Welsh Government
Consultation – summary of response

Net zero sector skills

April 2024

Overview

This document constitutes a summary of response to the net zero sector skills consultation published by the Welsh Government in October 2023.

Action required

This document is for information only.

Further information and related documents

Large print, Braille and alternative language versions of this document are available on request.

Contact details

For more information:
Employability and Skills Division
Welsh Government
Cathays Park
Cardiff
CF10 3NQ

netzeroskills@gov.wales

Additional copies

This summary of response and copies of all the consultation documentation are published in electronic form only and can be accessed on the Welsh Government's website.
Link to the consultation documentation: [Net zero sector skills consultation document](#)

Contents

1. Introduction

The Net Zero Sector Skills consultation[1] was launched on the 11th October 2023. It provided an opportunity to strengthen government understanding of the current skills status within each emission sector, as outlined in Net Zero Wales[2], as well as further understand how these tie into existing policy commitments and the skillsets required across various timeframes in the transition.

1.1 Across emission sectors, the journey towards fulfilling net zero commitments varies. There remains some confusion among the workforce, industries, businesses, and stakeholders in certain sectors regarding the direction of travel and how these changes could impact the skills of their workforce or an individual's career pathway. Currently, there is limited detailed information on the overall skills landscape for some sectors (including qualifications requirements) across Wales. However, some sectors have clearer pathways.

1.2 The consultation provided an opportunity to strengthen the evidence and understanding of the current skills position for each emission sector in Wales. It invited input from representatives across diverse sectors with a focus on:

- the challenges and barriers employers face in growing their workforce to meet the net zero commitment
- defining net zero skills
- identifying key milestones, including new investments and developments affecting sector skills, the impact on policy and legislation (for example the new Agriculture Bill), technological advancements, transitioning impacts of sectors, and critical dates
- new, emerging or increased net zero skills demands in Wales
- what groups are currently in place with a remit of considering net zero skills within sectors
- emerging and cross cutting issues including, supply chains, technology, artificial intelligence and circular economy
- what the potential impacts and challenges are for these skills requirements and how they could be addressed.

1.3 Miller Research was commissioned by the Welsh Government to undertake the analysis of responses to the consultation on net zero sector skills in January 2024.

The outcomes of the consultation will inform the development of Sector Skills Roadmaps. These will map and outline key milestones such as changes in industry practices aligned to carbon reduction, new technologies, and policies that will impact and affect the skills required to support the net zero transition. They will also include milestones in the form of key investments and projects in Wales, emerging legislation and policy shifts and will outline actions for skill and competency development, as identified through the consultation. This detail will inform and enable planning and policy prioritisation to stimulate and develop a workforce for the future aligned to Climate Change Pathways.

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[1] Net zero sector skills [HTML] | GOV.WALES
[2] Welsh Government (2021) Net Zero Wales Carbon Budget 2 (2021-25).

2. Methodology

Data Processing

2.1 Responses were invited as part of a 12-week consultation which commenced on the 11th October 2023. The consultation was published on the consultation pages of the Welsh Government's website. Responses were welcomed in the medium of English and Welsh. The consultation period ended on the 31st December 2023.

Data Analysis

2.2 A database of all responses to the online consultation was created, with each response assessed against the relevant questions to highlight the range of views and opinions expressed. Thematic analysis was applied through the methodical review of responses to each question by sector within the database to identify key themes. These insights were then organised into a specialised consultation framework, categorising responses by theme for each question. At the same time, elements that could contribute to the development of sector roadmaps were identified.

2.3 To guarantee the accuracy and comprehensiveness of response representation during analysis, the consultation framework was continually reviewed and reassessed. This process ensured the framework effectively captured the viewpoints expressed and assessed the consistency between different analysts' interpretations.

2.4 Considering the broad spectrum of perspectives and points raised, the methodology focused on identifying key themes where possible, while also acknowledging the diversity of viewpoints within each theme. Additionally, colour coding allowed the researchers to highlight similarities and potential symbiosis between different sectors.

2.5 Irregular responses, such as long-form reports or letters that did not explicitly address the consultation questions but were still relevant, were analysed and attributed to the most relevant question. In some instances, this required drawing inferences from the content and making assumptions about the intended question being addressed by the respondent.

2.6 The following sections of the report present the responses to each consultation question by key theme and, when relevant, attributed to sector stakeholder type.

Summary of Responses

2.7 The consultation received a total of 107 responses with 89 responses from organisations representing a single sector. Table 2.1 provides a breakdown of responses by sector.

Table 2.1 Total sector responses

Sector	Responses
Electricity and Heat Generation	27
Residential Buildings	26
Industry and Business	26
Public Sector	18
Land Use, Land Use Change and Forestry	13
Agriculture	10
Transport	7
Waste and Circular Economy	5
Unspecified	4

Miller Research analysis of responses

3. Emission Sectors & High Level Summary of Responses

3.1 The initial section of the consultation aimed to elicit information on the identified key milestones for net zero skills within and across emissions sectors. It involved mapping the current provisions of skills and skills development in Wales and the UK, examining links and dependencies between sectors and their skills, and reviewing existing skills groups and previous research conducted across sectors related to net zero skills.

3.2 These questions were asked in order to form a comprehensive understanding of the net zero skills landscape in Wales, as well as identify gaps in provision, knowledge or data.

3.3 The insights gathered from the consultation responses will be invaluable for the Welsh Government in developing its sectors skill roadmaps and undertaking skills gap analysis. The outcomes of noted research and reports by skills and sector groups will also be fully considered as part of the development of the final Sector roadmaps.

High level summary of Responses

3.4 The identification of key milestones was a crucial part of this consultation. Milestones identified from the consultation responses revolve around the urgent need for strategic, immediate and short-term actions to foster the development and implementation of net zero skills in Wales.

3.5 Key milestones identified include legislative changes such as the new Agriculture Bill, investments in renewable energy projects (e.g. offshore wind in the Celtic Sea) and policy initiatives aimed at decarbonising the economy. Technological advancements in areas such as AI, robotics and energy efficiency will also play a key role. Responses recognised the need for rapid development of net zero skills to meet established policy commitments, with 2030 and 2050 identified as key milestones for achieving carbon neutrality in the public sector and nationally.

3.6 Responses called for the immediate establishment and expansion of training programmes tailored to net zero skills across sectors. This included both technical and soft skills, ranging from renewable energy technologies to digital literacy and sustainable practices.

3.7 Respondents also highlighted the urgent need to embed sustainability and net zero principles throughout the education system in Wales. This included curriculum changes within primary, secondary and tertiary education to ensure that future generations are equipped with the necessary skills.

3.8 Respondents identified a need for sector-specific milestones tied to wider policy targets and industry-specific ambitions.

3.9 In terms of skills needs, responses highlighted that the transition to net zero will require a workforce skilled in the principles of the circular economy, digital literacy and sustainability. They outlined the importance of cross-disciplinary skills that integrate technical, digital, and soft skills, with a necessity for problem-solving, communication and project management abilities across all sectors. Moreover, the importance of digital skills, from basic digital literacy to more advanced data analysis and AI capabilities is emphasised for supporting innovation and addressing emerging issues.

3.10 A key emerging issue is the pace at which new technologies are developed, necessitating a workforce that is agile, continuously learning, and able to adapt to new tools and processes. This includes technologies in renewable energy, digital infrastructure and sustainable agriculture.

3.11 While innovation can assist with these challenges the need to decarbonise sectors not traditionally associated with high carbon emissions (e.g. tourism or services) presents an issue in the broadening scope of net zero skills and the continual development of skills to achieve these aims.

