge in providing more robust predictions is that every building requires an individual assessment and plan.

The CITB's review of several case studies across the UK found the common energy efficiency interventions were:

- Insulation (lofts, cavity walls, solid walls, floors)
- Airtightness
- Glazing (double and triple, secondary).

The CITB has reviewed how the skills requirements associated with 'other' green technologies can be fulfilled.[20]

Hydrogen is a technology under consideration due to the viability of the technology roll out. The current workforce should be able to transition into fitting hydrogen boilers as well as maintaining and repairing a hydrogen network. It provides a good case study of how an existing pathway can be converted and is said to be "the easiest" of all pathways the CITB considered. Some hydrogen-ready boilers have already been developed by manufacturers and conversion training for Gas Safe engineers is likely to take around one day. Pipework in the network will also need to be surveyed by qualified surveyors and repaired by a smaller number of fitters.

The CITB has also provided a scenario in which property-by-property **heat pump** conversion is undertaken to either an air-source or ground-source heat pump. This would involve an initial survey and system specification as well as the installation. Heat pump installation in a new build is estimated to take 6 working days, 8 working days to retrofit an existing home, and 3 working days to replace a heat pump. Heating system installers would need to upskill and the CITB have provided training content that could account for 40 hours of training. Over the next four years, a rapid increase in training will be needed. Although, at a UK level, the CITB believes that this is possible within the capacity of existing training facilities.

The CITB provide estimates on the skills demand associated with heat networks and on-site energy. However, these either consider infrastructure projects (in the case of heat networks) or require a mix of technologies (on-site energy). These are not included in this report.[21]

Relatedly, Construct Net Zero Cymru, a group of construction education professionals based at the University of Swansea and University of Wales Trinity St David's, is calling for a more coordinated approach to providing the skills required by the construction sector in Wales. They argue that the current training offering around green construction skills is limited in Wales. They would like to see a strategy that offers training from levels 1-7 and that better links further education (FE), higher education (HE), and other providers across Wales.

For reference, we have outlined the current training provision across FE institutions in sections 14 - 17 of this report.

7 Manufacturing

Reducing carbon emissions generated by the manufacturing sector is considered more challenging than other sectors. This is because manufacturing works with a wide variety of materials and practices, each of which may require their own plan towards decarbonisation.

To tackle this challenge, the South Wales Industrial Cluster was established to bring industries including oil refining, paper, nickel, insulation, chemicals, liquified natural gas import, coin

[20] https://www.citb.co.uk/media/vnfoegub/b06414_net_zero_report_v12.pdf.

[21] Ibid.

production, general manufacturing, steel, and cement together. These industries are working alongside energy generation and distribution companies as well as partners in academia to develop an advanced net-zero industrial cluster by 2040.

The Cluster aims to do this by:

- Exploring local solutions to Carbon Capture, Utilisation, and Storage.
- Supporting the initiation of a South Wales Hydrogen economy.
- Understanding the future demand for renewables.
- Mapping the infrastructure for delivering net-zero.
- Initiating a vision for a circular economy.
- Helping the industry to develop their own decarbonisation plans and helping to demonstrate how they can support the overall vision through integration with society.[22]

The Cluster is referenced in the Climate Change Committee's 'Advice Report: The path to a Net Zero Wales.' The report calls for an industrial decarbonisation strategy that establishes business models for electrification, hydrogen-use in manufacturing and carbon capture and storage. Decarbonisations plans will need to be developed with members of the Cluster and that *deep decarbonisation,* the phasing out of carbon-emitting fuels, will take place during the 2030s.[23]

Work towards these plans is just beginning. Therefore, training and skills needed to fulfil the vision across Wales are unknown at this stage.

We suggest that RSPs continue to monitor the Cluster's progress, as well as engage with specific industries within their regions to understand how decarbonisation will impact them.

[22] https://www.theccc.org.uk/wp-content/uploads/2020/12/Advice-Report-The-path-to-a-Net-Zero-Wales.pdf.

[23] Ibid.

8 Engineering

Across Great Britain, the Engineering Construction Industry Training Board (ECITB) workforce census captures data on the companies and workforce in:

- Nuclear
- Oil and gas
- Power generation
- Renewables
- Chemicals
- Pharmaceuticals
- Food and drink
- Water treatment
- Others (including steel, cement, glass, paper, and brewing).

In the 2021 Census, 107 companies responded to the question around which net zero technology they perceive has the greatest potential for growth. The results show that biofuels, carbon capture and storage (CCS), hydrogen, and nuclear are perceived to be the most likely areas to grow. However, nuclear also appeared at the bottom of many respondents' lists. The ECITB note that *"it is clear that nuclear is an area identified as either a huge opportunity or out of consideration without a significant in-between."*[24]

The skills gap is the difference between the required and available skills. Employers predict it will not improve over the next 3 years.[25] The issue is driven by skilled workers reaching retirement age, a lack of young employees entering the sector, new methods of working, and training being too time consuming.[26]

The Census shows that the engineering construction workforce is ageing, with nearly 40% of the workforce nearing retirement.[27] Additionally, the workforce is overwhelmingly male (86.2%) and white (96%).[28] There are not enough young, female, non-white workers entering the workforce to compensate for these upcoming retirements.

Additionally, younger workers are perceived by employers to lack the skills they desire (for the present and the future), including problem solving, management, team working, and safety management. However, some employers "suggested that health and safety training has taken too much of a front-seat in driving provision, and that there are gaps in knowledge in pragmatic areas such as 'economics' and 'working on a budget' and 'the importance of relationship management.'"[29] The ECITB recognises the issues around the skills gap and promotes the recognition of skills and qualification across sectors and jobs, including via skills passports.

Crucially, only 5% of employers predict a reduction in their workforce in the future, with 35% predicting an increase, and 43% assuming no change. Despite the workforce challenges, the sector is clearly confident about its long-term prospects and sees a role for itself in the green economy.

[24] https://www.ecitb.org.uk/wp-content/uploads/2021/10/Census-Report-1.pdf, p34.

[25] https://www.ecitb.org.uk/wp-content/uploads/2019/04/LMI-2019_LabourMarketOutlook.pdf, p4.

[26] https://www.ecitb.org.uk/wp-content/uploads/2019/04/LMI-2019_LabourMarketOutlook.pdf, p7.

[27] https://www.ecitb.org.uk/wp-content/uploads/2021/10/Census-Report-1.pdf, p24.

[28] https://www.ecitb.org.uk/wp-content/uploads/2021/10/Census-Report-1.pdf, p21/22.

[29] https://www.ecitb.org.uk/wp-content/uploads/2019/04/LMI-2019_LabourMarketOutlook.pdf, p7.

9 Transport

The UK government has set a deadline of 2030 for the ending of sales of conventional petrol cars and vans, followed by a deadline of 2035 for hybrids. The Consortium of British Industry (CBI) states that this will create significant job opportunities in two areas:

- electrification; and
- battery production.

At a UK level, over the next decade, the CBI states that 120,000 jobs could be directly impacted by this transition. This means many will either need to reskill or move to a new role. 80% of jobs in powertrains are at risk.[30] An additional challenge for skills planning is that there is still uncertainty around which technologies will be used and the differences between private transport and haulage. Haulage is still exploring which technologies can be successfully exploited including electric, hydrogen and low-carbon fuels.

The move to electric vehicles is also complicated by the potential future of autonomous vehicles and the globalised nature of the automotive industry. The Society of Motor Manufacturers and Traders identify a variety of skills that will be required in the future automotive industry including industrial chemistry, electric engineering, virtual modelling, software design, cyber security, digital science, engineering, and architecture. Given the breadth and variety of these skills, the future of the automotive industry and transport may need consideration as a 'new' multi-disciplinary industry, as opposed to a transition from a carbon industry to a low-carbon industry.[31]

10 Agriculture

Agriculture accounts for 5,297 kilotons of emissions, or 13.7% of Wales' total. This is a large amount in relation to the relatively small number of people employed in the sector. The sector is especially small in the Cardiff Capital Region (CCR). Agriculture, forestry, and fishing account for 0.7% of all employment in the region. In the regions of North Wales and South Wales, the sector accounts for 4.4% and 4.0% of employment, respectively. The sector is a major employer in Mid Wales accounting for 13.6% (13,199) of all employment in the region making it the third largest sector in terms of employment.

Agriculture is currently in a transition phase, as many policies, particularly around green issues, were affected by the UK's exit from the European Union. The development of a successor to the Common Agricultural Policy (CAP) is highlighted as a key priority by the UK Climate Change Committee.[32]

Welsh Government subsequently began a consultation to propose a regulatory basis for the Welsh Government to continue to support farmers, land managers, and the wider rural economy after the end of the EU Withdrawal Agreement Implementation Period[33]. The competitiveness of farming and food production was raised alongside the need to respond to the climate emergency, and therefore the 'greening'[34] of agricultural practices is likely to continue. It was anticipated that a Bill would appear in the current Senedd Term (2021).

We encourage the Mid Wales RSP to continue to monitor developments in this area. This will make sure that any emerging skills demands from further policy actions or wider trends, such as the loss of migrant labour associated with Brexit, are being accounted for.

[30] https://www.cbi.org.uk/media/6847/skills-and-training-for-the-green-economy-cbi-2021.pdf.

[31] https://www.cbi.org.uk/media/6847/skills-and-training-for-the-green-economy-cbi-2021.pdf.

[32] https://www.theccc.org.uk/wp-content/uploads/2020/12/Advice-Report-The-path-to-a-Net-Zero-Wales.pdf.

[33] https://gov.wales/sustainable-farming-and-our-land-simplifying-agricultural-support.

[34] https://gov.wales/sites/default/files/publications/2018-11/181107-basic-payment-scheme-greening-guidance.pdf.

11 Nuclear

There are currently no operational nuclear facilities in Wales. The Wylfa site on the Isle of Anglesey and the Trawsfynydd site in Gwynedd are at various stages of decommissioning. However, there are discussions around developing Small Modular Reactors (SMRs) at both sites, which are smaller, potentially safer, and more cost-efficient than larger-scale nuclear technologies.

As at January 2018, the Wylfa site employed 393 people and the Trawsfynydd site employed 159. These jobs were mainly in decommissioning.[35] Wylfa is unique amongst the 12 Magnox sites in the UK, in that it makes up 1.8% of jobs on the Isle of Anglesey, the local area. No other site represents more than 1% of the local job market.[36]

Every job at the Wylfa site supports 1.3 jobs in the host local authority, Isle of Anglesey, and 1.4 jobs in the host authority and the adjacent local authorities. The small difference between the two numbers implies that most of Wylfa's workforce lives on the Isle of Anglesey.[37]

Every job at the Trawsfynydd site supports 1.9 jobs in the host local authority, Gwynedd, and 2.0 jobs in the host authority and the adjacent local authorities. Again, the small difference between the two numbers implies that most of Trawsfynydd's workforce lives in Gwynedd.[38]

Workers at Magnox sites, including Wylfa and Trawsfynydd, are generally older than the average worker in the UK. Modelling shows that there is unlikely to be an over-supply of labour at the Wylfa plant between now and financial year 2036/37. Essentially, staff flow (hires and retirements) will balance the demand for labour over this period. However, at Trawsfynydd, there is likely to be an over-supply of labour, up to 89 people in some years.[39] This means that re-skilling is likely to be more of an issue at the Trawsfynydd site than at Wylfa.

