Smart strategies for the transition in coal intensive regions

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Blueprint for energy transition in Wales

WP 6 – Task 6.4 / D6.5

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TRACER website: www.tracer-h2020.eu

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Executive summary

Wales has a long history of coal-mining but has transitioned to other sectors since transition out of coal took place, largely in the mid-1980s, when colliery closures led to social upheaval and economic hardship in affected communities. The impact of this process continues to be seen in the former mining regions of the South Wales Valleys. In terms of the current energy transition, Wales was the first country in the world to declare a climate emergency, and Welsh Government has a strong political commitment to achieving net zero by 2050.

The challenges of this 'dual transition' were emphasised during the stakeholder engagement process in Wales carried out under TRACER Work Package 5 (Deliverables 5.2 and 5.3). Stakeholders' visions for the future highlighted the need for political leadership and collective effort in the just transition, and that recognising the mistakes of the past is necessary to seize present and future opportunities. The importance of a place-based approach to energy transition was a strong theme running through stakeholders' visions for the future, alongside the need to develop tailored solutions with an emphasis on community consultation, including in the former coal regions.

Since the TRACER stakeholder consultation took place, a range of visions for transition have emerged in Wales at different levels of governance. In 2021, Welsh Government led a 'deep dive' on policy for the renewable energy sector, which stated that:

"Our Vision is for Wales to generate renewable energy to at least fully meet our energy needs and utilise surplus generation to tackle the nature and climate emergencies. We will accelerate actions to reduce energy demand and maximise local ownership retaining economic and social benefits in Wales."

New frameworks are being developed at regional level in Wales which set a shared vision for regional economic development; climate change and decarbonisation are key components of these plans. These themes are also key features in the existing City Deals and Growth Deals in Wales, which also have their own visions and strategies for achieving net zero (City Deals and Growth Deals are bespoke packages of funding and decision-making powers negotiated between government and local authorities across the UK) (Ward 2020).

Many of the decisions that will impact the future energy mix in Wales have yet to be taken. While the recommendations of the UK Climate Change Committee have been accepted, it is considered crucial that the path to reaching those targets within Wales should be closely tailored to geography, culture and the economy.

Welsh Government has an ambition to make the long-term transition to a low carbon energy system, with a target of meeting the equivalent of 70% of Wales' electricity demand from domestic renewable electricity sources by 2030. A further target is to achieve at least 1 GW of renewable energy capacity to be locally owned by 2030, with the expectation for all new energy projects in Wales to have at least an element of local Welsh ownership from 2020. Welsh Government's Coal Policy was published in March 2021 and includes a commitment to avoiding the continued extraction and consumption of fossil fuels. Coal fired electricity generation is not expected to contribute to Wales' energy mix in the future. Gas fuelled power stations play an important role in electricity generation, but gas generation is increasingly changing from providing a steady baseload supply to a more flexible peaking and backup role.

To meet the planned energy transition, the Welsh Government now has a range of strategies in place. The plans for reducing emissions and developing a decarbonisation pathway in Wales are summarised in the policy document "Prosperity for All: A Low Carbon Wales. Wales' commitment to tackling climate change". The current carbon budget ("Net Zero Wales Carbon Budget 2") outlines the legislative pathway for transition to 2026. Wales has significant existing strengths in renewable energy resources, including natural resources, research expertise and collaborative networks. However, Wales also faces significant challenges, not least the shared responsibility for the governance of energy matters with the UK government in London.

Wales has had significant experience since the 1970s with the reclamation of coal-mining/industrial land, and there are many examples of successful site reclamation. On the other hand, there are currently significant costs forecast for the rehabilitation of over 2,000 coal tips still scattered across Welsh coalfield areas.

Energy transition is expected to have a major impact on jobs and skills in Wales. Research suggests that 20% of jobs in Wales will be directly affected by transition in both positive and negative ways – around 127,000 existing jobs may require upskilling, with around 134,000 existing jobs being in high demand. Recent research also suggests that the majority of skills shortages identified are relate to construction, heating, and electrical installation. Welsh Government's current programme has set out a range of objectives related to employment and skills, among which is the promised development of a Net Zero Skills Action plan, due to be published in the Autumn of 2022.