3.12 The shift towards a circular economy also presents a challenge, with skills in design, reuse, repair, remanufacture and reprocessing, increasingly in demand to reduce waste and increase the efficiency of resource use.

3.13 There is a need for agile learning environments that are capable of quickly adapting to new technologies and the importance of integrating sustainability into all levels of education and training. Respondents emphasised the role of lifelong learning and continuous professional development in keeping pace with the evolving skills landscape. Ethical considerations and sustainability principles are also key themes, suggesting that skills development should not only focus on technical capabilities but also on fostering an understanding of broader environmental and social impacts.

Mapping and Key Milestones

A high level summary of the **responses to the questions within the consultation is outlined below:**
What investment, policies, transitioning impacts, technologies are expected to be implemented in Wales that will impact the net zero skills needs in Wales and their timescales?

3.14 Responses to this question covered a range of policy and investment areas. In policy terms, it was noted that constitutional barriers and central UK Government policy and investment are affecting Wales' capacity to grow its skilled workforce and act on other needs. The mixed areas of responsibility and reserved matters were also said to lead to confusion, although there was a clear need for further decarbonisation and adaptation strategy and policy measures from both the UK and the Welsh Governments.

3.15 New technologies expected to be implemented included a wide range of renewable energy sources, including offshore wind, hydrogen, nuclear, solar and tidal stream energy. The rollout of electric and hydrogen powered vehicles would also be influential.

3.16 Key technologies mentioned included robotics, automation and AI, to minimise labour hours and increase efficiency.

3.17 Respondents noted various transition impacts, including concerns over the capacity of national grid infrastructure and its ability to meet new demands, as well as a risk of insufficient skills leading to delays in delivery.

Will these result in new jobs being created or broadly maintaining the existing number of jobs, but with a level of upskilling required or changes to the types of occupations? If so, please give details of opportunities and potential geography.

3.18 Respondents identified several potential new and increased numbers of jobs across each of the emissions sectors with more detail listed in Annex A.

3.19 In terms of existing jobs, respondents noted the necessity of upskilling or reskilling the workforce across various sectors. They noted that certain roles, like those in manufacturing and transport, might remain stable in the short term but will be supplementary to the net zero agenda. However, those working in engineering roles, including technicians and mechanics, may need upskilling or reskilling to operate and maintain new technologies and infrastructure.

3.20 There were mixed responses to the issues of potential job losses. Some respondents expected a decrease in demand for certain existing professions and shared doubts over whether there would be a net increase in jobs overall.

3.21 The anticipated geography of opportunities was expected to be spread over Wales, but with concentrations in certain areas for certain professions. For example, electricians and engineers nearer larger scale energy projects (e.g. North Wales or SW Wales). It was also noted that in rural Wales, the agricultural workforce is likely to require some reskilling to meet new requirements.

What will be the new, emerging or increased net zero skills demands in Wales as a result?

3.22 Responses to this question covered several sector-specific and transferable skills that are anticipated to increase (or are already increasing) in demand in Wales. The transferable skills have been included below, while sector specific skills are included in **Annex A.**

3.23 Project development and management:
- communication, engagement and soft skills – creative thinking, stakeholder engagement, Welsh language, influencing and marketing
- project management – project delivery, administration, planning and policy knowledge, communication, collaboration, problem solving, and flexibility

3.24 Technical specialisms:
- digital and IT – data analysis, cyber security, AI, robotics, machine learning, SCADA and software development

What are the key milestones or timescales to deliver these skills in Wales?

3.25 Respondents identified a number of key milestones and policy targets that will both impact and rely upon the skills landscape in Wales over the short and long term. As these milestones are sector specific, they can be found in **Annex A.**

What cross-cutting circular economy skills do you consider are required in your sector? (for example, eco-design, re-use, repair, remanufacture, reprocessing)?

3.26 Respondents provided the following examples of circular economy skills in design, reuse and recycling, and in regard to the supply chain:

- design skills, including
  - designing out waste
  - eco-design for buildings
  - lifecycle assessment
  - production from waste
  - spatial planning
  - zero carbon production methods

- reuse, repair and recycle, including
    - reuse of materials in the supply chain
    - battery repurposing
    - use of green steel
    - expertise in remanufacturing, refurbishing and repair – for example wind turbine components
    - timber processing waste as fuel/mulch

- shortened supply chain, including
    - building local supply chain expertise in circular economy skills
    - embedding system efficiencies and cross-industry synergies to support circularity
    - increasing skills in local supply (timber)

Addressing the skills needs

Is there provision to deliver these skills offered in Wales?

3.27 Most respondents affirmed that skill provision exists in Wales, albeit with significant qualifications.

3.28 Concerns were raised about the adequacy of current skills provision, regarding the limited access and delivery capacity, both in terms of geography and scale. Responses urged Wales to design a coordinated strategy to prevent overlap and ensure efforts are not diluted across industries, education and government sectors. Additionally, there were concerns regarding consistency across nations.

3.29 The emergence of new skills requires attention, as it was felt that current offerings may not adequately cater for these. Furthermore, it was noted that many courses are still in the development or pilot stage, highlighting the ongoing need for refinement.

3.30 Those answering no to this question said there was a gap between the demand for training provision and the provision available as well as a lack of expertise to deliver the training required. Respondents also provided recommendations for what skills provision should look like. These included:

- collaboration with professional bodies for comprehensive development requirements
- consideration of potential income loss when promoting apprenticeships
- degree apprenticeships and progression pathways
- enablers like business development and confidence building
- importance of training availability in Welsh

If not, are they being delivered elsewhere in the UK and can Wales based employers and individuals access this provision?

3.31 Respondents provided a range of examples of what can be accessed from Wales.

3.32 Respondents also answered with some suggestions of good practice including a greater amount of funding available in England, courses developed by private companies including Octopus and Aria, and lessons that could be learnt from collaborative working taking place between industry and government.

3.33 Challenges and limitations included a lack of resources (funding), a nation-wide skills gap and restrictive eligibility for current available courses which has age limits or wage requirements to access existing courses.

If these skills are being delivered in Wales, is the scale appropriate currently and does it meet Wales' future workforce needs?

3.34 It was broadly conveyed that the existing skills provision in Wales needs to adapt to meet the ambitious goals of decarbonisation and reaching net zero emissions. Many sectors are currently facing challenges in recruiting the necessary workforce to fulfil these critical roles.

3.35 The following issues were described:
- although some training expansion has occurred it is expected to be outpaced by sector growth, with existing current demand greater than supply
- gaps in the alignment of technical competencies, self-certification and support for older skilled tradespeople
- the skills landscape in Wales was described as fragmented

3.36 The following recommendations were made in regard to scaling to meet the challenge:
- collaboration with local authorities and third sector organisations to upskill staff and ensure the delivery of net zero skills to suitable organisations
- effective collaboration between developers and educational colleges to meet the local needs and beyond
- an emphasis on new training standards, curriculums, and facilities in the floating offshore wind industry

What do you see as the barriers to address the skills needs in Wales?

3.37 Respondents identified a range of barriers to addressing skills needs in Wales. The strongest emphasis was on the lack of adequate training opportunities and relevant qualifications, especially when considering regional availability, quality and flexibility.

3.38 Respondents also highlighted that they lacked awareness of the types of green roles or opportunities that might be available, or that will become available in the transition to net zero.

3.39 Clarity of policy direction and strategies were sited are being as critical element to provide sectors with the forward look, coordination or clarity on timelines; all of which are necessary in building the infrastructure for net zero.

3.40 Recruitment and retention issues are thought to create further skills challenges, with issues ranging from talent retention difficulties to persistent gender inequalities within the workforce. Additionally, there is competition for skilled workers across various sectors, exacerbated by a shortage of STEM-qualified young people and unattractive job conditions.