The Nuclear Decommissioning Authority will provide £2 million to Grŵp Llandrillo Menai (the College Group comprising Coleg Llandrillo, Coleg Meirion-Dwyfor and Coleg Menai) to support the provision of qualifications in Construction, Automotive Engineering and Building Services, amongst others. The funding is aimed at supporting people in the North Wales region to gain the relevant skills and qualifications to find employment within the area.[40]

Also, Magnox, the body directly responsible for decommissioning at Wylfa and Trawsfynydd, has committed to spend nearly £100,000 on the Môn Communities First project. This project provides training and support to help people from deprived areas of Anglesey into employment.[41]

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35 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/725779/Economic_Impact_Assessment_of_Magnox_Sites_-_13-07-18_STC.pdf, p18.

36 Ibid.

37 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/725779/Economic_Impact_Assessment_of_Magnox_Sites_-_13-07-18_STC.pdf, p28

38 Ibid.

39 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/725779/Economic_Impact_Assessment_of_Magnox_Sites_-_13-07-18_STC.pdf, p81

40 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/725779/Economic_Impact_Assessment_of_Magnox_Sites_-_13-07-18_STC.pdf, p35

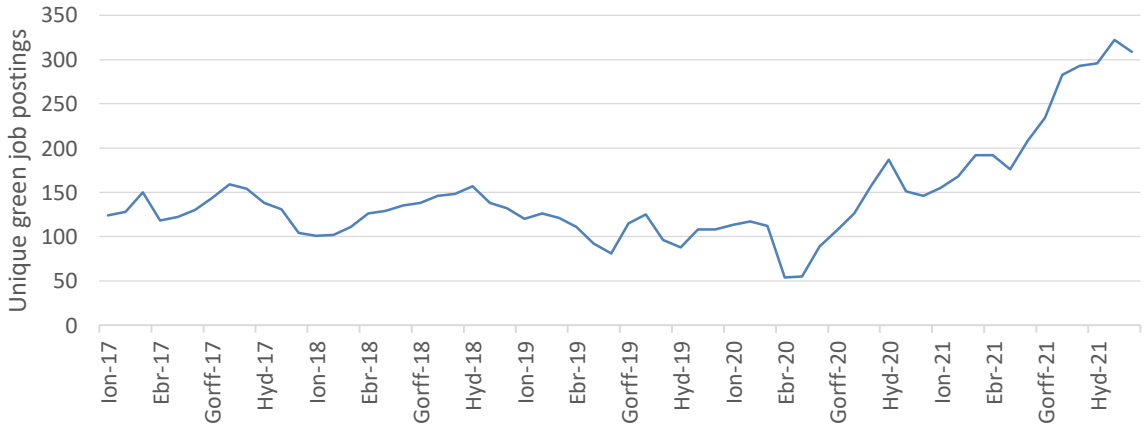
41 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/725779/Economic_Impact_Assessment_of_Magnox_Sites_-_13-07-18_STC.pdf, p78

12 The green jobs market in Wales

Emsi Burning Glass shows job postings across Wales. The data can be filtered by local authority, timescale, job titles, and more. To better understand *green jobs* that are being posted, they use an experimental list of 365 job titles that they consider to be part of the green economy. These job titles are available upon request.

There were 1,095 unique green job postings in Wales between January 2021 and December 2021, representing 0.4% of all job postings (273,406). **Figure 2Figure 2** shows the active unique job postings per month between January 2017 and December 2021.

Figure 2 - Number of unique green job postings, by month, Wales, January 2017 – December 2021



Source: Emsi Burning Glass – economicmodeling.com

A job can be posted several times on multiple websites. Therefore, the total postings may include multiple counts of a post. Unique postings are the number of jobs once these duplicates have been removed. Therefore, it is a more realistic representation of the true number of jobs that are available.

Table 11 shows the most commonly posted job titles were Recycling Workers (99 unique posts), Environmental Health and Safety Managers (63 unique posts), and Recycling Managers (59 unique posts).

Table 11 - Top 15 green job postings, Wales, by job title, January 2021 – December 2021

Job title	Total postings	Number of unique postings
Recycling Workers	179	99
Environmental Health and Safety Managers	107	63
Recycling Managers	119	59
Environmental Health Officers	96	53
Environmental Health and Safety Specialists	129	44
Environmental Consultants	122	42
Environmental Officers	73	40
Environmental Managers	79	31
Environmental Advisors	65	30
Environmental Engineers	74	28
Environmental Coordinators	79	27
Sustainability Consultants	88	27
Solid Waste Operators	36	25
Renewable Energy Engineers	49	24
Environmental Health and Safety Advisors	55	24

Source: Emsi Burning Glass – economicmodeling.com

Table 12 shows the most commonly posted occupations were Environment Professionals (154 unique posts), Health and Safety Officers (139 unique posts), and Refuse and Salvage Occupations (123 unique posts).

Table 12 - Top 15 green job postings, by occupation, Wales, January 2021 – December 2021

Occupation (SOC)	Total postings	Number of unique postings
Environment Professionals	336	154
Health and Safety Officers	323	139
Refuse and Salvage Occupations	243	123
Engineering Professionals n.e.c.	168	59
Science, Engineering and Production Technicians n.e.c.	138	48
Managers and Proprietors in Other Services n.e.c.	90	47
Other Skilled Trades n.e.c.	134	47
Plant and Machine Operatives n.e.c.	45	30
Quality Assurance and Regulatory Professionals	61	22
Marketing and Sales Directors	27	18
Construction and Building Trades n.e.c.	32	18
Marketing Associate Professionals	29	17
Chief Executives and Senior Officials	23	16
Elementary Storage Occupations	38	15
Other Administrative Occupations n.e.c.	23	14

Source: Emsi Burning Glass – economicmodeling.com

Emsi Burning Glass shows the skills that are listed in job adverts. These are split into **hard skills** and **common skills**. Hard skills are associated with a qualification or a specialist skill as opposed to those which a person may need or demonstrate in their everyday role (such as self-motivation, teamwork).

Table 13 shows that the most common hard skills included in green job postings across Wales in 2020-21. These include Environment Health and Safety (408 postings), Sustainability (320 postings), Auditing (259 postings), and Risk Analysis (235 postings).

Table 13 - Top hard skills found in unique green job postings, Wales, January 2021 – December 2021

Skill	Frequency in postings (%)	Postings with skill / Total postings
Environment Health And Safety	21	227 / 1,095
Sustainability	16	177 / 1,095
Risk Analysis	16	172 / 1,095
Auditing	16	170 / 1,095
ISO 14000 Series	11	118 / 1,095
Environmental Resource Management	9	102 / 1,095
Environmental Science	8	90 / 1,095
Environmental Management Systems	7	73 / 1,095
Waste Management	7	72 / 1,095
Environmental Health	6	69 / 1,095
Welsh Language	6	65 / 1,095
Environmental Laws	5	56 / 1,095
Key Performance Indicators (KPIs)	5	50 / 1,095
Environmental Consulting	4	49 / 1,095
Construction	4	48 / 1,095

Source: Emsi Burning Glass – economicmodeling.com

13 Future infrastructure projects

Across Wales, green infrastructure projects will have a large impact on job creation and therefore skills demand. These projects may cover a range of green activities including clean energy production, carbon capture, electric vehicle infrastructure, measures to improve biodiversity, and more.

However, it is impossible to know exactly which projects will exist in Wales in the future and new investments are likely to be announced at different points in time. Therefore, we have used estimates of the number of jobs likely to be created on projects that may take place. This provides RSPs with useful data which they can use if a project is announced in their region.

Following research, the Trade Union Congress (TUC) Wales proposed a list of 16 infrastructure projects (**Appendix C**) totalling £6 billion in public investment. While it is impossible to know whether these projects will come to fruition at this stage, the research is useful as it provides an analysis of two key measures for RSPs.

- **Potential job creation** - the largest absolute numbers of direct and supply chain jobs created by the project.
- **Potential jobs multiplier** - the number of direct and supply chain jobs created per £1 million investment.

Going forward this provides a useful framework for RSPs, as new infrastructure and spending projects are announced over the coming years. From this, RSPs can assess likely labour and therefore skills demand. Other organisations, such as the New Economics Foundation, praise this approach stating it *"give(s) a general illustration of the kinds of investment and jobs in*

infrastructure that would be required for a green recovery which sets Wales on a path to rapid decarbonisation."[42]

The projects that create the largest number of direct and supply chain jobs are in construction and RetroFit projects, as well as large-scale industrial projects such as the building of electric vehicle (EV) factories and steel industry decarbonisation.

Table *14* - Top 5 projects by potential job creation, Wales, 2020

Project	Average number of jobs created over 2-year stimulus
Build social housing (using domestic offsite manufacture)	12,138
Retrofit social housing	10,210
Expand and upgrade rail network	7,604
Build battery factories for EVs	5,130
Steel industry R&D for decarbonisation	4,317

Source: TUC Wales

Using a different measure, the number of jobs created for every million pounds spent (known as the employment multiplier effect), the types of jobs ranking at the top of the list changes. Top ranked jobs now include different types of green infrastructure projects such as energy efficiency upgrades, pedestrianisation and cycle lane schemes, and reforestation.

Table 15 – Top 5 projects by the potential number of jobs created per £1 million invested, Wales, 2020

Project	Number of jobs created per £1million invested per year
Energy Performance Certificates (EPCs) and Building Renovation Passport for all homes	33.00
Reforestation schemes	23.16
Retrofit social housing	22.00
Retrofit public buildings	21.44
Build cycle lanes and pedestrianisation	21.44

Source: TUC Wales

[42] Please note the list is not exhaustive and there are several potentially low carbon foundational sectors that are not captured by the report.

14 Cardiff Capital Region (CCR)

The Cardiff Capital Region (CCR) is made up of ***10*** local authorities: Blaenau Gwent, Bridgend, Caerphilly, Cardiff, Merthyr Tydfil, Monmouthshire, Newport, Rhondda Cynon Taf, Torfaen, and the Vale of Glamorgan. As of 2019, 713,600 people are employed in the region, representing 49.4% of the people employed in Wales.

With an estimated 661,214 households in the region (48.3% of the Wales total), retrofitting properties will be a major factor over the coming years. If Wales is to be net zero by 2050, the Welsh Energy Service believes the following needs to happen:

- 42,000 homes insulated
- 140,000 heat pumps installed
- 154,000 homes improved to EPC band D, C and B
- 112,000 homes moved from fossil fuelled to low carbon heating
- No new gas connection from 2025.

Compared to other regions in Wales, the CCR has less renewable electricity potential. The Welsh Energy Service shows energy being produced by two sources by 2035:

- 532 MW of onshore wind; and
- 830 MW of solar photovoltaic.

Employment in the CCR is broadly in line with the average for Wales, apart from in agriculture, in which fewer than average people work. There is a significant number of people working in sectors which are exposed to changes associated with a green economy. Specifically, **Table *16*** shows there are an estimated 83,000 people employed in production and 46,700 in construction in 2019.