The Welsh Government has a political commitment and a strategic plan for Wales' transition to net zero. The legislative pathway set out in Net Zero Wales Carbon Budget 2 provide a *de facto* roadmap for Wales' transition pathway. The next two carbon budgets for Wales will cover the periods 2026-2030 and 2031-2035. By the end of 2024, Welsh Government has committed to scaling up local energy plans to create a national energy plan, mapping out future energy demand and supply for all parts of Wales. They have also committed to lead the development of a strategic plan for the future energy grid to 2050. These developments, together with the planned Net Zero Skills Action Plan and new Innovation Strategy, should soon provide more clarity on the pathways beyond 2035 to 2050.

Wales' common vision statement

The TRACER stakeholder engagement process/Entrepreneurial Discovery Process for Wales took place during 2020-21. The main findings of the stakeholder consultation emphasised the following points:

- Wales is undergoing a dual transition – an incomplete long-term socio-economic transition out of coal mining, and an ongoing energy transition to renewables. Both of these have a profound territorial dimension.
- The socio-economic transition out of coal has lacked (and still lacks) a long-term spatially focused policy framework, with potentially damaging implications for net zero strategies.
- A transition to sustainable energy in Wales faces significant infrastructure and technological barriers. A major shift in policy focus is needed to address the problems of governance, unequal access and societal involvement.
- Despite the challenges, Wales has important strengths related to energy transition – research expertise, the industrial bases, internal and external linkages, and collaborative networks.

The stakeholders' visions for the future highlighted the need for political leadership and collective effort in the just transition, and that recognising the mistakes of the past is necessary to seize present and future opportunities. New ideas and priorities should be developed in three main areas, relating to: political, regulatory and financial incentive frameworks; infrastructural and sectoral investments; and labour market, skills and community support (see Table 1).

Table 1: Visions for energy transition in Wales: areas of need and opportunity

	Areas of Need	Areas of Opportunity
Political, regulatory and financial incentive frameworks	• Transition incentives; • Mapping of energy needs and R&D in Wales; • Align Welsh needs with UK and potentially other funding and development sources.	• Public procurement & seed funding; • Local leadership (e.g. city-region deals); • Alignment with Welsh Government economic, energy and related policies and strategies.
Infrastructural and sectoral investments	• Decarbonising heat; • Upgrading and decentralising energy grid; • Improving public transport; • Investment in energy storage; • Reduce energy dependency; • Sustainable and considered green energy shift.	• Retrofitting houses & building design; • Mix of renewables (solar, tidal, wind, nuclear, hydrogen); • ICT, artificial intelligence and high-value manufacturing; • EV infrastructure, methane and CO2 capture; • Circular economy;
Labour market, skills and community support	• Public ownership of energy transition; • Promote local infrastructure and wealth creation; • Access to education and training and skills development; • Creating good quality jobs; • Effective communication of transition benefits for energy literacy; • Identify locational dynamics (e.g. job & residence location); • Address deprivation, especially in former coal mining areas.	• Digitalisation; • Large scale initiatives; • Connecting training providers with businesses and policymakers; • Create and/or promote "centres of excellence" in energy; • Community energy projects.

Source: TRACER Report D5.3. Report setting out a vision and future-oriented priorities in Wales

The need for a place-based approach to energy transition was a strong theme running through stakeholders' visions for the future, suggesting an integrated approach to identify and address local needs, weaknesses and strengths and ultimately develop tailored solutions. Throughout the identified themes, stakeholders underlined the importance of consulting the community regarding its own transition needs. In particular, the specific circumstances in the former coal mining regions in South Wales need to be understood. This enables the Valleys to be recognised as an economically viable and/or productive area, alongside the cities and towns that follow the major transport corridors in South Wales. In the case of North Wales, stakeholders view the area as a potential renewable energy powerhouse, and as a leading region in a net zero or carbon negative economies.