3.41 Financial constraints were referenced several times by some respondents as being a major barrier and where they felt insufficient funding was being allocated towards training and education. Moreover, the absence of incentives for companies to invest in skills development hinders progress towards a more skilled workforce. Further investigation may be required on this point to establish whether there is a general lack of awareness of the options available or whether the current offer isn't meeting need.

3.42 Lastly, respondents identified a pressing need for a more coordinated approach and a comprehensive national strategy to drive workforce development towards opportunities to develop Net Zero Skills and associated roles . This was considered to be lacking at present.

What action is needed to remove those barriers?

3.43 Respondents across sectors provided a range of interventions that could be implemented to remove barriers to addressing skills needs in Wales.

3.44 Numerous respondents placed importance on partnership and collaboration. This included across professions in land use, agriculture and forestry and between government/public sector, industry and educational institutions. Clear coordinated policies with closer engagement with relevant industries were also encouraged.

3.45 Responses commonly noted the need for a greater amount of training opportunities and support for educational institutions. There were demands for training which is up-to-date, accessible, geographically dispersed, accredited and funded.

3.46 It was also emphasised that there is a need for recruitment that is more inclusive and raises awareness of career opportunities to a younger demographic. Those working in the 'career support' industry also need to better understand net zero skills and their benefits.

3.47 There were calls for central funding mechanisms to support upskilling and reskilling professionals. This could include paid traineeships for new entrants and the reform of the apprenticeship levy scheme to incentivise a greater number of businesses to take on apprentices.

3.48 Respondents wished to see policy that included an overarching delivery plan, consistent approaches to apprenticeships between devolved nations, and to boost emerging technologies such as heat pump development. Government commitment to larger programmes would also ensure that sectors can respond accordingly.

3.49 Respondents advocated for greater sector awareness. For example, normalising net zero skills within business and a proactive approach in promoting technological developments and opportunities related to net zero by government and educational institutions.

What is the impact if these skills are not available in Wales?

3.50 Answers to this question could be split into the following categories:
- economic impacts to Wales, which could occur if sufficient investment is not made. This could include:

  – developers looking for workforce elsewhere and missed economic investment
  – the exporting of services to England or other areas
  – greater business costs
  – job losses
  – limited access to funding

- impacts on the environment, with continued or higher emissions and net zero targets
- social impacts, including health risks that arise from not moving to clean energy at a sufficient pace, a brain drain in certain geographies in Wales, and vulnerabilities of Welsh communities to climate events which could exacerbate inequality

3.51 Other impacts mentioned were a lack of access to emerging technologies in Wales, delayed delivery of projects, industry incentivisation being lowered and the inability to meet just transition and other policy goals.

Links to other sectors

Are there any dependencies with other sectors, with specific links to skills? If so, what are these and what are their impacts?

3.52 Interdependencies identified by respondents included the strong links between the electricity and heating sectors and the building and construction sectors. A respondent observed the opportunity for floating offshore wind to benefit both disadvantaged communities and communities displaced by the decline of the fossil fuel sector.

3.53 Dependencies related to land use and agriculture were also cited, including overlaps between the skills gap for nature conservation and restoration and the need for reskilling and upskilling under the Sustainable Farming Scheme. A respondent advocated as a priority the need to break down the barriers in knowledge and skills between forestry and other sectors, in particular agriculture.

3.54 Infrastructure-related connections were said to exist across multiple sectors. For example, the transport sector is dependent on engineering, research and development, the alternative fuels industry, electricity, and more in achieving its net zero goals. Furthermore, residential buildings have connections with education, transport, housing, and energy.

3.55 Other responses outlined the following dependencies:
- 'traditional' jobs such as forklift drivers are possibly not seen as a 'net zero job', but are critical to the net zero transition and supply chains
- the link between industry and HE/FE. HE can develop basic/practical skills, whilst FE can collaborate with businesses for research and training to fast-track technological change

Skills Groups

What groups (steering, advisory) exist currently to gather and capture information on skills needs, undertake mapping and monitoring, or advice on future industry/sector requirements?

3.56 Across sectors, respondents listed a wide range of existing groups covering energy and renewables, land management groups, transport bodies and more general references to industry organisations, academia and skills infrastructure. Comprehensive sector-specific lists can be found at Annex B. The table below outlines the number of different groups named by respondents from each of the emissions sectors.

Table 3.1 Total sector responses

Sector	Number of groups identified
Electricity and Heat Generation	12

Residential Buildings	10
Land Use, Land Use Change, and Forestry	10
Transport	8
Public Sector	10
Industry and Business	35
Agriculture	9
Waste and Circular Economy	4

Miller Research analysis of responses

Annex B providers a table outlining the Groups that have been identified.

What research have these groups already undertaken?

3.57 Respondents covered a comprehensive range of reports pertaining to different sectors and industries including energy, utilities and renewables, land management and forestry and more general green jobs..

Emission Sector Summary

3.58 Information on the themes outlined above was obtained from the following emission sectors:

- Electricity and Heat Generation
- Residential Buildings
  Transport
  Public Sector
- Industry and Business
- Agriculture*3
- Land Use, Land Use Change and Forestry (LULCF)
- Waste Management

3.59 This section provides a high-level summary of the feedback received from these emissions sectors. More comprehensive detail is included in Annex A.

Electricity and Heat Generation

3.60 Respondents suggested that transitioning to net-zero emissions in the Electricity and Heat Generation sector in Wales requires investment, policy changes, and technology adoption, particularly in renewable energy sectors like offshore wind power generation. Skills investment was identified as crucial, with initiatives such as offshore training programmes and the development of engineering centres aiming to foster talent. National initiatives, like changes in leasing expectations and renewable energy policies, will impact the Welsh market, highlighting the importance of considering broader frameworks in local projects.

- [3] Agriculture and Waste Management included detailed insights within the questions that were tailored to ongoing developments in these sectors.

3.61 The shift to renewable energy sources will reshape electricity and heat generation, with a focus on replacing methane boilers with air source heat pumps. There's a high demand for skilled workers to meet targets in offshore wind, solar, and heat pump sectors. Challenges include consumer education and policy clarity, which could hinder effective implementation.

3.62 This will drive increased demand for specific skills, including heat pump engineers and digital expertise. Concerns about workforce availability highlight the need for robust training programmes and fast-tracking initiatives. Geographically, all areas of Wales will require skilled workers for renewable energy infrastructure, with opportunities for local employment. Identified areas for upskilling include engineering, digital skills, offshore construction, marine operations, sustainable energy maintenance, and environmental expertise, indicating diverse skill demands in Wales' transition to a low-carbon economy.

Residential Buildings

3.63 Respondents outlined various initiatives impacting the Residential Buildings sector, including grants for household battery installations, ECO and Warm Homes funding, and the Welsh Government's Optimised Retrofit Programme. Policy shifts such as Welsh Housing Quality Standards, the Future Homes Standard consultation, and the Heat Strategy for Wales are expected to shape the regulatory landscape.

3.64 These developments are likely to result in both the creation of new jobs and the upskilling of existing ones. Emerging occupations include roles in surveying, project management, compliance, renewable technology installation, and financial modelling. Existing jobs will require upskilling, such as oil and gas boiler fitters transitioning to air source or ground source heat pump installation. Roofers and homebuilders will need technology skills for retrofitting, while surveyors will require training in data management to adapt to new methodologies. Additionally, project managers, quantity surveyors, and specialists in retrofitting and embodied carbon will play essential roles in achieving net zero targets.