Table 16 - Workplace employment, by sector, Cardiff Capital Region (CCR), 2019

Sector	Number of people who work in CCR	Percentage of CCR workforce (%)	Wales	Percentage of people in Wales who work in the sector (%)
Agriculture, forestry and fishing	4,800	0.7	44,600	3.1
Production	83,000	11.6	165,700	11.5
Construction	46,700	6.5	97,300	6.7
Wholesale, retail, transport, hotels and food	174,400	24.4	373,200	25.8
Information and communication	20,300	2.8	34,200	2.4
Finance and insurance activities	24,600	3.4	35,900	2.5
Real estate activities	10,900	1.5	19,600	1.4
Professional, scientific and technical activities; administrative and support service activities	96,700	13.6	175,400	12.1
Public administration, defence, education and health	216,100	30.3	425,300	29.5
Other service activities	36,000	5.0	72,800	5.0
Total	**713,600**	**100.0**	**1,444,100**	**100.0**

Source: StatsWales

Emsi Burning Glass shows data on current **job postings** which can be classified as a 'green job'. Between January 2021 and December 2021, there were 612 unique green jobs posted in the CCR. The median advertised wage was between £31,488 and £34,944 for each month of the year which is higher than the median advertised wage of between £24,000 and £28,480. This suggests that green jobs are better paid than the average job in the CCR.

A job can be posted a number of times on multiple websites; therefore, the total postings is not a 'true' figure of the number of jobs being advertised. A unique job represents the number of jobs once duplicates are removed. **Table *17***

Table *17* shows that the highest number of unique postings was for Recycling Workers at 52, followed by Environmental Health and Safety Managers, and Environmental Consultants and Environmental Health Officers, at 32 and 29.

Table 17 – Top 15 green job postings, by job title, Cardiff Capital Region, January 2021 – December 2021

Job title	Total postings	Number of unique postings
Recycling Workers	100	52
Environmental Health and Safety Managers	55	32
Environmental Consultants	88	29
Environmental Health Officers	60	29
Environmental Health and Safety Specialists	58	26
Sustainability Consultants	82	26
Environmental Engineers	70	24
Environmental Advisors	58	23
Recycling Managers	69	22
Environmental Health and Safety Advisors	49	19
Environmental Managers	44	18
Solid Waste Operators	26	17
Environmentalists	35	14
Environmental Coordinators	35	14
Renewable Energy Analysts	19	14

Source: Emsi Burning Glass – economicmodeling.com

Emsi Burning Glass map these jobs to occupations that are listed in the Standard Occupational Classification (SOC). As shown in

Table *18* the most common posted occupations were Environment Professionals (93 unique job postings) and Health and Safety Officers (84 unique job postings).

Table 18 – Top 15 green job postings, by occupation, Cardiff Capital Region, January 2021 – December 2021

Occupation (SOC)	Total postings	Number of unique postings
Environment Professionals	221	93
Health and Safety Officers	183	84
Refuse and Salvage Occupations	171	78
Engineering Professionals n.e.c.	115	42
Other Skilled Trades n.e.c.	98	36
Managers and Proprietors in Other Services n.e.c.	46	29
Science, Engineering and Production Technicians n.e.c.	43	17
Quality Assurance and Regulatory Professionals	48	14
Physical Scientists	42	13
Marketing and Sales Directors	18	12
Marketing Associate Professionals	23	12
Caretakers	21	11
Production Managers and Directors in Mining and Energy	31	10
Chemical Scientists	24	7
Construction and Building Trades n.e.c.	11	7

Source: Emsi Burning Glass – economicmodeling.com

Within the region, Cardiff had the most unique green postings at 270, followed by Newport at 99 and Bridgend at 49.

Table 19 – Number of unique green job postings, by local authority, January 2021 - December 2021

Local authority	Number of unique postings
Cardiff	270
Newport	99
Bridgend	49
Monmouthshire	36
Caerphilly	33
Blaenau Gwent	32
Merthyr Tydfil	27
Rhondda Cynon Taf	22
Vale of Glamorgan	22
Torfaen	22

Source: Emsi Burning Glass – economicmodeling.com

Cardiff Capital Region City Deal was the first **growth deal** in Wales. The region is focused on investing across a range of sectors, including upgrading housing stock and transport infrastructure through the new South Wales Metro project. The Region has an Energy Vision that lays out a route to carbon neutrality by 2050. To achieve this, they estimate that there needs to be a 51% reduction in domestic heat and power emissions, a 54% reduction in commercial and industrial emissions, and a 60% reduction in road transport emissions.[43]

[43] https://www.cardiffcapitalregion.wales/about-ccr/#priority-sectors.

The Region notes that around a sixth of the energy consumed by the public and business is generated from renewable sources. Moving the remaining energy generation to renewable/low carbon sources is key to the Region's decarbonisation strategy. Alongside this central issue, the Region is consulting with key stakeholders to define a work programme for the coming years.[44]

CCR skills partnership worked with FE providers within the Region to identify **green skills provisions**. The results show that there is limited provision for standalone green skills. However, many existing courses have elements or themes that resonate with the green agenda. These courses are listed in **Table 20**.

[44] https://www.cardiffcapitalregion.wales/news-events/latest-news/shaping-the-plan-to-action-our-energy-vision-and-strategy/.

Table *21* shows courses that are available as part of the Personal Learning Account (PLA) in Wales. This scheme is fully funded by Welsh Government and offers anyone over the age of 18 and earning less than £29,534 access to courses at FE institutions across Wales. Some PLA courses are also offered via the mainstream routes at colleges, so some duplication is visible across the tables.

Through engagement with the FE providers in the Region, it is clear that providers are looking to expand their green offerings. As an example, College Merthyr Tydfil are developing plans for a brand new Sustainable and Renewable Technology Centre to replace their existing Construction, Motor Vehicle and Engineering building. Similarly, Bridgend College have recently launched a STEAM Academy.

Table 20 – Courses related to the green agenda delivered by further education (FE) institutions, Cardiff Capital Region, 2020-21

Sub-sector		Related Further Education (FE) provision in Cardiff Capital Region
Low-carbon electricity	Solar	Level 3 Award in the Installation and Maintenance of Small Scale Solar Photovoltaic Systems
		Level 3 Award in the Installation and Maintenance of Solar Thermal Hot Water Systems
		NICEIC Solar Photovoltaic (4 Days) - Part time
		NICEIC Solar Photovoltaic Maintenance (2 Days) - Part time
		Level 3 EAL certificate in Standby Battery Systems - Part time
		Level 3 Award in the Installation and Maintenance of Small Scale Solar Photovoltaic Systems - Part time
		Photovoltaics (3 days) - Part time
		Level 3 NICEIC award in the Installation and Maintenance of Solar Thermal Hot Water Systems - Part time
		Solar thermal hot water awareness (1 day) - Part time
		Solar thermal hot water (2 day) - Part time
	Nuclear	Level 3 Engineering (including Enhanced): Unit 3: Engineering Product Design and Manufacture
	Wind	HNC General Engineering - Unit: 1 Engineering World Renewable Energy
	Other	Level 2 Engineering: Unit 1 - The Engineering World & Unit 2 - Investigating an Engineering Product, Environmental impact
		Level 3 Engineering (including Enhanced): Unit 39: Modern Manufacturing Systems & Unit 3: Engineering Product Design and Manufacture
Low-carbon heat	Heat pumps	Level 3 Award in the Installation and Maintenance of Heat Pumps Systems (Non-refrigerant Circuits)
		Level 3 Award in Plumbing (covers solar thermal, photovoltaic, heatpumps, wind generation, CHP, and biomass

		EAL Plumbing (covers solar thermal, photovoltaic, heatpumps, wind generation, CHP, and biomass)
		Level 2 and level 3 in Installation and Maintenance of Photovoltaic/Ground Source Heat Pumps
		Samsung Heat Pumps
		NICEIC Domestic Heat Pumps Ground Source and Air Source - Part time
		Heat pumps (5 days) - Part time
		Level 3 in Energy Efficiency Measure of Older Buildings (Heritage)
		Level 2 and level 3 award in Plumbing Studies: Units within qualification cover renewables
		Foundation Level 2 in Construction
		Progression Level 2 in Construction
		Level 2 and 3 Apprenticeships
		Level 3 Diploma in Construction & Built Management
		Foundation Degree in Construction
		BPEC Battery Storage Training course - Part time
		Domestic Energy Assessor (3-5 day) - Part time
		HNC/D in Construction and the Built Environment
		Level 3 Award in Construction Management
Energy efficient products	Smart controls	Level 2 WBL framework award in Construction Maintenance: Covers solar, photovoltaic, SMART tech
		Level 2 and Level 3 award in Electrical Installation: Units within qualification cover Renewables
Low emissions vehicles and infrastructure	Electric vehicles	Level 3 Award in Domestic Electric Vehicle Charging Equipment Installation

		Level 3 Award in Domestic, Commercial and Industrial Electric Vehicle Charging Equipment Installation
		Levels 1, 2, and 3 Awards in Hybrid and EV Maintenance
		Level 1 award in Introduction to Electric and Hybrid Vehicle High Energy Systems
		Level 2 award in Safe Maintenance of Electric and Hybrid Vehicles
		Level 2 award in Hazard Management of Electric and Hybrid Vehicles
		Level 3 award in Component Removal and Replacement in Electric and Hybrid Vehicles
		Level 4 award in Diagnosis and Rectification of Faults in Electric and Hybrid Vehicles
		Electric Vehicle Charging Course
		Electric Vehicle Charging course NICEIC or EAL - CIST
		Level 2 award in Hybrid/Electric Vehicle Operation and Maintenance
		Level 3 award in Hybrid/Electric Vehicle Repair and Replacement
		Level 3 award in Installation of Electric Vehicle Charging Points
		Level 2 Btec in Engineering: Unit 30 Vehicle engines and systems
Other	Agriculture and forestry	Level 3 Diploma in Forestry
		Level 2 Diploma in Countryside Management
		Level 2 Environmental Conservation (Apprenticeship)
		Woodland management/chainsaw programmes - Part time
		Specialist provision re-green reforestation techniques - Part time

	Insulation	NICEIC Energy Efficiency - Part time
	Retrofit	BPEC (NICEIC) Water Regulations - Part time
		BPEC Warm Water Underfloor Heating Systems - Part time
		NICEIC Water Regulations - CIST - Part time
		Understanding Domestic Retrofit - Part time
		Energy Retrofit Assessor/co-ordinator Training - Part time
		TrustMark approved Retrofit Assessor - Part time
		TrustMark approved Retrofit Coordinator - Part time
		Domestic Energy Assessor - Part time
		Non-Domestic Energy Assessor - Part time
		NEBOSH Certificate in Environmental Management - Part time
		Principles of Sustainable Resource Management - Part time
		PMO Industrial Environment Awareness - Part time
		Level 2 Dry Lining - Part time
		City & Guilds Level 2 NVQ Certificate in Insulation and Building Treatments (Construction) - Part time
		City & Guilds Level 2 NVQ Diploma in Insulation and Building Treatments (Construction) - Part time

Source: Cardiff Capital Region

Table 21 – Courses related to the green agenda approved for the Personal Learning Account (PLA), Cardiff Capital Region, 2021-22