Welsh Government's current Net Zero Wales Carbon Budget 2 sets out a vision for a range of policy areas, including: electricity and heat generation; transport; residential buildings; industry and business; agriculture; land use, land use change and forestry; waste management and the public sector. For example, the vision expressed for electricity and heat generation is *"Our vision is for a decarbonised energy system which provides wider economic and social benefits for Wales than the system we see today"* (Welsh Government, 2021b). More recently, the Welsh Government's 'deep dive' on renewable energies produced a vision for Wales (see Box 1) and a series of recommendations for the sector (see Section 4) (Welsh Government 2021d).

Box 1: Welsh Government renewable energy vision for Wales

> "*Our Vision is for Wales to generate renewable energy to at least fully meet our energy needs and utilise surplus generation to tackle the nature and climate emergencies. We will accelerate actions to reduce energy demand and maximise local ownership retaining economic and social benefits in Wales*."

Source: Welsh Government (2021) Renewable energy deep dive: recommendations. Outcome of the exercise to identify opportunities to significantly scale up renewable energy in Wales.

At regional level in Wales, new frameworks are being developed which set a shared vision for regional economic development at regional level; climate change and decarbonisation will be a key component of these. These themes are also key in the existing City and Growth Deals in Wales, which have their own visions and strategies relating to achieving net zero.

Wales' projection of the energy mix

To set the context for the envisaged evolution of the energy mix in Wales, it should be noted that large areas of energy policy for electricity, oil and gas, coal, nuclear energy and energy efficiency are reserved to the UK Government. The Welsh Government has powers in relation to certain specific policy dimensions related to energy policy and climate change.[1] The Wales Act devolved powers to Welsh Ministers on energy consenting for onshore and offshore generation up to 350 MW. Policy for heat, and onshore oil and gas licensing is also devolved.

Welsh Government has an ambition to make the long-term transition to a low carbon energy system, with a target of meeting the equivalent of 70% of Wales' electricity demand from domestic renewable electricity sources by 2030. A further target is to achieve at least 1 GW of renewable energy capacity to be locally owned by 2030, with the expectation for all new energy projects in Wales to have at least an element of local Welsh ownership from 2020. Wales has significant strengths and natural resources in terms of renewable energies including wind, solar PV and biomass, as well as a developing marine and tidal energy sector (see Section 3). Wales is a net exporter of electricity, generating approximately 27.9 TWh in 2019, while consuming around 14.7 TWh.

In terms of fossil fuels, the UK Government committed to removing coal from the electricity mix by 2025, since been brought forward to 2024 following public consultation (HM Government 2020; DBEIS 2021). In addition, it will not provide new direct support for UK thermal coal mining or coal-fired power plants. In Wales, the last coal-fired power plant for commercial energy generation closed in March 2020. Further, Welsh Government's Coal Policy was published in March 2021 and includes a commitment to avoiding the continued extraction and consumption of fossil fuels.[2] Coal fired electricity generation is therefore not expected to contribute to Wales' energy mix in the future (Welsh Government 2020a). In addition, the proposed Clean Air Bill would ban the indoor burning of solid fuels (traditional house coal and wet wood) after 2023 (Welsh Government 2020b).