Transport

3.65 Policy changes include the UK Government's Zero Emission Vehicle mandate and the Welsh Government's EV Strategy were identified as key drivers. Investments are expected in active travel infrastructure, zero-emissions bus fleets, EV charging infrastructure, and local power supply upgrades for electric vehicles.

3.66 These developments are likely to impact job creation and require upskilling in existing roles within the transport sector. Initiatives like electrification in the rail industry could create around 6,000 jobs across Great Britain, with specific opportunities in Wales, such as at the CAF plant in Newport. New roles in environmental specialists for decarbonising bus operations are also anticipated. Existing roles such as bus drivers, mechanics, electrical engineers and transport planners will require upskilling to adapt to innovative technologies and evolving electric infrastructure. However, concerns exist regarding potential job losses in professions related to ICE vehicle servicing and parts supply industries.

3.67 Emerging net-zero skills demands in Wales will include proficiency in installing, maintaining, and operating EV infrastructure and hydrogen generation systems. Skills in carbon and energy management will also be crucial.

Public Sector

3.68 The public sector respondents largely focussed on the development of net-zero skills, investments and policies generally raising EV strategies and renewable energy as key.

Opportunities and challenges identified in the public sector as a result of these policies were in administration, project management, and planning. Existing roles such as managers and leaders will require green management skills, while planning and consent specialists will be needed to navigate consenting processes for energy projects. They raised concerns regarding potential shortfalls in capacity within regulatory bodies and statutory conservation bodies, highlighting the need for upskilling and capacity building. They suggested that addressing current vacancies in the public sector will be vital for progressing towards net-zero goals effectively.

Industry and Business

3.69 Industry and business respondents identified a range of policies and investments relating to renewable energy, however, concerns were raised about potential cuts to apprenticeship funding and the rush into net-zero skills without proper planning, which could negatively impact the manufacturing base.

3.70 They identified the creation of new jobs and the upskilling of existing ones across various sectors including new roles for electricians, heating engineers, recycling and food retail, with adaptation for existing roles in gas fitting, construction, and manufacturing. Geographically, job opportunities are expected to be spread across Wales, with concentrations in areas hosting large-scale energy projects like offshore wind developments. Concerns about job losses were expressed, particularly in roles reliant on the fossil fuel industry, and the costs associated with upskilling could pose challenges for individuals and smaller organisations.

Land Use, Land Change and Forestry

3.71 Investments and policies are expected to focus on ecological conservation, sustainable farming practices and the adoption of technology in horticulture and forestry. Respondents suggested that strategies for carbon sequestration, such as woodland creation and continuous cover forestry, will drive private sector investment in commercial forestry and wood processing. Collaboration with the government to promote the forestry sector as a place for investment and professional growth is also anticipated.

3.72 The transition will likely result in both the creation of new jobs and the upskilling of existing ones across sectors related to land use, forestry, agriculture, and renewable energy. Reskilling existing jobs will also be important in sustainable land management, fishing, renewable energy developments, and sustainable tourism operations.

Agriculture

3.73 A wide array of new and transitioning skills are deemed essential to navigate this transformation effectively. These include understanding the wellbeing framework and Sustainable Development Goals (SDGs), as well as knowledge of soil biology and ecology to mitigate greenhouse gas emissions from livestock. Additionally, a grasp of the global impact of food systems and skills in carbon accounting are vital for reducing emissions and promoting sustainable management principles, aligning farming practices with changing consumer demands and environmental priorities.

3.74 Technologies expected to play a pivotal role in shaping the future of agriculture in Wales include innovations such as vertical farming, robotics and AI for livestock monitoring, alongside renewable energy solutions. However, harnessing the full potential of these technologies will require significant investments in skills development and education.

3.75 Solutions to removing barriers to skills development and for addressing the skills needs included curriculum innovation in education institutions to ensure that agricultural courses reflect the challenges and opportunities of achieving net-zero farming.

Waste and Circular Economy

3.76 The waste and circular economy sector in Wales is poised for significant transformation, driven by a combination of investment, policies, technologies, and emerging trends. Notably, there's a growing emphasis on utilising locally made products and reducing imports, with initiatives like the Fashion-Enter factory's skills academy in Newtown, Powys, receiving praise for their contributions to skill development. Policy interventions, such as Extended Producer Responsibility for various waste streams and ambitious targets for waste reduction and recycling, are reshaping the landscape, urging stakeholders to adapt to more circular models of resource use. Additionally, technological advancements like AI, automation, and digitisation are revolutionising operations within the sector, while biorefining emerges as a promising avenue for sustainable waste management, albeit still in its nascent stages in Wales.

3.77 These changes are expected to catalyse the creation of new jobs and occupations within the waste and circular economy sector, with stakeholders unanimously acknowledging this potential. Apprenticeships at various levels, roles in eco-design, net-zero consultancy, and business models tailored to the circular economy are among the anticipated job opportunities. Moreover, the evolving landscape is also projected to demand new skills and occupations within the existing waste management sector. The better utilisation of recycling and upcycling, coupled with the adoption of innovative technologies and products, necessitates expertise in data analysis, waste consultancy, material science, engineering, and supply chain management. However, there's a looming concern regarding the loss of practical skills and trades, particularly within the repair and reuse sector, as seasoned workers approach retirement age, highlighting the urgency for skill replenishment and succession planning.

4. General Questions

4.1 The consultation provided a section of general (non-sector specific) questions which, similarly to the emission sector section above, aimed to gather information by asking questions targeting key milestones and future proofing for net zero skills, mapping the current state of skills development infrastructure in Wales, as well as exploring existing skills groups and research conducted regarding skills.

4.2 This section provided the chance for respondents to offer broader insights, as well as allow those representing multiple sectors or no specific sector further opportunities to give their thoughts on how net zero skills can be developed in Wales.

High level summary of responses

4.3 The demand for skills is notably increasing in sectors pivotal to the net zero transition, such as renewable energy, digital infrastructure, transportation, retrofit, and sustainable agriculture.

4.4 The demand for traditional skills adapted to low-carbon technologies, such as electrical engineering and construction is also rising. Respondents highlighted the need for cross-sectoral skills, including project management, planning, and leadership to support these emerging demands.

4.5 Respondents called for enhancing education and training programmes to align with these emerging skill demands, including updating curriculums, providing practical training opportunities, and fostering partnerships between education providers and industry.

4.6 Respondents highlighted a need to develop and enhance awareness among employers and the workforce about the importance of net zero skills and the opportunities they present to encourage investment in skills development.

5. Net Zero Skills Definition

5.1 The consultation addressed the absence of a universally accepted definition or understanding of "net zero skills" across different organisations. Previously, Wales has not had a shared definition, prompting the need to establish one to ensure a common understanding of the jobs and skills required to achieving net zero emissions. This entails facilitating communication between government, the private sector, employees, and training providers, to clarify the skills required.

5.2 The consultation aimed to develop a collective understanding of net zero skills within Wales, to enable businesses to identify opportunities related to these skills and empower stakeholders to foster and support their development more effectively.

5.3 In March 2023, the Office of National Statistics (ONS) provided a definition of a green job as: "Employment in an activity that contributes to protecting or restoring the environment, including those that mitigate or adapt to climate change"[4].

5.4 With the ONS definition of green jobs as a foundation, and considering various other published definitions, the Welsh Government drafted a working definition of net zero skills in Wales: "An umbrella term that refers to skills, competencies and knowledge within employment that supports our transition to a net zero economy. This can relate to all sectors, organisations, and industries, whether directly or indirectly, on their path to net zero". Consultation responses around this definition is the focus of the following section.