Sub-sector		Related Personal Learning Account (PLA) approved provision in Cardiff Capital region, 2021/22
Low-carbon electricity	Solar	Level 3 Award in the Installation and Maintenance of Small Scale Solar Photovoltaic Systems
		Photovoltaics (3 days)
		Level 3 Award in the Installation and Maintenance of Solar Thermal Hot Water Systems
		Solar thermal hot water awareness (1 day)
		Solar thermal hot water (2 day)
	Nuclear	-
Low-carbon heat	Heat pumps	Samsung Heat Pumps
		Level 3 Award in the Installation and Maintenance of Heat Pumps Systems (Non-refrigerant Circuits)
		NICEIC Domestic Heat Pumps Ground Source and Air Source
		NICEIC Energy Efficiency
		BPEC Warm Water Underfloor Heating Systems
		BPEC Water Regulations
		BPEC Domestic Unvented Hot Water storage systems
		Heat pumps (5 days)
		Domestic energy assessor (3-5 day)
		Understanding Domestic Retrofit
		Energy Retrofit Assessor/co-ordinator Training
		TrustMark approved Retrofit Assessor*
		TrustMark approved Retrofit Coordinator
		HNC/D Construction and the Built Environment
		City and Guilds Sustainable Construction Certificate/Diploma

Sub-sector		Related Personal Learning Account (PLA) approved provision in Cardiff Capital region, 2021/22
		Domestic Energy Assessor
		Non-Domestic Energy Assessor
		Non-Domestic Energy Assessor (DSM) Training
Alternative fuels	Anaerobic digestion	-
	Hydrogen fuel cells	-
Energy efficient products	Smart controls	-
Low-carbon services	Consultancies and financial services	-
Low emissions vehicles and infrastructure		Level 2 Award in Hybrid/Electric Vehicle Operation and Maintenance
		Level 3 Award in Hybrid/Electric Vehicle Repair and Replacement (initial with capital)
		Level 3 Award in Hybrid/Electric Vehicle Repair and Replacement (subsequent without capital)
		Level 3 Award Installation of Electric Vehicle Charging Points
		BPEC Battery Storage Training course
Other		NEBOSH Certificate in Environmental Management
		Principles of Sustainable Resource Management
		PMO Industrial Environment Awareness
		Level 2 Dry Lining
		City & Guilds Level 2 NVQ Diploma in Insulation and Building Treatments (Construction)
		CITB SEATS – Site Environmental Awareness Training Scheme
		WAMITAB Level 4 High Risk Operator
		WAMITAB Level 3 Medium Risk Operator

Source: Cardiff Capital Region

15 North Wales Region

The North Wales Region is made up of ***six*** local authorities: Isle of Anglesey, Gwynedd, Conwy, Flintshire, Denbighshire, and Wrexham. As of 2019, an estimated 315,500 people were employed in the region representing 21.8% of the total people employed in Wales.

The Region has an estimated 306,228 number of households representing 22.4% of the Welsh total.

North Wales is estimated to consume 23% of the total energy consumed in Wales.

The Welsh Energy Service provides modelling assumptions on the role each region can play in making Wales net zero by 2020. North Wales is highlighted as having a promising renewable energy capacity. It currently hosts 37% of Wales' renewable energy capacity and has 1,183 MW of renewable energy installed in the region.

By 2035, the Welsh Energy Service show North Wales producing energy from:

- 2.8 GW of offshore wind
- 300 MW of small scale modular nuclear reactors
- 310 MW onshore wind
- 180 MW tidal stream
- 1 GW tidal lagoon.

This represents a much larger output than other regions in Wales. Each technology will have its own specific skills requirements and demands. Therefore, we encourage the North Wales RSP to give particular focus to this area. It is estimated to create 64,400 jobs.

If Wales is to be net zero by 2050, the Welsh Energy Service believes that domestic properties will need the following to happen:

- 30,000 homes insulated
- 65,500 heat pumps installed
- 35% of homes improved to EPC band D, C, and B
- 67,000 homes moved from fossil fuel to low carbon heating
- No new gas connections from 2025.

71% of North Wales' electricity consumption is because of commercial and industrial sources which is a higher proportion than other regions.

The North Wales Region has a slightly higher percentage of people working in sectors that are likely to be exposed to a green transition than the Wales average. Construction employs a slightly higher percentage of people in the region at 13.4% compared to 11.5% in Wales. This is also true of production at 7.2% in the region compared to 6.7% in Wales. Agriculture is 4.4% in the region compared to 3.1% in Wales. This suggests a higher proportion of workers in North Wales may be at risk of being impacted by a green transition.

Table 22 - Workplace employment, by sector, North Wales Region, 2019

Sector	Number of people who work in the North Wales Region	Percentage of North Wales Region workforce (%)	Wales	Percentage of people in Wales who work in the sector (%)
Agriculture, forestry and fishing	13,800	4.4	44,600	3.1
Production	42,400	13.4	165,700	11.5
Construction	22,800	7.2	97,300	6.7
Wholesale, retail, transport, hotels and food	86,200	27.3	373,200	25.8
Information and communication	5,800	1.8	34,200	2.4
Finance and insurance activities	3,400	1.1	35,900	2.5
Real estate activities	3,600	1.1	19,600	1.4
Professional, scientific and technical activities; administrative and support service activities	33,700	10.7	175,400	12.1
Public administration, defence, education and health	87,400	27.7	425,300	29.5
Other service activities	16,300	5.2	72,800	5.0
Total	**315,500**	**100.0**	**1,444,100**	**100.0**

Source: StatsWales

Emsi Burning Glass shows data on current **job postings** which can be classified as a 'green job'. Between January 2021 and December 2021, there were 212 unique green jobs posted in the North Wales Region. The median advertised wage is reported on a monthly basis and varied between £20,608 and £31,488 between January 2021 and December 2021. This is very volatile but reflects the relatively small sample sizes at different points in the year due to the COVID-19 pandemic.

Going forward, we suggest that the North Wales RSP monitor this figure, so a more reliable analysis can be made in comparing green jobs to all jobs in the Region's economy.

A job can be posted a number of times on multiple websites; therefore, the total postings is not a 'true' figure of the number of jobs being advertised. A unique job represents the number of jobs once the duplicates are removed. **Table 23** shows that the most unique postings were Recycling Workers (31 unique job postings). This was followed by Environmental Officers (21 unique job postings) and Recycling Managers (18 unique job postings).

Table 23 - Top 15 green job postings, North Wales Region, by job title, January 2021 – December 2021

Job title	Total postings	Number of unique postings
Recycling Workers	60	31
Environmental Officers	29	21
Recycling Managers	25	18
Environmental Health and Safety Managers	25	17
Renewable Energy Engineers	18	13
Solar Panel Installers	13	8
Conservation Officers	8	6
Environmental Advisors	6	6
Solid Waste Operators	8	6
Environmental Health Officers	9	6
Environmental Managers	13	5
Recycling Assistants	10	5
Environmental Health and Safety Assistants	13	5
Environmental Coordinators	31	5
Environmental Health and Safety Specialists	22	4

Source: Emsi Burning Glass – economicmodeling.com

Emsi Burning Glass map these jobs to occupations listed in the Standard Occupational Classification (SOC). As shown in **Table 24** the most common posted occupations were Refuse and Salvage Occupations (26 unique job postings) and Health and Safety Officers (24 unique job postings).

Table 24 - Top 15 green job postings, North Wales Region, by occupation, January 2021 – December 2021

Occupation (SOC)	Total postings	Number of unique postings
Refuse and Salvage Occupations	42	26
Health and Safety Officers	61	24
Environment Professionals	26	19
Plant and Machine Operatives n.e.c.	21	17
Chief Executives and Senior Officials	19	13
Science, Engineering and Production Technicians n.e.c.	37	12
Construction and Building Trades n.e.c.	15	9
Farm Workers	15	8
Managers and Proprietors in Other Services n.e.c.	15	6
Quality Assurance and Regulatory Professionals	11	6
Health Associate Professionals n.e.c.	14	6
Conservation Professionals	6	5
Medical and Dental Technicians	7	5
Engineering Professionals n.e.c.	29	4
Marketing Associate Professionals	5	4

Source: Emsi Burning Glass – economicmodeling.com

Within the region, Flintshire had the most unique green postings at 61, followed by Conwy at 56.

Table 25 – Number of unique green job postings, by local authority, January 2021 – December 2021

Local authority	Unique postings
Flintshire	61
Wrexham	56
Conwy	39
Gwynedd	23
Denbighshire	19
Isle of Anglesey	14

Source: Emsi Burning Glass – economicmodeling.com

Ambition North Wales and the **North Wales Growth Deal** are investigating five low carbon projects, as part of their aim to generate investment in the region. These projects are generally in the early stages of development and projected impacts are therefore susceptible to change.

The Region wishes to establish a Low Carbon Energy Centre of Excellence in partnership with Bangor University and M-Sparc. This project is predicted to generate 26 jobs and contribute around £24 million to Gross Value Add (GVA) in the Region.[45]

Morlais is an island off the coast of Anglesey which has potential as a site of tidal technology development. The region is exploring connecting the island to the electricity grid to allow future tidal developments to plug the energy they create into the national system easily and more cheaply. This project is expected to create up to 110 jobs, contribute £79 million in GVA, and save 200,000 tonnes of carbon emissions.[46]

The growth deal is supporting and investing in a second energy generation project, at the Trawsfynydd nuclear power plant. They are looking to invest in Small and Advanced Modular Reactors (SMRs). These are cleaner than previous nuclear technologies. If the project proceeds to completion, it is estimated that around 550 new jobs will be created, up to 700 MegaWatts of electricity could be generated, and the site could save around 2.7 million tons of carbon emissions.[47]

The Smart Local Energy project is designed to support renewable and decarbonising local energy projects. This project is projected to create around 190 new jobs and contribute to decarbonisation in the Region.[48]

Similarly, the Transport Decarbonisation project is in the very early stages but is hoped will support the transition to clean hydrogen power being integrated into the transport network. If successful, this project could generate around 95 jobs.[49]

The North Wales Skills Partnership worked with FE providers within the Region to identify **green skills provisions**. The results show that there is limited provision for standalone green skills. However, many existing courses have elements or themes that resonate with the green agenda. These courses are listed in **Table 26.**

[45] https://ambitionnorth.wales/low-carbon-energy/low-carbon-energy-centre-of-excellence-egni/.

[46] https://ambitionnorth.wales/low-carbon-energy/morlais/.

[47] https://ambitionnorth.wales/low-carbon-energy/trawsfynydd/.

[48] https://ambitionnorth.wales/low-carbon-energy/smart-local-energy/.

[49] https://ambitionnorth.wales/low-carbon-energy/transport-decarbonisation/.

Table 27 shows courses that are available as part of Personal Learning Account (PLA) in Wales. This scheme is fully funded by Welsh Government and offers anyone over the age of 18 and earning less than £29,534 to access courses at further education institutions across Wales. Some PLA courses are also offered via the mainstream routes at colleges, so some duplication is visible across the tables.