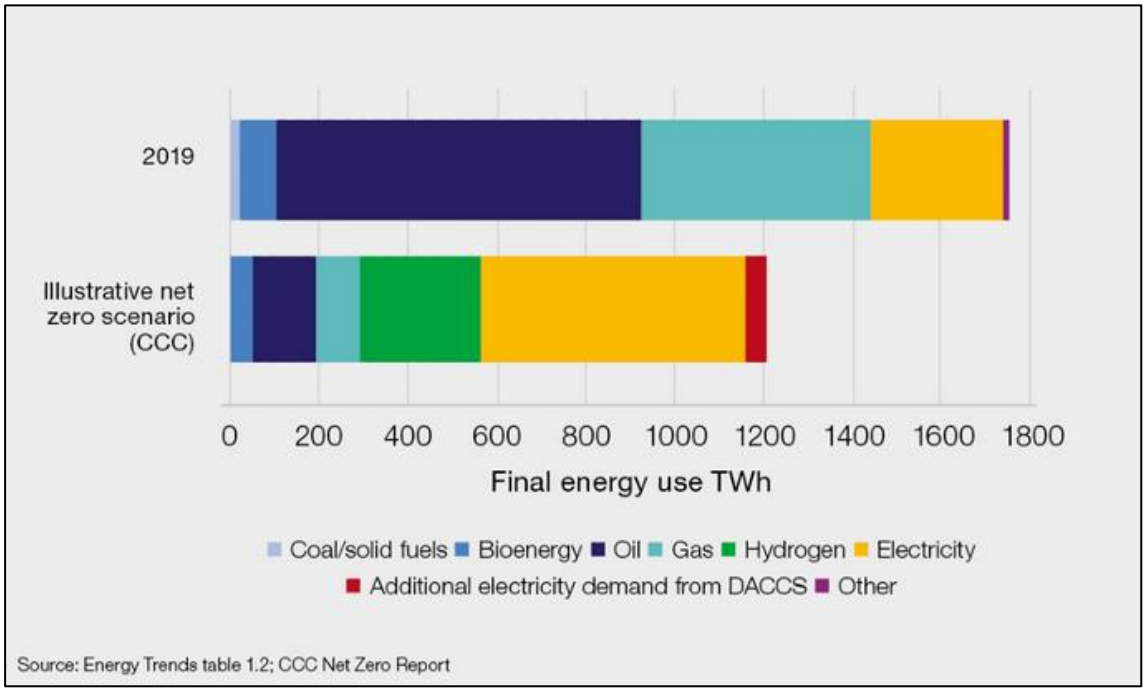
UK Government accepts that the UK as a whole will continue to rely on natural gas for 'some years' (HM Government 2020). It planned to consult with network operators, suppliers and consumer groups in 2021 on the future of gas, including on whether it is appropriate to end gas grid connections to new homes from 2025 in favour of clean energy alternatives. A gradual move away from fossil fuel boilers is planned through a combination of energy efficiency measures and lower carbon replacement boilers. In Wales, gas fuelled power stations accounted for almost 70% of electricity generated in 2019 (with around 27% from renewables) (Welsh Government 2020a). However, gas generation in Wales is increasingly changing from providing a steady, baseload supply to a more flexible peaking and backup role. In terms of the potential role of hydrogen, a proposed pathway for hydrogen

1 For example, the Wales Act 2017 (Section 67) inserted section 26A of the Coal Industry Act 1994, which states that any licence that authorises operations in relation to coal in Wales can only have effect with the approval of the Welsh Ministers.