High Level Summary of Responses

5.5 There was general agreement among respondents on the wide range of skills included in the definition. The definition was appreciated for its inclusivity, ensuring that net zero is not seen as the sole responsibility of specific industries and highlighting the shared responsibility across sectors in supporting net zero targets.

5.6 Net zero skills are broadly defined by responses to encompass a variety of competencies across sectors that contribute to achieving net zero emissions by 2050. Skills identified through the consultation span various sectors and include expertise in renewable energy technologies, engineering, energy efficiency, sustainable land management, low-carbon transportation, and sustainability reporting. They cover cross-disciplinary abilities such as project management, leadership, digital literacy, and innovative problem-solving with a focus on the need for adaptability of skills and knowledge to support the transition to a low carbon economy.

5.7 While the draft definition was broadly understood, there was a call for greater specificity and examples to clarify what skills are included. Respondents suggested that the definition could benefit from outlining specific competencies and examples of net zero skills in action across different sectors. Suggestions were made to refine the definition to emphasise the need for a holistic approach that includes skills that contribute to both climate mitigation and climate change adaptation and resilience.

5.8 There were some concerns around the practical application of the draft definition across various industries and job roles. This led to recommendations to ensure the definition is versatile enough to remain applicable in a practical manner across the broad spectrum of employment areas affected by net zero targets. There was also an emphasis on the

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[4] "Green jobs" update, current and upcoming work: March 2023

importance of having a clear and actionable definition that can be effectively integrated into educational curriculums, professional development programmes, and policy frameworks to support skills development.

5.9 Some respondents desired additional information to accompany the definition to make it more actionable. This included clearer definitions of key terms, the naming of specific skills needed, and how these skills align with Wales' net zero goals. Some respondents suggested broader definitions or frameworks, such as those provided by international organisations, to enrich the understanding and scope of net zero skills. The idea of providing visual or simplified explanations to make the concept more accessible to the general public, students, and non-specialists was also mentioned.

Is the draft definition [5] of Net Zero Skills easy to understand? Please consider how clear the definition is in regard to the work you and others do and whether it can be applied in a practical manner.

5.10 The majority of respondents felt that the draft definition was easy to understand. One reason for this was responsibility being shared across sectors in supporting the Welsh Government targets. It was felt that this removes the suggestion that net zero is solely the responsibility of those who work directly within a net zero output industry.

5.11 However, it was seen as important to ensure knowledge and awareness of what net zero means across all industries, as it is broader than the eight emission sectors and needs to be used as an umbrella term.

5.12 Other respondents thought the term was understandable but had some reservations and recommendations, for example:
- it is important that mitigation skills and knowledge should not be viewed in isolation from adaptation or resilience work
- the definition is lacking specificity, and further explanation and information could make the definition clearer
- the current definition could be open to interpretation or perception
- it will be difficult to embed in industry
- the need to recognise the essential contribution that project managers, planning officers, environmentalists, auditors, land-use managers and others will play in supporting the function.

5.13 A smaller number of respondents did not believe that the draft definition was understandable, with their criticisms including:
- it may be confusing to those who do not have a background in sustainability,
- the words 'within employment' are not inclusive of those who are able to play important roles in helping us reach net zero but who may be outside of employment,
- concern that the use of the term 'net zero skills' may inadvertently limit people's perception of sustainability to climate specific risks, impacts and metrics
- a lack of clear structure on what constitutes a net zero skills pathway
- confusion among young people as to what a 'green job' is, with narrow perceptions risking alienating them from even considering 'green' roles.

5.14 Some respondents had some additional suggestions for an alternative definition, including the United Nations industrial Development Organisation's definition of green skills,

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[5] 'An umbrella term that refers to skills, competencies and knowledge within employment that supports our transition to a net zero economy. This can relate to all sectors, organisations and industries, whether directly or indirectly, on their path to net zero.'

as the knowledge, abilities, values and attitudes needed to live in, develop and support a sustainable and resource-efficient society. Another respondent suggested incorporating both green and net zero jobs as "net zero skills support our transition to net zero and can relate to all sectors. It refers to knowledge, skills and competencies that contribute to the long-term protection of the environment, including those that mitigate climate change through reducing our carbon emissions."

5.15 Finally, there were some additional clarifications from a small number of respondents, including:
- questions on the purpose of the definition and its intended audience
- how might the definition impact data that is captured for the measurement of net zero.

Are there ways the definition could be made clearer? If further information is needed to accompany the definition, what information would be most useful?

5.16 Although there was a degree of support for the draft definition, there was a request for further information from many respondents. Respondents wished to see:

- the naming of specific green skills that would be needed
- for the Welsh Government to embrace whole-life carbon net-zero principles where whole life-cycle analysis and assessment play a key role.
- further detail with a shared understanding of skills, competencies and knowledge, along with an understanding of which skills underpin specific careers in climate action. These skills could then represent the net-zero activity that is needed in Wales and therefore underpin the definition. Using a Whole-life Carbon Net-Zero (WLCNZ) framework was suggested as one form of doing this.
- a broad interpretation of the definition to attract and recognise the contribution of the broadest possible cohort of skills that will contribute to the net zero.
- further information regarding what the Welsh Government views as an appropriate method for upskilling staff, be that Personal Learning Accounts or apprenticeship opportunities.
- placing an emphasis on the need for enhancing STEM and digital competencies.

5.17 Alternatives were suggested to the definition. Two respondents wished to see further clarity on terms, such as including the term "carbon emissions" as many do not understand the term net zero, as well as pivoting terminology toward climate change action so things are not purely focused on mitigation. Other respondents wished to see a simplified version of the definition that could be shared with the public and education providers.

5.18 There was some confusion over net zero skills, and the skills required in a net zero economy, and one alternative suggested was "net-zero skills refers to the skills, competencies and knowledge required to support our transition to a net zero economy." One respondent also mentioned that this definition should not be static; that is that it should change and evolve as understandings or requirements to net zero do.

5.19 It was suggested that there be an option for visual explanations that can cater to broader audiences. An example was given of this having been done well by the National Grid, who have a short video explanation of net zero on their website which provides a visual explanation for a range of audiences.

6. Digital

6.1 The Digital Strategy for Wales prioritises digital skills as a central mission, aiming to equip the workforce with the necessary digital capabilities for success in work and everyday life. Professor Philip Brown's report [6], aligned with this strategy, underscores Wales' imperative to keep up with digital innovation to avoid lagging behind, offering insights into the future of work and the economy amidst the fourth industrial revolution.

6.2 The consultation considered digital skills as a cross-cutting theme in achieving net zero, due to the central and increasing role they will play in the workforce.

What are the digital skills needed within the sector to support our net zero commitments?

6.3 Respondents identified several digital skill and associated provisions needed to support net zero skills commitments:
- agile skills provision
- specialised digital skills
- collaboration and shared language
- data analysis and artificial intelligence
- equity and access
- marketing and community awareness

6.4 Respondents emphasised the importance of not limiting access to large-scale businesses but ensuring digital upscaling extends across the economy, including SMEs, social enterprises and the third sector. Alongside this, there was an emphasis on policies aimed at ensuring equity of access to technology and fostering digital literacy among the future labour force.

6.5 There was also reference to the importance of collaboration between traditional sector infrastructure organisations and those with significant digital delivery experience, to establish a shared language around digital and implement cohesive digital programmes within sectors.

6.6 Several respondents mentioned the importance of data analysis, artificial intelligence, and automation in supporting net zero commitments. This includes the need for skills in data processing, artificial intelligence development, and utilising artificial intelligence technologies across sectors to accelerate progress toward net zero targets.

6.7 The importance of agile structures and processes in skills provision to align with evolving digital technologies and innovation was highlighted throughout. This included considering the role of digital technologies in future qualifications and exploring challenges and opportunities associated with artificial intelligence technologies.