Table 26 – Courses related to the green agenda delivered by further education (FE) institutions, North Wales Region, 2020-21

Sub-sector		Related Further Education (FE) provision in North Wales Region
Low-carbon electricity	Solar	NICEIC Solar Photovoltaic (4 Days) - Part time
		NICEIC Solar Photovoltaic Maintenance (2 Days) - Part time
		Level 3 EAL certificate in Standby Battery Systems - Part time
		Level 3 Award in the Installation and Maintenance of Small Scale Solar Photovoltaic Systems - Part time
		Photovoltaics (3 days) - Part time
		Level 3 NICEIC award in the Installation and Maintenance of Solar Thermal Hot Water Systems - Part time
		Solar thermal hot water awareness (1 day) - Part time
		Solar thermal hot water (2 day) - Part time
	Nuclear	Level 3 Engineering (including Enhanced): Unit 3: Engineering Product Design and Manufacture
		Diploma Radiation Protection L3 PaaVqset - GQA - Part time
		Diploma Radiation Protection L2 PaaVqset - GQA - Part time
	Wind	RWE Wind Turbine Apprenticeships
		Diploma in Power Engineering (Wind Turbine)
		HNC General Engineering - Unit: 1 Engineering World Renewable Energy
	Other	Level 2 Engineering: Unit 1 - The Engineering World & Unit 2 - Investigating an Engineering Product, Environmental impact
		Level 3 Engineering (including Enhanced): Unit 39: Modern Manufacturing Systems & Unit 3: Engineering Product Design and Manufacture
		HNC General Engineering: Unit: Renewable Energy
		Degree Apprenticeship (Mechanical Engineering Systems/Electrical & Electronic Engineering Systems): Unit - Renewable Energy

Sub-sector		Related Further Education (FE) provision in North Wales Region
		Level 2 and level 3 in Installation and Maintenance of Photovoltaic/Ground Source Heat Pumps
		Samsung Heat Pumps - Part time
		Level 3 Award in the Installation and Maintenance of Heat Pumps Systems (Non-refrigerant Circuits) - Part time
		NICEIC Domestic Heat Pumps Ground Source and Air Source - Part time
		Heat pumps (5 days) - Part time
		Level 3 in Energy Efficiency Measure of Older Buildings (Heritage)
Low carbon heat	Heat pumps	Level 2 and level 3 in Installation and Maintenance of Photovoltaic/Ground Source Heat Pumps
		Samsung Heat Pumps - Part time
		Level 3 Award in the Installation and Maintenance of Heat Pumps Systems (Non-refrigerant Circuits) - Part time
		NICEIC Domestic Heat Pumps Ground Source and Air Source - Part time
		Heat pumps (5 days) - Part time
		Level 3 in Energy Efficiency Measure of Older Buildings (Heritage)
		Level 2 and level 3 award in Plumbing Studies: Units within qualification cover renewables
		Foundation Level 2 in Construction
		Progression Level 2 in Construction
		Level 2 and 3 Apprenticeships
		Level 3 Diploma in Construction & Built Management
		Foundation Degree in Construction
		BPEC Battery Storage Training course - Part time
		Domestic Energy Assessor (3-5 day) - Part time
		HNC/D in Construction and the Built Environment

Sub-sector		Related Further Education (FE) provision in North Wales Region
		Level 3 Award in Construction Management
Alternative fuels	Anaerobic digestion	-
	Hydrogen fuel cells	-
Energy efficient products	Smart controls	Level 2 WBL framework award in Construction Maintenance: Covers solar, photovoltaic, SMART tech
		Level 2 and Level 3 award in Electrical Installation: Units within qualification cover Renewables
Low-carbon services	Consultancies and financial services	-
Low emissions vehicles and infrastructure	Electric vehicles	Level 1 award in Introduction to Electric and Hybrid Vehicle High Energy Systems
		Level 2 award in Safe Maintenance of Electric and Hybrid Vehicles
		Level 2 award in Hazard Management of Electric and Hybrid Vehicles
		Level 3 award in Component Removal and Replacement in Electric and Hybrid Vehicles
		Level 4 award in Diagnosis and Rectification of Faults in Electric and Hybrid Vehicles
		Electric Vehicle Charging Course
		Electric Vehicle Charging course NICEIC or EAL - CIST
		Level 2 award in Hybrid/Electric Vehicle Operation and Maintenance
		Level 3 award in Hybrid/Electric Vehicle Repair and Replacement
		Level 3 award in Installation of Electric Vehicle Charging Points
		Level 2 Btec in Engineering: Unit 30 Vehicle engines and systems
Other	Agriculture and forestry	Level 3 Diploma in Forestry
		Level 2 Diploma in Countryside Management

Sub-sector		Related Further Education (FE) provision in North Wales Region
		Level 2 Environmental Conservation (Apprenticeship)
		Level 3 Diploma in Agriculture - Agri-Biodiversity
		Level 3 Conservation Management (Apprenticeships)
		Woodland management/chainsaw programmes - Part time
		Specialist provision re-green reforestation techniques - Part time
	Insulation	NICEIC Energy Efficiency - Part time
	Retrofit	BPEC (NICEIC) Water Regulations - Part time
		BPEC Warm Water Underfloor Heating Systems - Part time
		NICEIC Water Regulations - CIST - Part time
		Understanding Domestic Retrofit - Part time
		Energy Retrofit Assessor/co-ordinator Training - Part time
		TrustMark approved Retrofit Assessor - Part time
		TrustMark approved Retrofit Coordinator - Part time
		City and Guilds Sustainable Construction Certificate/Diploma - Part time
		Domestic Energy Assessor - Part time
		Non-Domestic Energy Assessor - Part time
		Non-Domestic Energy Assessor (DSM) Training - Part time
		NEBOSH Certificate in Environmental Management - Part time
		Principles of Sustainable Resource Management - Part time
		PMO Industrial Environment Awareness - Part time
		Level 2 Dry Lining - Part time
		City & Guilds Level 2 NVQ Certificate in Insulation and Building Treatments (Construction) - Part time

Sub-sector		Related Personal Learning Account (PLA) approved provision in North Wales Region, 2021-22
Low-carbon electricity	Solar	Level 3 Award in the Installation and Maintenance of Small Scale Solar Photovoltaic Systems
		Level 3 Award in the Installation and Maintenance of Solar Thermal Hot Water Systems
	Nuclear	-
Low-carbon heat	Heat pumps	NICEIC Domestic Heat Pumps Ground Source and Air Source
		NICEIC Energy Efficiency
		BPEC Water Regulations
		BPEC Domestic Unvented Hot Water storage systems
Alternative fuels	Anaerobic digestion	-
	Hydrogen fuel cells	-
Energy efficient products	Smart controls	-
Low-carbon services	Consultancies and financial services	-
Low emissions vehicles and infrastructure	Electric vehicles	Level 2 Award in Hybrid/Electric Vehicle Operation and Maintenance
		Level 3 Award in Hybrid/Electric Vehicle Repair and Replacement (initial with capital)
		Level 3 Award Installation of Electric Vehicle Charging Points
Other		CITB SEATS – Site Environmental Awareness Training Scheme

Sub-sector		Related Further Education (FE) provision in North Wales Region
		City & Guilds Level 2 NVQ Diploma in Insulation and Building Treatments (Construction) - Part time
		CITB SEATS – Site Environmental Awareness Training Scheme - Part time
		WAMITAB Level 4 High Risk Operator - Part time
		WAMITAB Level 3 Medium Risk Operator - Part time

Source: North Wales Regional Skills Partnership

Table 27 – Courses related to the green agenda approved for the Personal Learning Account (PLA), North Wales Region, 2021-22

Source: North Wales Regional Skills Partnership

16 South West Wales Region

The South West Wales Region is made up of ***four*** local authorities: Neath Port Talbot, Pembrokeshire, Swansea, and Carmarthenshire. 318,900 people are employed in the Region, representing 22.1% of Wales' workforce.

The Region has an estimated 310,159 households, representing 22.7% of the Welsh total.

Employment in the Region varies from the Wales averages. **Table 28** shows that the Production sector makes up 9.9% of the Region's workforce compared to 11.5% in Wales. Agriculture, forestry and fishing is marginally larger in the Region at 4.0% compared to 3.1% in Wales. A larger percentage of people work in Public administration, defence, education, and health (31.2% in the region compared to 29.5% in Wales).

Table 28 – Workplace employment, South West Wales Region, by sector, 2019

Sector	Number of people who work in the South West Wales Region	Percentage of South West Wales Region workforce (%)	Wales	Percentage of people in Wales who work in the sector (%)
Agriculture, forestry and fishing	12,900	4.0	44,600	3.1
Production	31,500	9.9	165,700	11.5
Construction	21,700	6.8	97,300	6.7
Wholesale, retail, transport, hotels and food	85,700	26.9	373,200	25.8%
Information and communication	6,200	1.9	34,200	2.4
Finance and insurance activities	7,200	2.3	35,900	2.5
Real estate activities	3,800	1.2	19,600	1.4
Professional, scientific and technical activities; administrative and support service activities	35,200	11.0	175,400	12.1
Public administration, defence, education and health	99,500	31.2	425,300	29.5
Other service activities	15,300	4.8	72,800	5.0
Total	**318,900**	**100.0**	**1,444,100**	**100.0**

Source: StatsWales

Emsi Burning Glass shows data on current **job postings** which can be classified as a 'green job'. Between April 2020 and March 2021, there were 204 unique job postings in the South West Wales Region. The median advertised wage in each month was between £21,504 and £34,944.

This is very volatile but reflects the relatively small sample sizes at different points in the year due to the COVID-19 pandemic.

Going forward, we suggest that the South West Wales RSP monitor this figure, so a more reliable analysis can be made in comparing green jobs to all jobs in the Region's economy.

As a job can be posted a number of times on multiple websites, the job total postings is not a 'true' figure of the number of jobs being advertised. A unique job represents the number of jobs once the duplicates are removed. **Table 29** shows that the most unique postings were Recycling Managers (15 unique job postings). This is followed by Wind Turbine Technicians (14 unique job postings).

Table 29 – Top 15 green job postings, by job title, South West Wales Region, January 2021 – December 2021

Job title	Total postings	Number of unique postings
Recycling Managers	17	15
Wind Turbine Technicians	56	14
Environmental Health and Safety Specialists	47	12
Environmental Health Officers	17	12
Environmental Consultants	31	11
Recycling Workers	13	11
Environmental Health and Safety Managers	17	9
Environmental Officers	25	8
Environmental Managers	22	8
Sustainability Managers	22	8
Environmental Assistants	7	6
Solar Pv Installers	11	5
Sustainability Officers	7	5
Environmental Health and Safety Advisors	6	5
Conservation Assistants	5	4

Source: Emsi Burning Glass – economicmodeling.com

Emsi Burning Glass map these jobs to occupations Listed in the Standard Occupational Classification (SOC). As shown in

Table *30* the most commonly posted occupations were Environment Professionals (33 unique job postings) and Health and Safety Officers (19 unique job postings).