2 https://gov.wales/coal-policy-statement

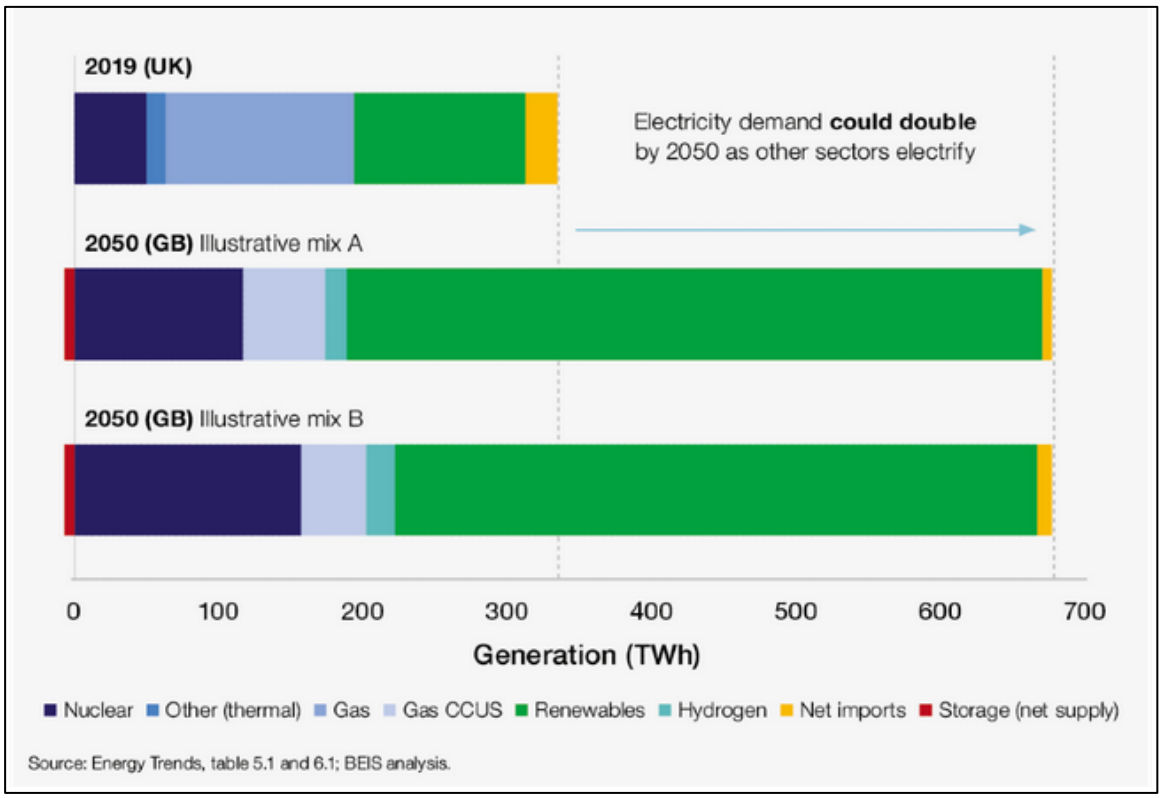
development was set out by Welsh Government in a 2021 consultation document (Welsh Government, 2021e).