Is there provision to deliver these skills offered in Wales?

6.8 Respondents provided a thorough list of initiatives and programmes in Wales aimed at promoting good digital practice, addressing skills gaps, and supporting the adoption of digital technologies. These include:
- Newid; a partnership between WCVA, Cwmpas, and ProMo-Cymru, which provides training and support to the third sector, funded by the Welsh Government

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[6] Review of digital innovation: final report

- DCW, delivered by Cwmpas in partnership with the Good Things Foundation and Swansea University, also funded by the Welsh Government, focusing on digital skills development until June 2025
- plans for HE providers in Wales to deliver courses related to forestry and architectural technology
- Qualifications Wales exploring the role of digital technologies in future qualifications.

6.9 However, respondents said that, despite these efforts, there is still a shortage of high-level digital skills necessary for the future, and this poses a challenge for technological adoption and decarbonisation efforts in the long term.

If not, are they being delivered elsewhere in the UK and can Wales based employers and individuals access this provision?

6.10 The one response to the question indicated that there are subjects taught by organisations outside of the traditional education sector. Some examples of these organisations include:
- Green Register
- ASBP
- Passive House Trust

If these skills are being delivered in Wales, is the scale appropriate currently and does it meet Wales' future workforce needs?

6.11 The only response to this question suggested that smaller institutions are not meeting demand the Wales needs.

Are there any barriers to address these skills. If so, what are they and how can they be addressed?

6.12 Respondents emphasised the need to rethink traditional training methods and institutions to build the local economy. They stressed the importance of flexibility, adaptability and knowledge of individuals' upskilling needs.

6.13 The WLGA is working with councils to introduce digital approaches into services, but there is a shortage of digital skills and knowledge, leading to high staff turnover and increased costs. Training is necessary to raise awareness of opportunities and integrate digital into service development.

7. Employer Challenges

7.1 Understanding the challenges and barriers employers face is of critical importance in helping to shape the offer of support that can be provided by the Welsh Government. This section of the consultation aimed to gain perspectives on the types of challenges employers across sectors face in maintaining and developing a skilled workforce, and the solutions that could be offered in future.

High level summary of responses

7.2 Employers identified several key barriers to upskilling their workforce, including financial constraints, the rapid pace of technological change, and the lack of a clear regulatory and policy framework.

7.3 Employers, particularly SMEs, struggle with the initial financial investment required for training and upskilling employees. To overcome these barriers, stakeholders called for enhanced access to funding and incentives designed to support skills development, clearer guidance from the government, and the development of flexible, industry-aligned training programmes and short courses. Financial support mechanisms are crucial to enable employers to invest in employee training without jeopardising operational budgets.

7.4 Respondents emphasised difficulties with keeping up with the rapid pace of technological advancements (including renewable energy technology, energy efficiency measures, and digital tools). Low carbon transition will require not just technical skills, but skills in leadership and change management.

7.5 Employers expressed concern over the lack of clarity and consistency in policies and regulation related to net zero. Such uncertainty hinders long-term investments in skills and technology. Respondents called for a more defined strategic framework that outlines clear pathways and support for businesses in the transition.

7.6 Existing skills gaps, particularly in technical and specialist fields related to net zero, hampers employers' ability to find and retain qualified staff. This issue is exacerbated by competition for talent in these emerging areas. Retaining skilled workers and providing them with ongoing upskilling opportunities is challenging, especially in sectors experiencing rapid changes in skill requirements.

7.7 Responses highlighted a perceived disconnect between the skills taught in education and training programmes and the needs of industries working towards net zero targets. Employers advocate for closer collaboration between education institutions and industry to address this gap. Respondents identified that training programmes should be made more accessible, flexible, and relevant to the diverse needs of employers across sectors including the provision of geographically accessible and timely training tailored to specific industry challenges.

7.8 This was emphasised further by responses which highlighted the significance of attracting the younger generation and new entrants to the necessary careers via available programmes, reducing the existing gap between education and employment, which is attributed to a lack of skills and experience. Employers advocate for structured training programmes like graduate schemes and apprenticeships, along with increased funding. The apprentice system in Wales should be reviewed to create a more flexible system that can provide these opportunities.

7.9 Respondents also emphasised the need for targeted financial incentives, grants and subsidies to alleviate the cost burden of training and upskilling employers. They also

highlighted the strengthening of partnerships between industry and educational institutions to ensure training programmes are aligned with real-world needs and emerging technologies. Responses called for a stable and clear policy environment with long-term commitments to net zero goals to provide employers with the confidence to invest in skills development and the adoption of innovative and flexible training models, including online learning, on-the-job training, and modular courses, which can help meet the diverse needs of both employers and employees.

What are the key challenges employers face to upskill their staff in net zero skills?

7.10 Respondents identified several key challenges to employers, including some relating to general organisational context, such as the need for business risk assessments that identify climate-related risks and opportunities. Keeping pace with evolving technologies was seen as a challenge and the lack of policy certainty made it difficult for some employers to plan. There was also concern about a lack of clarity and fragmentation within the green skills environment.

7.11 Skills and labour shortages were also front of mind for many respondents, including workforce depletion since Brexit and the pandemic and concerns about the supply of skilled workers.

7.12 Adaptation to new ways of working was an issue for several respondents, including changes to job specifications, engaging and informing staff about low-carbon demands and the cost implications of reskilling and upskilling. Several acknowledged the need for better workforce planning.

7.13 Challenges for small companies in upskilling their staff included changes to continuing professional development requirements and the availability of training. This was especially true in terms of access to cost-effective education and expertise or to funded provision.

What are the solutions to overcome the challenges?

7.14 Themes for solutions identified within this question include a range of options around training support and expansion of provision to non-traditional audiences. Respondents called for training tailored to sector/business needs, to facilitate easy access to funding and hybrid teaching methods and provide access to expert advice and support.
- maintaining Personal Learning Accounts
- investment programmes
- expanding apprenticeship programmes
- policy and communication
- awareness raising and Support
- back to work focus
- tailored training and support
- engagement with Innovation Skills

7.15 According to respondents, producing effective solutions requires the Welsh Government to sustain Personal Learning Accounts and ensure awareness among smaller organisations about the availability of free courses related to net zero skills. Also, implementing investment and learning programmes where risks are shared could encourage SMEs to invest in skills. Examples such as shared apprenticeship schemes illustrate this approach.

7.16 Supporting educational institutions in Wales to develop specialist provision for all sectors was raised by respondents. One suggested that policymakers should consider expanding fully funded degree apprenticeship schemes into areas directly related to Net Zero sectors such as

Engineering, Manufacturing, and IT/Computing. There was also a call for establishing partnership routes for the delivery of skills, like the HEFCW hub for digital skills.

7.17 Another respondent suggests developing programmes to attract people back into work, including those experiencing long-term unemployment or ex-offenders. Finally, it was suggested that it would be beneficial to recognise and support companies with in-house training schemes and capture informal training schemes into a national programme to accelerate the pace of innovation learning programmes.

What would encourage employers to invest in skills for their workforce?

7.18 Several responses highlighted the critical need for access to funding to support growth, transition, and upskilling efforts. The focus was not only on direct financial support but also on streamlining access to grant support and providing capital investment alongside upskilling initiatives. Collaboration between industry, education institutions, and government entities was emphasised as a key strategy to address skills gaps effectively. This collaboration would allow for flexibility in training approaches and ensure alignment with industry needs.

7.19 Many respondents emphasised the need for a clear and comprehensive plan from the government to instil confidence amongst employers to invest in skills development. They suggested that long-term industrial strategies would provide stability and predictability, which are important in allowing businesses to allocate resources towards skill-building initiatives.