Table 30 – Top 15 green job postings, by occupation, South West Wales Region, January 2021 – December 2021

Occupation (SOC)	Total postings	Number of unique postings
Environment Professionals	75	33
Health and Safety Officers	61	19
Engineering Professionals n.e.c.	24	13
Science, Engineering and Production Technicians n.e.c.	52	13
Managers and Proprietors in Other Services n.e.c.	29	12
Refuse and Salvage Occupations	18	12
Plant and Machine Operatives n.e.c.	10	9
Van Drivers	8	7
Marketing and Sales Directors	9	6
Other Administrative Occupations n.e.c.	9	5
Company Secretaries	6	5
Electricians and Electrical Fitters	9	5
Other Skilled Trades n.e.c.	12	5
Teaching and Other Educational Professionals n.e.c.	12	3
Quality Control and Planning Engineers	9	3

Source: Emsi Burning Glass – economicmodeling.com

Within the Region, Swansea had the most unique green postings (71), followed by Neath Port Talbot (55), Carmarthenshire (51), and Pembrokeshire (27).

Table 31 - Number of unique green job postings, by local authority, South West Wales Region, January 2021 – December 2021

Local authority	Number of unique postings
Swansea	71
Neath Port Talbot	55
Carmarthenshire	51
Pembrokeshire	27

Source: Emsi Burning Glass – economicmodeling.com

The **Swansea Bay City Deal** was established to bring together funding and expertise from the public, private, and academic sectors. The City Deal currently has nine projects in various stages of development, including digital and infrastructure projects. Most pertinent to this report are the Skills and Talent, Homes as Power Stations, Pembroke Dock Marine, and Innovation and Low Carbon Growth.

The Skills and Talent project aims to identify skills gaps and provide training to support the rollout of the City Deal projects and themes. This project has received business case approval from the UK and Welsh Government.[50]

The Homes as Power Stations project aims to improve the energy efficiency of new build homes and retrofit energy efficient and renewable technologies to existing homes. Specifically, the project aims

[50] https://www.swanseabaycitydeal.wales/projects/skills-and-talent/.

to deliver renewable energy solutions to 7,000 retrofits and 3,300 new builds within five years. Linked to this deliverable are the aims of developing a regional supply chain around renewable technologies, and sharing this learning. This project has received business case approval from the UK and Welsh Government.[51]

The Pembroke Dock Marine project comprises four elements:

- a Marine Energy Engineering Centre of Excellence;
- developments to the infrastructure at Pembroke Dock;
- a Marine Energy Test Area; and
- the Pembrokeshire Demonstration Zone.

This package of projects is predicted to contribute £73.5 million to the regional economy. This project has received business case approval from the UK and Welsh Government.[52]

The Innovation and Low Carbon Growth project comprises seven projects that focus on decarbonising the steel and metals industry, support the commercialisation of hydrogen technology, support the advanced manufacturing sector, and decarbonising journeys within the Region. This project has received business case approval from the UK and Welsh Government.[53]

South West Wales Skills Partnership worked with FE providers within the Region to identify **green skills provisions**. The results show that there is limited provision for standalone green skills. However, many existing courses have elements or themes that resonate with the green agenda. These courses are listed in **Table 32.**

Table 33 shows courses that are available as part of Personal Learning Account (PLA) in Wales. This scheme is fully funded by Welsh Government and offers anyone over the age of 18 and earning less than £29,534 to access courses at further education institutions across Wales. Some PLA courses are also offered via the mainstream routes at colleges, so some duplication is visible across the tables.

[51] https://www.swanseabaycitydeal.wales/projects/homes-as-power-stations/.

[52] https://www.swanseabaycitydeal.wales/projects/pembroke-dock-marine/.

[53] https://www.swanseabaycitydeal.wales/projects/supporting-innovation-and-low-carbon-growth/.

Table 32 – Courses related to the green agenda delivered by further education (FE) institutions, South West Wales Region, 2020-21

Sub-sector		Related Further Education (FE) provision in South West Wales Region
Low-carbon electricity	Solar	Level 3 Award in the Installation and Maintenance of Small Scale Solar Photovoltaic Systems
		Photovoltaics (3 days)
		Solar thermal hot water awareness (1 day)
		Solar thermal hot water (2 day)
	Nuclear	-
Low-carbon heat	Heat pumps	Samsung Heat Pumps
		Level 3 Award in the Installation and Maintenance of Heat Pumps Systems (Non-refrigerant Circuits)
		NICEIC Domestic Heat Pumps Ground Source and Air Source
		NICEIC Energy Efficiency
		BPEC Warm Water Underfloor Heating Systems
		BPEC Battery Storage Training course
		BPEC Water Regulations
		BPEC Domestic Unvented Hot Water storage systems
		Domestic energy assessor (3-5 day)
Alternative fuels	Anaerobic digestion	-
	Hydrogen fuel cells	Collaborative partnership between ourselves and River Simple Hydrogen Solutions to look at developing fully accredited courses designed at tailoring their workforce needs.
Energy efficient products	Smart controls	-
Low-carbon services	Consultancies and financial services	-
Low emissions vehicles and infrastructure	Electric vehicles	Pearson BTEC Level 3 National Extended Diploma in Electrical and Electronic Engineering
		Level 2 Award in Electric/Hybrid Vehicle Repair
		IMI Level 3 Award in Electric/Hybrid Vehicle System Repair and Replacement

Sub-sector		Related Further Education (FE) provision in South West Wales Region
Other		City & Guilds Level 2 Work based Practical Horticulture
		City & Guilds Level 2 Coppicing and Greenwood skills
		Level 2 and level 3 Award in Agricultural Engineering
		Level 1, 2, and 3 Award in Agriculture
		Foundation Apprenticeship - Agriculture
		Level 3 Apprenticeship - Agriculture
		Foundation Apprenticeship – Land based Engineering
		Level 3 Apprenticeship – Land based Engineering
		Higher Apprenticeship in Agriculture
		FdSc Agriculture
		BSc Agriculture
		Practical Horticulture
		Principles of Horticulture
		Pearson BTEC Level 3 National Diploma in Building Services Engineering
		City & Guilds Level 3 NVQ Diploma in Installing Electrotechnical Systems and Equipment (Buildings, Structures and the Environment)
		Level 1 Award in Environmental Awareness

Source: South West Wales Regional Skills Partnership

Table 33 – Courses related to the green agenda approved for the Personal Learning Account (PLA), South West Wales Region, 2021-22

Sub-sector		Related Personal Learning Account (PLA) approved provision in South West Wales Region, 2021-22
Low-carbon electricity	Solar	Level 3 Award in the Installation and Maintenance of Small Scale Solar Photovoltaic Systems
		Photovoltaics (3 days)
		Level 3 Award in the Installation and Maintenance of Solar Thermal Hot Water Systems
		Solar thermal hot water awareness (1 day)
		Solar thermal hot water (2 day)
Low-carbon electricity	Nuclear	-
Low-carbon heat	Heat pumps	Samsung Heat Pumps
		Level 3 Award in the Installation and Maintenance of Heat Pumps Systems (Non-refrigerant Circuits)
		NICEIC Domestic Heat Pumps Ground Source and Air Source
		NICEIC Energy Efficiency
		BPEC Warm Water Underfloor Heating Systems
		BPEC Water Regulations
		BPEC Domestic Unvented Hot Water storage systems
		Heat pumps (5 days)
		Domestic energy assessor (3-5 day)
		Understanding Domestic Retrofit
		Energy Retrofit Assessor/co-ordinator Training
		TrustMark approved Retrofit Assessor
		TrustMark approved Retrofit Coordinator
		HNC/D Construction and the Built Environment
		City and Guilds Sustainable Construction Certificate/Diploma
		Domestic Energy Assessor
		Non-Domestic Energy Assessor
		Non-Domestic Energy Assessor (DSM) Training

Sub-sector		Related Personal Learning Account (PLA) approved provision in South West Wales Region, 2021-22
		BPEC Battery Storage Training course
Alternative fuels	Anaerobic digestion	-
Alternative fuels	Hydrogen fuel cells	-
Energy efficient products	Smart controls	-
Low-carbon services	Consultancies and financial services	-
Low emissions vehicles and infrastructure	Electric vehicles	Level 2 Award in Hybrid/Electric Vehicle Operation and Maintenance
		Level 3 Award in Hybrid/Electric Vehicle Repair and Replacement (initial with capital)
		Level 3 Award in Hybrid/Electric Vehicle Repair and Replacement (subsequent without capital)
		Level 3 Award Installation of Electric Vehicle Charging Points
Other		NEBOSH Certificate in Environmental Management
		Principles of Sustainable Resource Management
		PMO Industrial Environment Awareness
		Level 2 Dry Lining
		City & Guilds Level 2 NVQ Certificate in Insulation and Building Treatments (Construction)
		City & Guilds Level 2 NVQ Diploma in Insulation and Building Treatments (Construction)
		CITB SEATS – Site Environmental Awareness Training Scheme
		WAMITAB Level 4 High Risk Operator
		WAMITAB Level 3 Medium Risk Operator

Source: South West Wales Regional Skills Partnership

17 Mid Wales Region

The Mid Wales Region is made up ***two*** local authorities: Powys and Ceredigion. As of 2019, an estimated 96,100 people were employed in the region, representing 6.7% of the people employed in Wales.

The Region has an estimated 91,108 households, representing 6.7% of the Welsh total.

The Mid Wales Region is estimated to make up 6% of the total energy consumed in Wales.

The Welsh Energy Service has provided modelling assumptions on the role each Region can play in making Wales Net Zero by 2020. There are a number of existing priorities:

- Retrofitting the region's housing and building stock.
- Working to ensure electricity and gas grids are ready for a decarbonised future.
- Using renewable energy sources.
- Accelerating a shift to zero carbon transport whilst improving the region's connectivity.
- Developing and harnessing the potential of agriculture to contribute to zero carbon energy.
- Harnessing innovation to support decarbonisation and clean growth.

In 2019, the Mid Wales Region has an almost even split in terms of energy demand, with 35% coming from commercial and industrial sources, 33% from domestic sources, and 32% from transport.

Going forward, the Wales Energy Service model shows Mid Wales currently has 25% of Wales' onshore wind capacity and 412 MW of renewable energy generated in the Region. Using this model, the Region will generate over twice as much electricity as it consumes. Energy generation from onshore wind and solar photovoltaic will rise to ~1 GW.

If Wales is to be net zero by 2050, the Welsh Energy Service believes that domestic properties will need the following to happen:

- 30,000 homes insulated
- 26,600 heat pumps installed
- Electrification of heating systems in off-grid homes
- No new gas connections from 2025.

Employment in the Region varies significantly to the Wales averages. 13.6% of employment is in agriculture, forestry and fishing, compared to 3.1% in Wales. Public administration, defence, education and health account for 23.2% of the region's workforce, compared to 29.5% across Wales. **Table 34** shows that construction and production are both slightly smaller; 6.5% of work in construction in the Region compared to 6.7% in Wales, and 9.2% work in production compared to 11.5% in Wales.

We note that differences between agriculture, forestry and fishing is significant and that the Mid Wales RSP may want to pay particular attention to this sector in terms of green skills. This is also reflected in modelling from the Wales Energy Service.