Figure 1: Illustrative UK final energy use in 2050



Source: HM Government 2020

Figure 2: Electricity mix today & illustrative 2050 mixes

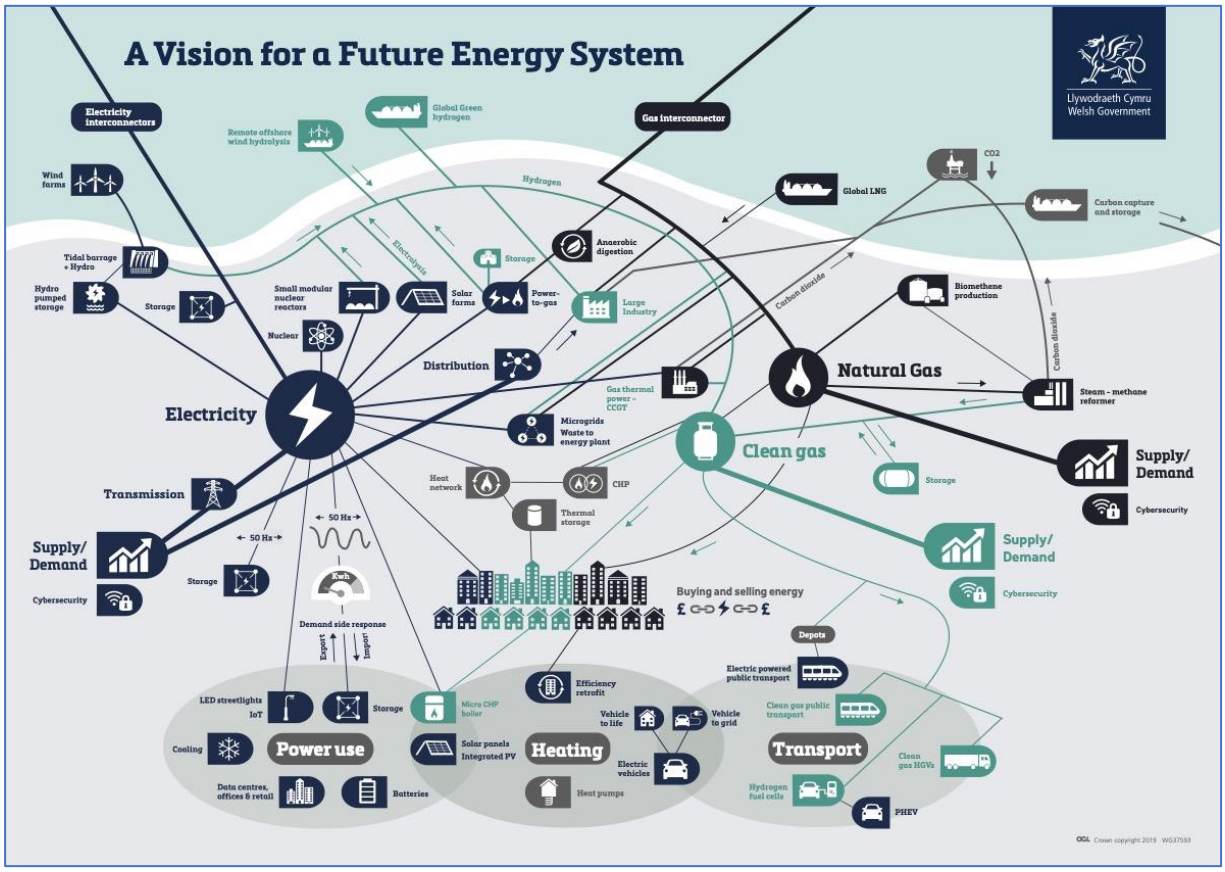


Source: HM Government 2020

The mix of devolved and reserved powers around energy in Wales makes it challenging to forecast a projected energy mix. Even for the UK as a whole, the UK Government is reluctant to target or forecast a particular energy generation mix by 2050. As stated in December 2020's Energy White Paper, *"We are not targeting a particular generation mix for 2050, nor would it be advisable to do so. [...] The electricity market should determine the best solutions*

for very low emissions and reliable supply, at a low cost to consumers" (HM Government, 2020). Nevertheless, Figure 1 and Figure 2 were published in the Energy White Paper to illustrate potential scenarios. Many of the decisions that will impact the future mix have not yet been taken. Within Wales, while the recommendations of the UK Climate Change Committee have been accepted, it is considered crucial that the path to reaching the targets should be closely tailored to Wales' geography, culture and economy. The 'Prosperity for All: A Low Carbon Wales' strategy did include a vision for a future energy system in Wales (see Figure 3).

Figure 3: Vision for a future energy system in Wales.



Source: Welsh Government (2020) A Vision for a Future Energy System; https://gov.wales/low-carbon-energy-scheme-infographic

Wales' available options meeting the planned energy transition

To meet the planned energy transition, Welsh Government currently has a range of strategies in place (as discussed also in TRACER Deliverable D6.1). The plans for reducing emissions and developing a decarbonisation pathway in Wales are summarised in the policy document "Prosperity for All: A Low Carbon Wales. Wales' commitment to tackling climate change" (Welsh Government 2019a). The Environment (Wales) Act 2016 sets a 2050 target for reducing emissions and puts in place a statutory process establishing interim targets for 2020, 2030 and 2040, as well as carbon budgets. Welsh Ministers must set five yearly carbon budgets, with associated delivery plans. Pathways are set out for power, buildings, transport, industry, land use, agriculture, waste and F-gases. The current carbon budget ("Net Zero Wales Carbon Budget 2") outlines the legislative pathway for transition to 2026.