7.20 One response raised the issue of access to competent advice and support, particularly in understanding business risks and opportunities related to the transition to net zero, will be critical going forward. This support is vital for businesses to navigate the complexities of skill development and technological advancements, and larger employers may be more willing to invest in upskilling efforts if the investment is de-risked. De-risking strategies could include assurances around securing contracts, filling skills gaps, and growing business opportunities in new markets.

7.21 It is crucial to identify and address skills gaps through ongoing professional development opportunities aligned with career progression. This will ensure that employees remain equipped with the necessary skills for both their current roles and career advancement.

7.22 In short, the largest factors in encouraging employers to invest in workforce skills included:
- access to funding
- collaboration
- clear implementation plans
- expert advice and support
- de-risking investment
- flexible training models
- identification of skills gaps

7.23 The responses underscore the importance of a coordinated approach involving funding support, collaboration, clear planning, expert guidance, risk mitigation strategies, flexible training options, and continuous skills gap analysis to effectively overcome challenges in achieving net zero skills.

What are the restrictions to developing Welsh supply chains, with regard to skills?

7.24 According to responses there are several challenges relating to skills development and restrictions to developing Welsh supply chains. These challenges include a lack of appropriate funding models for upskilling, limited recognition of non-traditional career paths, and a need for training at scale.

7.25 Additionally, one respondent suggested there is a shortage of staff with technical skills in various sectors, which hampers the adoption of new technologies. Another believed that the private sector has an advantage in attracting talent through higher wages and that uncertainty around strategic technology choices, such as hydrogen versus electricity further complicates decision-making for organisations.

8. Innovation

8.1 Innovation plays a critical role in optimising investments throughout Wales and facilitating the essential changes required for Wales' workforce to fulfil the Welsh Government's net zero commitment. Aligned with the Innovation Strategy, the Net Zero Skills plan seeks to embed net zero skills development in collaboration with industry bodies and delivery organisations.

8.2 Therefore, consulting stakeholders on innovation in relation to net zero skills was important to identify opportunities, assess needs and inform policy and investment.

High level summary of responses

8.3 Innovation is recognised as critical to achieving net zero targets. Respondents highlighted the need for skills that can support the development, adoption, and implementation of innovative and sustainable solutions across sectors. Skills in entrepreneurship, systems thinking, and technology adoption are necessary to drive innovation in products, services and processes.

8.4 Respondents advocated for the fostering of an innovation-friendly ecosystem that encourages collaboration between academia, industry and government, and the development of skills that support creative problem-solving and technology development. Responses emphasised the demand for digital and technical skills, including data analysis, AI, and software development. Skills in entrepreneurship and leadership were identified as supporting the ability of organisations to identify opportunities, drive change, and engage stakeholders in support of net zero initiatives.

8.5 Respondents identified effective collaboration across disciplines and sectors as vital for innovation with skills that facilitate cross-sectoral and interdisciplinary collaboration viewed as crucial for developing holistic and sustainable solutions.

Our recently published, mission-based Wales Innovates strategy recognises the transition to net-zero as probably the greatest economic opportunity of our time, where innovation will be critical to our success, so what additional skills will be needed to ensure the development and adoption of new ideas?

8.6 Respondents to this question raised a wide range of issues including technical expertise, digital literacy, entrepreneurial mindset, sustainability knowledge, and effective management and communication abilities.

8.7 Additional technical skills mentioned in this question related to sector specific needs of developing net zero industries. These included emerging skills in a range of areas including:
- nuclear energy
- renewable energy
- energy storage
- hydrogen and alternative clean fuels
- carbon capture
- physics-based data analysis

8.8 Skills relating to digital technologies and artificial technologies were cited as needed in order to:
- reduce carbon footprints
- increase productivity
- produce less waste.

8.9 Other respondents believed skills specific to the circular economy are crucial to net zero. These included more theoretical skills in

- systems thinking
- circular economy business models
- resource efficiency
- circular economy literacy in senior leadership

8.10 Entrepreneurship, management, and business skills were also mentioned as being able to improve business outcomes, boost job creation, upskill, innovate, and achieve better business resilience. The soft skills described were

- entrepreneurship
- change management, management
- leadership
- communications

8.11 Advocacy and communication skills were also mentioned as important to support innovation and to deliver necessary social value and community benefits.

8.12 Several respondents mentioned the need for businesses to adopt more collaborative practices to prevent silo working and facilitate greater information sharing. One respondent stressed that this is heightened in the context of clusters of organisations who share similar geographies.

9. Welsh Language

9.1 Wales aims to cultivate a bilingual workforce proficient in Welsh, particularly in sectors with considerable customer engagement Welsh-speaking customers are prevalent. It is acknowledged that changes brought about by decarbonisation have the potential to affect the level of Welsh language use across sectors. Therefore, the questions in this section focus on the potential positive and negative impacts of emerging net zero skills and associated policies, and how best to exploit or mitigate these.

High Level Summary

9.2 Respondents regarded the development of net zero skills as an opportunity to enhance and promote the use of the Welsh language. Ensuring bilingual training availability and integrating Welsh language into the net zero skills framework were suggested as ways to support the language's vitality and increase its use in professional settings.

9.3 Suggestions were made to ensure that ongoing initiatives such as Cymraeg 2050 and the Further Education and Apprenticeship Welsh-medium Action Plan are integrated into sector-specific roadmaps for net zero skills.

9.4 Responses highlighted the need for bilingual training provision, emphasising the importance of developing Welsh language terms related to net zero skills and ensuring that trainers are equipped to deliver sessions in Welsh. This includes train-the-trainer programmes and translation services to support Welsh language learning.

9.5 To effectively support the Welsh language, responses highlighted that reliable data on the current use and demand for Welsh language skills in the net zero skills are needed. Targets for improvement and integration of goals into strategic planning can help enhance positive impacts on the Welsh language.

We would like to know your views on the effects that net zero skills would have on the Welsh language, specifically on opportunities for people to use Welsh and on treating the Welsh language no less favourably than English. What effects do you think there would be? How could positive effects be increased, or negative effects be mitigated?

9.6 There were five responses to this question in total.

9.7 It was suggested that net zero skills provided an opportunity for Welsh language skills to be developed, but that further support for the local economy and opportunities to use the Welsh language would be needed.

9.8 Ensuring that Cymraeg 2050 and the Further Education and Apprenticeship Welsh-medium Action Plan are implemented in sector road maps would help to ensure there are opportunities for people to gain skills and use them within communities.

9.9 It was suggested that there is a need to ensure that training is available bilingually and is able to meet the requirements of learner choice. This would include ensuring that Welsh language terms are embedded into net zero skills training and work, even for those who are not Welsh speakers. It would also require train the trainer provision, as well as provision for translation services and Welsh culture to be embedded. The roadmaps must show exactly

how learners' linguistic needs will be met when developing courses, qualifications, learning materials and engagement campaigns.

9.10 Finally, to fully support the Welsh language, efforts need to be made to embed local supply chains as much as possible.

Please also explain how you believe the proposed policy net zero skills could be formulated or changed so as to have positive effects or increased positive effects on opportunities for people to use the Welsh language and on treating the Welsh language no less favourably than the English language, and no adverse effects on opportunities for people to use the Welsh language and on treating the Welsh language no less favourably than the English language.

9.11 A total of two respondents opted to answer this question.

9.12 The responses mentioned that the roadmaps should reflect the increasing demand for Welsh language skills within existing and future workforces. However, strategically reliable data is needed to establish a baseline of the national and local picture and then set targets for improvement.