Table 34 - Workplace employment, by sector, Mid Wales Region, 2019

Sector	Number of people who work in the Mid Wales Region	Percentage of Mid Wales Region workforce (%)	Wales	Percentage of people in Wales who work in the sector (%)
Agriculture, forestry and fishing	13,100	13.6	44,600	3.1
Production	8,800	9.2	165,700	11.5
Construction	6,200	6.5	97,300	6.7
Wholesale, retail, transport, hotels and food	26,900	28.0	373,200	25.8
Information and communication	2,000	2.1	34,200	2.4
Finance and insurance activities	700	0.7	35,900	2.5
Real estate activities	1,300	1.4	19,600	1.4
Professional, scientific and technical activities; administrative and support service activities	9,700	10.1	175,400	12.1
Public administration, defence, education and health	22,300	23.2	425,300	29.5
Other service activities	5,100	5.3	72,800	5.0
Total	**96,100**	**100.0**	**1,444,100**	**100.0**

Source: StatsWales

Emsi Burning Glass shows data on current **job postings** which can be classified as a 'green job'. Between January 2021 and December 2021, there were 67 unique job postings in the Mid Wales Region. The average wage over this period for posts was £28,544. The advertised median wage in each month was between £20,480 and £34,688.

This is very volatile but reflects the relatively small sample sizes at different points in the year due to the COVID-19 pandemic.

Going forward, we suggest that the Mid Wales RSP monitor this figure, so a more reliable analysis can be made in comparing green jobs to all jobs in the Region's economy.

As a job can be posted a number of times on multiple websites, the job total postings is not a 'true' figure of the number of jobs being advertised. A unique job represents the number of jobs once the duplicates are removed. **Table 35** shows that the highest number of unique postings were Environmental Health Officers (6 unique job postings).

Table 35 – Top 15 green job postings, by job title, Mid Wales Region, January 2021 – December 2021

Job title	Total postings	Number of unique postings
Environmental Health Officers	10	6
Environmental Health and Safety Managers	10	5
Environmental Coordinators	8	5
Environmental Administrators	9	5
Recycling Workers	6	5
Wind Turbine Technicians	4	4
Recycling Managers	8	4
Environmental Assistants	3	3
Sustainability Officers	20	3
Environmental Operations Managers	5	3
Environmental Officers	3	2
Environmental Health and Safety Specialists	2	2
Conservation Officers	2	2
Environmental Health and Safety Officers	3	2
Renewable Energy Engineers	3	1

Source: Emsi Burning Glass – economicmodeling.com

Emsi Burning Glass map these jobs to the Standard Occupational Classification (SOC). As shown in **Table 36** the most commonly posted occupations were Health and Safety Officers (12 unique job postings) and Environment Professionals (9 unique job postings).

Table 36 – Top 15 green job postings, by occupation, Mid Wales Region, January 2021 – December 2021

Occupation (SOC)	Total postings	Number of unique postings
Health and Safety Officers	18	12
Environment Professionals	14	9
Refuse and Salvage Occupations	12	7
Science, Engineering and Production Technicians n.e.c.	6	6
Other Administrative Occupations n.e.c.	9	5
Elementary Storage Occupations	8	5
Higher Education Teaching Professionals	4	3
Medical and Dental Technicians	5	3
Animal Care Services Occupations n.e.c.	3	3
Electricians and Electrical Fitters	2	2
Other Skilled Trades n.e.c.	17	2
Electrical Engineers	3	1
Quality Assurance Technicians	2	1
Inspectors of Standards and Regulations	2	1
Biological Scientists and Biochemists	1	1

Source: Emsi Burning Glass – economicmodeling.com

Within the Region, Powys had the most unique green postings (55), followed by Ceredigion (12).

Table 37 – Number of unique green job postings, by local authority, Mid Wales Region, January 2021 – December 2021

Local authority	Number of unique postings
Powys	55
Ceredigion	12

Source: Emsi Burning Glass – economicmodeling.com

The **Mid-Wales Growth Deal** is not yet fully established. Heads of Terms were signed in December 2020 and work has been underway throughout 2021 to develop a work programme, with specific projects yet to be announced.

The Mid Wales Skills Partnership worked with FE providers within the Region to identify **green skills provisions**. The results show that there is limited provision for standalone green skills. However, many existing courses have elements or themes that resonate with the green agenda. These courses are listed in **Table 38.**

Table 39 shows courses that are available as part of Personal Learning Account (PLA) in Wales. This scheme is fully funded by Welsh Government and offers anyone over the age of 18 and earning less than £29,534 to access courses at further education institutions across Wales. Some PLA courses are also offered via the mainstream routes at colleges, so some duplication is visible across the tables.

Table 38 – Courses related to the green agenda delivered by further education (FE) institutions, Mid Wales Region, 2020-21

Sub-sector		Related Further Education (FE) provision in Mid Wales Region
Low-carbon electricity	Solar	-
	Nuclear	-
Low-carbon heat	Heat pumps	City & Guild Level 3 Award in Energy Awareness
		Level 2 Award in Understanding Domestic Retrofit
		Level 5 Diploma in Retrofit Coordination & Risk Management
		Retrofit Assessor Training
		City & Guilds Level 3 NVQ Diploma in Installing Electrotechnical Systems and Equipment (Buildings, Structures and the Environment)
Alternative fuels	Anaerobic digestion	-
	Hydrogen fuel cells	Collaborative partnership between ourselves and River Simple Hydrogen Solutions to look at developing fully accredited courses designed at tailoring their workforce needs.
Energy efficient products	Smart controls	-
Low-carbon services	Consultancies and financial services	-
Low emissions vehicles and infrastructure	Electric vehicles	Pearson BTEC Level 3 National Extended Diploma in Electrical and Electronic Engineering
		Level 2 Award in Electric/Hybrid Vehicle Repair
		IMI Level 3 Award in Electric/Hybrid Vehicle System Repair and Replacement
Other		Level 2 and level 3 Award in Agricultural Engineering
		Level 1, 2, and 3 Award in Agriculture
		Foundation Apprenticeship - Agriculture
		Level 3 Apprenticeship - Agriculture
		Foundation Apprenticeship – Land based Engineering
		Level 3 Apprenticeship – Land based Engineering
		Higher Apprenticeship in Agriculture

Sub-sector		Related Further Education (FE) provision in Mid Wales Region
		FdSc Agriculture
		BSc Agriculture
		Practical Horticulture
		Principles of Horticulture
		City & Guilds Level 2 Work based Practical Horticulture
		City & Guilds Level 2 Coppicing and Greenwood skills
		Building Engineering Services/Construction - SSA5
		Pearson BTEC Level 3 National Diploma in Building Services Engineering
		Level 1 Environmental Awareness module

Source: Mid Wales Regional Skills Partnership

Table 39 – Courses related to the green agenda approved for the Personal Learning Account (PLA), Mid-Wales Region, 2021-22

Sub-sector		Related Personal Learning Account (PLA) approved provision in Mid Wales Region, 2021-22
Low-carbon electricity	Solar	-
	Nuclear	-
Low-carbon heat	Heat pumps	Level 3 Award in the Installation and Maintenance of Heat Pumps Systems (Non-refrigerant Circuits)
		NICEIC Domestic Heat Pumps Ground Source and Air Source
		Understanding Domestic Retrofit
		TrustMark approved Retrofit Coordinator
		HNC/D Construction and the Built Environment
		Domestic Energy Assessor
		Non-Domestic Energy Assessor
Alternative fuels	Anaerobic digestion	-
	Hydrogen fuel cells	-
Energy efficient products	Smart controls	-
Low-carbon services	Consultancies and financial services	-
Low emissions vehicles and infrastructure	Electric vehicles	Level 2 Award in Hybrid/Electric Vehicle Operation and Maintenance
		Level 3 Award in Hybrid/Electric Vehicle Repair and Replacement (initial with capital)
		Level 3 Award Installation of Electric Vehicle Charging Points
Other		NEBOSH Certificate in Environmental Management
		Level 2 Dry Lining
		City & Guilds Level 2 NVQ Certificate in Insulation and Building Treatments (Construction)

Source: Mid Wales Regional Skills Partnership

18 Future actions and planning

Our goal has been to paint a complete picture of the current and future skills associated with a move to a green economy. Our goal ideally would have been to provide more clarity on specific skills required for the future. However, the current lack of data means we have provided intelligence and data on the 'here and now,' as well as data that will help inform RSPs in the future.

There are several suggestions RSPs should consider that will help inform their ongoing strategies on green skills. These will help to make sure RSPs are receiving timely and holistic intelligence as the situation evolves. We believe the suggestions offer a good mix of activities that can begin now and those that can be done over the medium-term.

1. Continue to monitor green job postings in the regions

As we know, the green economy is growing quickly and across multiple sectors. RSPs should continue to gather data on the number of job postings in the region which are green. This allows RSPs to quantify the size of the green workforce, new and changing occupations, as well as observe what skills are emerging through job specifications. This will provide real time intelligence and can be used to respond to any rapidly growing gaps or skills that have not been accounted for.

Job postings will pick up skills demands that are perhaps not first thought of by different economic sectors when discussing green skills, such as the skills needed for support roles.

2. Continue to engage with the RetroFit agenda and speak to relevant sectors

The RetroFit programme has been highlighted by the UK Climate Change Committee as being vitally important in reducing carbon emissions in Wales. There is also excellent research, intelligence, and data available as outlined in this report. The data confirms that the skills demands associated with RetroFit could become urgent in a very short time scale.

While the programme is a larger factor in some regions than others, such as the Cardiff Capital Region, it is still going to play a vital role across Wales. We suggest RSPs engage not only with the Construction sector who will be delivering the RetroFit programme but all sectors that might be impacted (such as the retrofitting of social care facilities and healthcare, transport to move goods).

3. Monitor the developments of the South Wales Industrial Cluster in the medium to long-term

The work of the South Wales Industrial Cluster will be vital in outlining how individual industries in manufacturing and production can decarbonise. It also offers practical plans to move towards a circular economy. It may use technologies such as hydrogen energy production, carbon capture, and perhaps as of yet unknown other technologies as they become feasible. This intelligence will prove useful to all regions in Wales.

As the development of the South Wales Industrial Cluster continues, jobs and therefore skills demands should emerge. The Climate Change Committee states that *deep decarbonisation* should be taking place in the 2030s.

4. Respond to new green infrastructure projects

New green infrastructure projects will create new skills demands. This is true of both larger and smaller scale projects. Such projects can have a profound effect on skills demands within a region and may instigate a rapid transformation.

The Welsh Energy Service regional profiles provide an excellent picture of each region's strengths, and the infrastructure projects that are likely to be built there. For example, North Wales has a much greater potential to produce renewable energy than other parts of Wales. It is therefore more likely to have such projects built in North Wales.

5. Engage with government research and forecasters

In our research, we found that one of the great challenges is around the feasibility of technology both in terms of practicality and cost. The potential use of clean energy sources, such as hydrogen, has been much debate. The cost of using green technologies and whether it is feasible to consumers and businesses is constantly evolving. For example, the price of heat pumps is reducing but it is still likely to need some form of subsidy over the next few years to be a feasible economic solution.

We encourage RSPs to engage with government research and forecasters to understand if there has been any change in these areas. This will help them understand if new technologies are producing new skills demands.

6. Engage with sector representatives and education providers on green issues

The RSPs' sectors and education providers are an invaluable source of intelligence and insight. The RSPs should continue to raise their own findings with industry and education providers, as they play a vital role in additional context. It will help provide a fuller picture of both challenges and potential solutions.

7. Develop a system to collect data on an ongoing basis

Some of the data outlined in this report is updated periodically by organisations such as the ONS and Welsh Government. Therefore, it can be used to monitor change over time. We recommend RSPs work with partners to identify which data would be useful to track over time and, where possible, to begin to collect relevant data themselves.