Underpinning this policy framework, and to reach the target of meeting the equivalent of 70% of Wales' electricity demand from domestic renewable electricity sources by 2030, Wales has significant existing strengths in renewable energy resources. Renewable sources with a substantial share in Welsh electricity generation are currently wind, solar PV and biomass. Offshore and onshore wind are likely to continue to play an important role in renewable energy generation in Wales (see Table 2). Wales currently has 86 operational wind farms,

including the fifth-largest offshore wind farm worldwide in Gwynt y Môr. Solar accounted for 12% of all renewable electricity generation in Wales in 2019 and a number of zones have been identified as priority areas for large-scale solar energy developments in future (Welsh Government 2019c).

On marine and tidal energy, Wales has the potential to generate around 10 GW from marine energy, and two demonstration zones have been assigned to test wave and tidal stream technologies in Wales. Welsh Government has committed to identifying strategic resource areas by 2023 to signpost areas for development (Welsh Government 2021d).

Table 2: Offshore wind opportunities

Timeframe	Opportunity	Added capacity
Mid-2020s	Site extensions	0.5-0.6 GW
By c. 2030	New leasing	1-3 GW
Beyond 2030	Floating wind parks	Multi-GW

Source: Welsh Government 2019a.

In terms of the environmental legacy of coal mining in Wales and land remediation efforts, Wales has had significant experience since the 1970s with the reclamation of coal-mining/industrial land. There are many examples of successful reclamation of underground mining sites, including the Blaenavon UNESCO Site and Big Pit Mining Museum, Rhondda Heritage Park, Cefn Coed Colliery Museum, Cwm Cynon Business Park, Gatewen Colliery, Wrexham (redeveloped to housing and public open space), Maesteg Comprehensive School, Oakdale Business Park, Bargoed Woodland Park and Ebbw Vale Garden Festival Park. Surface mining sites have also been reclaimed for landfill/recycling, schools, leisure centres, golf courses, horse racing tracks, sports pitches, water treatment/sewage works, electricity facilities, campsites and visitor centres.

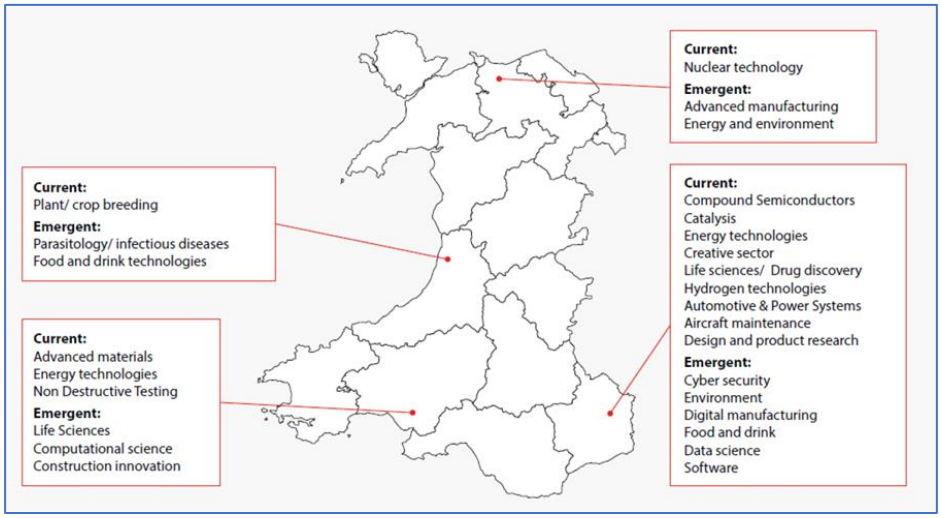
One of the main outstanding environmental challenges relating to the coal mining legacy in Wales is presented by the over 2,000 coal tips located across the coalfield areas. Welsh Government officials are working with local authorities and the Coal Authority on a maintenance programme to enable the long-term remediation of these sites.[3] However, costs are significant. According to a local politician, at least £500 million is required to remediate coal tips in Wales over the next ten years.[4] There is potential for valuable mineral extraction from the tips, but it is estimated that two-thirds are in private hands, while others are owned by farmers with no resources for the work needed.