9.13 The introduction of a Welsh Language Education Bill and the Curriculum for Wales will contribute towards all learners becoming confident Welsh speakers through the statutory education system.

10. Additional Comments

10.1 Respondents were given the opportunity to offer any further insights that they felt they had not covered within the consultation questions.

We have asked a number of specific questions. If you have any related issues which we have not specifically addressed, please use this space to report them:

10.2 Fifteen respondents opted to provide additional comments to the consultation. These are comprehensively listed below:

- a comment from the horticulture sector that it is made up of approximately 550 growers across Wales and their need for more specific and targeted content than farmers in general
- a summary of a skills and recruitment review within HGH2 (forestry). This review will have a wider set of proposed actions for the timber sector but these need to be agreed in early 2024 with stakeholders
- advanced land management skills are also required because of the need to tackle the challenging trade-offs of meeting net zero targets with Wales's priority to meet other priorities including addressing the biodiversity crisis, water quality, flood risk mitigation, cultural services, etc. as embodied by the Wales Environment and Wellbeing of Future Generations acts
- an urgent need for the Welsh government to develop a collaborative relationship with businesses in Wales helping them to understand challenges and develop solutions. Short-term working groups were suggested to set up to direct a plan. All stakeholders need to understand net zero, what skills and qualifications are needed and the timescales. Stakeholders would also benefit from a better understanding of future technologies and the impact they may have on skills requirements and timelines.
- caution that not only does a lack of skills provisioning jeopardise project delivery and our ability to reach net zero targets, but it will also deprive Wales of a once in a generation opportunity to develop prosperous rural communities.
- clear guidance and certainty being needed around the Sustainable Farming Scheme and woodlands place within it. Specifically, the skills and finance gap that relates to tree planting and farming in Wales needs to be addressed
- concern at the number of engineering skills shortages in the market at present. These included those required for the commissioning and manufacture of low carbon technologies, including heating, ventilation, smart infrastructure for buildings and the electricity network
- concern that recent cuts to the apprenticeship budget in Wales will mean that the much-needed increase in the scale and pace of apprenticeships will be difficult to meet
- encouraged to see finance listed in the Net Zero Skills Action Plan as an indirect/cross cutting skill, which can support all sectors of the economy
- it was said that as HEFCW transitions into the Commission for Tertiary Education and Research (CTER) from April 2024, there will be an opportunity for the Commission to work with the post-compulsory education and training sector as a whole to ensure providers are meeting current and future needs in all sectors, and that individuals have access to the training relevant to fulfil their ambitions and to enable them to play their part in Wales's net zero future
- the need for Wales to bridge between traditional production forestry, the broader woodland sector and farming. With huge scope to bring farmers into the fold as active woodland managers in Wales, benefits to economic diversification of their livelihoods that is so urgently required would be realised.

- Net Zero Industry Wales and its members aim to drive and support the skills agenda for achieving a net zero economy in Wales. Collective funding for future job positions can simplify decision-making and increase the availability of trained individuals for employment during construction
- recognition that creating attractive training programmes and an education system that attracts a young, diverse, workforce is essential to our Net Zero future.
- recruitment concerns in relation to research, development and innovation and associated amended industry standards that accompany this practice
- skills needed for major future challenges in emission mitigation though carbon sequestration in tree growth, carbon storage in wood products, and restoration of peatland / other organic soils should be prioritised. The capacity of the Welsh land use sectors to mitigate these emissions and maximise carbon sequestration is constrained by the shortage of skills in the integration of production and environmental management. Even where higher level skills exist, they will need substantial further enhancement to meet the severe future threats to Wales's land based carbon stocks
- specific comments on retrofitting: system design and the options suitable for different properties will vary considerably and this will require a significant level of training to achieve. For a lot of retrofit requirements, compliance will be driven through the UK building regulations
- support for the Welsh government in its drive to develop skills that contribute to a greener, more sustainable future
- the Crown Estate welcomed the opportunity to work alongside the Welsh Government and wider stakeholders in the development of Roadmap following this call for evidence to support the development of the sector skills roadmaps
- there is a requirement for skilled professionals with expertise in cybersecurity and data management when working in energy sector. Sector practices are increasingly containing a digital connected element, and this is essential for meeting net zero and facilitating the uptake of flexible energy services. With the growth in the internet of things (IOT), and connected devices, digital and software engineering skills are one of the largest growing in the industry
- there is currently no clear definition of net zero, what it means for Wales, the scale of the challenges and the opportunities the transition offers for jobs and businesses.
- whilst current funding initiatives are beneficial, the funding mechanisms are often very restrictive in terms of timescale for delivery. This is problematic for the projects for retaining skilled staff for training, but more importantly it does not provide business with a guaranteed support process in the long term. As such a long term investment plan for skills development is essential to meet the challenge going forward
- respondents emphasised the importance of a clear and coordinated strategy for net zero skills development that aligns with Wales' broader economic and sustainability goals with an emphasis on innovation, inclusivity, and collaboration across sectors.
- a similar approach is needed to what is being developed for the ONS on what constitutes as a 'green job', using a framework to set out clear upskilling pathways for different industries, sectors and organisations.

11. Equality

11.1 The concept of equality was a cross-cutting theme of this consultation, aligning with ambitions for a just transition in net zero jobs. Several themes could be drawn out from the responses regarding the impacts on equality (and existing inequalities) in relation to net zero skills. These findings can guide how equality can be mainstreamed by sectors in taking skills ambitions forward.

11.2 Responses touched on equality considerations within the context of developing and implementing net zero skills in Wales, although did not extensively detail specific equality challenges or solutions. Implicit in the responses was the recognition that the net zero transition must be inclusive, providing equal opportunities for all members of society to participate and benefit. This includes addressing barriers to entry into net zero careers for underrepresented groups and ensuring that training and education programmes are accessible to all.

11.3 Responses highlight that training and education programmes related to net zero skills must be accessible to all individuals, regardless of their background, gender, age, or socio-economic status. This includes addressing barriers to entry into net zero careers for underrepresented groups and ensuring that opportunities for upskilling and reskilling are available across Wales, not just in urban or economically advantaged areas.

11.4 Respondents recognise that certain groups may be underrepresented in sectors critical to the net zero transition such as STEM fields and renewable energy. Ensuring that training programmes are designed to be inclusive and appealing to a diverse range of participants is seen as essential. Responses call for targeted initiatives to encourage women, ethnic minorities, and other underrepresented groups to pursue careers and training in net zero related fields. Suggestions included, mentorship programmes, networking events, and awareness campaigns that highlight role models and success stories. Respondents note that achieving equality in net zero sectors may require cultural and structural changes within organisations and industries with the promotion of flexible working conditions, equitable recruitment practices, and supportive workplace environments seen as crucial for attracting and retaining a diverse workforce.

11.5 Responses note that the costs associated with training and education can be a significant barrier for individuals from lower socio-economic backgrounds. Responses suggest the need for financial support mechanisms, such as grants, scholarships, or subsidised training opportunities to ensure everyone has the change to acquire net zero skills.

11.6 Respondents also highlighted a lack of awareness around the opportunities available for contributing to the net zero transition, particularly in communities that may not traditionally have access to information around green jobs and training programmes noting that outreach and information campaigns tailored to diverse audiences may help bridge this gap.

11.7 There is a need to embed equality considerations into strategic planning and policy making processes for net zero skills development. Responses discussed the conduct of equality impact assessments for new training programmes and policies to ensure they are designed to benefit all facets of society and engagement with groups and organisations that represent women, minorities, and disadvantaged communities in the design and implementation of net zero skills programmes to ensure initiatives are accessible.