Appendix A - References

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Appendix B - The most common jobs and skills in the green energy sector

Jobs and skills in the green energy sector are perhaps the most thought of when discussing a green economy. Many of these jobs are *new* jobs, meaning they did not exist before the green technologies existed. However, **Table 40** shows that many of the skills that make up these jobs already existed within other parts the economy.

We detail the jobs and their descriptions early in the report as they are referred to by multiple data sources and papers cited throughout.

E2 (Environmental Entrepreneurs)[54], the American Council on Renewable Energy (ACORE), and the Clean Energy Leadership Institute (CELI), commissioned BW Research to analyse the wages and demographics of employees in the green energy sector in the United States. While this research was for the United States and therefore has limited comparability in terms of wages and demographics, the research does provide a list of jobs and a description of the activities and likely skills involved with them[55].

The jobs cover several industrial sectors including energy production, construction, logistics, and wholesale. These can be related to other pieces of information in this report. It also highlights the role each region can play to drive Wales towards a green economy. The summaries serve as an excellent illustration of what each job entails in terms of activity and skills.

Therefore, we encourage RSPs to use this information as a useful checklist on jobs and skills in the green energy sector. We suggest that this information is used *alongside* Welsh and UK sources going forward. For example, comparing this dataset to LCREE datasets, known infrastructure projects in their regions, and priority sector intelligence.

Table 40 - Job descriptions of the most common green jobs

Job	Description
Wind turbine technicians	Wind turbine technicians install and repair wind turbines and their component parts. Turbines need to be maintained throughout the year to ensure they run efficiently and effectively. They may require specific repairs or maintenance to their electrical, mechanical, or hydraulic systems. A wind turbine technician will travel to sites, investigate problems, and then work on repairs which include activities such as lubricating parts. They may also be involved in the installation of turbines although in the United States this is a smaller part of the role. Within the United States, wind turbine technicians are employed exclusively in the renewable energy generation sector suggesting the role may have some highly specialised skills or knowledge associated with it.
Solar photovoltaic installers	Solar photovoltaic installers assemble, install, and maintain solar PV systems on roofs and other structured on land. They measure, cut, assemble, and bolt structural framing and solar modules to the structures. Another part of the role may include minor electrical work associated with ensuring systems are installed and functioning properly – such as checking current requirements.
Clean energy technology welders, cutters, solderers, and brazers	Welding, cutters, solderers, and brazers jobs have been around for a long time but they will be crucial in the construction and maintenance of clean energy infrastructure over the coming decades. Research by BW research states that welders, in particular will be needed to support the construction of

[54] https://e2.org/reports/clean-jobs-better-jobs/.

[55] Energy and building standards vary between the United States and UK. Therefore, there may be some impact on comparability and the skills required in each country.

Job	Description
	transmission lines, the manufacturer and maintenance of wind turbines, retrofit activities, and other parts of the economy.
Supervisors of production workers in clean energy fields	Supervisors of production works will be needed in all sectors associated with the clean energy economy. In the United States, this means producing wind turbines, energy efficient appliances, heating and cooling products, lighting fixtures, hybrid and electric vehicles, batteries, and smart meters. Production supervisors need the skills to manage and co-ordinate the activities of production and operation workers across the manufacturing and development process.
Clean energy plumbers, pipefitters, and steamfitters	These jobs work with pipe systems that carry liquids and gasses from one place to another, including water, steam and gas. They also test fixtures, appliances and equipment, and provide certificates for safe installation at properties. Within the clean energy economy, these jobs may be involved in grey water systems or geothermal heating and cooling systems. They may also play a role in calculating savings that will come from energy efficient appliances. We know from work by the Construction Industry Training Board (CITB) that these roles are associated with retrofitting proprieties, but they may also be found in grid modernisation, renewable energy generation, and clean fields as well the conversion/decommissions of older power plants.
Building efficiency insulation workers	These roles insulate buildings by covering floors, ceilings, and walls with materials that help insulate the property. They play a vital role in ensuring the energy use of a building is efficient. Therefore, reducing the need for wasteful forms of heating and cooling. Insulation workers need to be able to read blueprints, identify the materials required to insulate the property, prepare surfaces, measure and cut materials, and handle materials properly (such as ensuring they do not get moist). We know from work by the CITB that these jobs will play a big part in retrofitting properties.
Building efficiency HVAC mechanics, installers, and technicians	Heating, ventilation, air condition mechanics (HVAC) are responsible for installing, serving, and repairing heating and air conditioning systems in residential, commercial, and industrial buildings. They play a vital role in transitioning to more efficient systems and providing low carbon emissions and energy cost savings. We know from CITB research that these jobs are likely to be vitally important in a retrofit programme.
Clean energy construction labourers	Construction labourers support activities on construction sites. Their job typically involves activities such as cleaning, preparation of job sites, digging trenches, supporting excavations, helping to erecting scaffolding, and cleaning waste. In the UK, some of these jobs may require additional training and certification such as scaffolding. They will be needed across to the economy to support retrofit activities as well as infrastructure projects.
Clean energy electricians	Electricians will be installing, maintaining and repairing electrical systems according to relevant codes and standards. Across the green energy economy, these skills will be required in construction, installation of energy generation systems, installation of other energy efficient products such as LED lighting, appliance maintenance, smart meter installation and grid modernisation. Automotive electricians will also be required to work with electrical systems found in hybrid and electric cars, trucks, and buses.
Clean energy electrical power-	In addition to the previously highlighted clean electricians, electrical power line installers and repairers will be needed to help build and maintain new and modernised electrical grid infrastructure and large-scale renewable

Job	Description
line installers and repairers	energy generation infrastructure. Activities will include inspecting and testing power lines (including transformers, circuit breakers, and switches) and ensuring new residential, industrial, and commercial developments are properly supplied by the energy grid.
Clean energy project construction managers	Construction managers will be needed to plan, direct, and co-ordinate construction and maintenance of buildings, facilities, and systems. They oversee many parts of the construction process project conception to building. Almost all green energy projects will require the use of construction managers. We know from work by the CITB that these projects are going to be important to the retrofit programme.
Building efficiency carpenters	Carpenters will be required to construct, install, and repair structures made of wood which act as concrete forms for building frameworks. They may also be working with rafters, stairways, windows, door frames, hardwood floors, cabinets, siding, and drywall insulation. The research highlights carpenters as particularly important for the clean energy economy as they support the developments of new energy efficient building projects. Some new techniques may need to be taught to carpenters such as increasing the spacing between framing membranes to allow more insulation to be added to the building.
Clean transportation service mechanics and technicians	A new range of vehicles – whether they be electric, hybrid electric, plug-in hybrid, natural gas powered, hydrogen or fuel cell powered will need service mechanics and technicians to maintain them. Many traditional automotive mechanics and technicians are unable to work on these new technologies as the technology before the powertrains varies to a traditional oil powered car. With the growing number of electric vehicles on roads – and the possibility of new technologies becoming more feasible and finding their way into cars – these roles will be vital.
Clean energy product assembler and fabricators	Assemblers and fabricators will be needed to assemble finished products and their parts. They will play an important role in the manufacturing industry. They are likely to be needed in a variety of different sub-sectors and around a number of new technologies that may be found in Wales.
Clean energy product wholesale sales representatives	Wholesalers and manufactures will need to have a wide ranging and robust understanding of clean energy products, markets, and technologies. They will need to be able to inform customers about the energy efficiency and environmental impacts of products. Also, they will need to share information on tax benefits, grants, rebates and other financial incentives that may be available.

Source: BW Research

Appendix C – Trade Union Congress – List of infrastructure projects

Project	Score	Wales jobs multiplier (jobs created per £1 million invested per year)	Public investment (£ billions)	Number of direct short-term jobs created in Wales	Number of direct and indirect short-term jobs created in Wales

Broadband upgrade	13	9.95	0.17	1,014	1,313
R&D for decarbonising heavy industry - experimental technology	15	14.39	0.50	3,426	4,317
Expand and upgrade rail network	15	13.87	1.37	5,870	7,604
Build battery factories for EVs	16	12.95	0.33	3,960	5,130
Electric car charging points (rural)	14	12.60	0.18	1,077	1,396
Build cycle lanes & pedestrianisation	15	21.44	0.41	2,725	3,530
Build social housing (using domestic offsite manufacture)	13	18.29	0.66	9,370	12,138
Retro**F**it social housing	17	22.00	1.16	7,882	10,210
Energy efficiency assessments	16	33.00	0.30	2,731	3,960
Retrofit public buildings	18	21.44	0.09	572	741
Upgrade ports and shipyards for offshore wind supply chain	16	18.01	0.15	1,668	2,161
Build manufacturing facilities for offshore (including floating) wind turbines	13	12.95	0.03	240	311
District heating	12	17.02	0.10	1,051	1,361
Reforestation schemes	16	23.16	0.39	2,895	3,613
Environmental restoration (including flood defences)	15	19.13	0.12	709	918
Support farmers to switch to Organic Agriculture	15	14.96	0.06	327	359

Source: Trade Union Congress

Appendix D – Comments on key area of skill level for individual sub-sector (corresponding to relevant NVQ Level)

Sub-sector		Comment on skill gap areas	Time horizon
Low-carbon electricity	Solar	Supply chain considered relatively secure, however an uptick in demand would require technicians to be trained at NVQ level 3 equivalent to develop a larger installer base to deliver grid connected solar for utility scale/decentralised generation.	Short-term skills gaps (2021-2025)
Low-carbon electricity	Nuclear	Entire supply chain in need of upskilling to meet emerging demand; NVQ level 1 – 3 for construction; NVQ level 4+ for design and planning.	Long-term skills gaps (2026-2036
Low-carbon heat	Heat pumps	Key skills gap area to meet increasing demand is in the design, specification and installation of heat pumps; NVQ level 2 – 3	Long-term skills gaps (2026-2036
Alternative fuels	Anaerobic digestion	To meet forecasted demand, higher skill levels would be required NVQ 4+ to design and connect AD plants to the grid and ensure biomethane is of sufficient quality for DNOs.	Short-term skills gaps (2021-2025)
Alternative fuels	Hydrogen fuel cells	Highly skilled jobs (NVQ level 4+) for R&I required in future; a good stock of technicians expected to be available from existing automotive sector to meet manufacturing demand (i.e. NVQ 1 – 3)	Short-term skills gaps (2021-2025)
Energy efficient products	Smart controls	Highly skilled NVQ level 4+ in software engineering is considered as a key skill to enable future innovations within the sub-sector; good stock of manufacturing technicians expected to be available (NVQ 1 – 3) for manufacturing demands.	Short-term skills gaps (2021-2025)
Low-carbon services	Consultancies and financial services	Highly skilled NVQ level 4+ demand is ongoing and required to ensure service sector organisations can exploit emerging opportunities.	Long-term skills gaps (2026-2036
Low emissions vehicles and infrastructure	Electric vehicles	Sector is expected to preserve jobs across all NVQ levels as existing, large automotive capacity in UK switches to ULEV technology. Ongoing R&I activities demands highly skilled researchers NVQ Level 4+.	Short-term skills gaps (2021-2025)