In terms of energy efficiency, Welsh Government has developed an energy efficiency strategy for the period up to 2026 (Welsh Government, 2016). An example of current activity is the Optimised Retrofit project, which involves a collaboration of 68 partners, including 26 social housing providers, aiming to improve the energy efficiency of over 1,700 homes in Wales.[5]

Wales benefits from recognised strengths in ongoing high-level research on renewable energy technologies and decarbonisation, a well-regarded academic and research sector with strong international links, and existing collaboration with industry on decarbonisation. The Regional Innovation Scoreboard 2021 (European Commission 2021) also highlighted Wales' strong performance in tertiary education, lifelong learning and digital skills.

[3] https://gov.wales/first-minister-of-wales-mark-drakeford-calls-coal-tip-safety-summit
[4] https://www.geplus.co.uk/news/500m-needed-for-welsh-coal-tip-remediation-10-11-2020/
[5] https://www.optimised-retrofit.wales/

Figure 4: Hot spots' of university-business collaboration in Wales



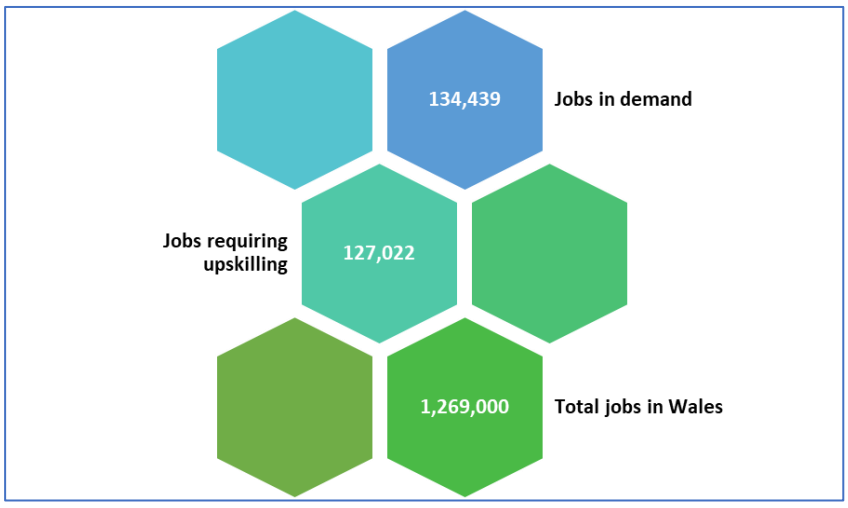
Source: Morgan et al., 2017.

There is still a fair degree of uncertainty on future jobs and skills requirements, as more needs to be known about technology pathways and the future energy mix (see also TRACER Deliverable D6.3). The independent Green Jobs Taskforce report to the UK Government in 2021 noted, "*There are still gaps across a variety of sectors. Further clarity of the UK's decarbonisation pathways, investment timelines and location are required*".

Around 20% of existing UK jobs (c.6.3 million workers) are expected to be affected by transition, with around 3 million workers requiring upskilling and around 3 million in high demand.[6] In Wales, c.127,000 existing jobs may require upskilling, with c.134,000 existing jobs being in high demand (Robins et al 2019) (see Figure 5. This data is also referenced by a report to the Future Generations Commissioner of Wales (Chapman & Kiberd 2021) which suggests that of the 20% of jobs in Wales which are directly affected by transition:

"*an estimated 150,000 jobs (10.3%) are 'transition aligned' and as such are already well positioned to capitalise on the green transition. An estimated 140,000 (9.6%) are thought to require some form of reskilling. This does not necessarily imply a sector shift or redundancy, only the need to adjust to new and unfamiliar working requirements. The sectors most affected by the green transition include construction (30%), transport (26%) and manufacturing (17%), which together account for 73% of the jobs in need of reskilling*".

Figure 5: Expected impact of transition on jobs in Wales



Source: Robins et al 2019.

[6] https://pcancities.org.uk/tracking-local-employment-green-economy-pcan-just-transition-jobs-tracker

Recent work on skills shortages (linked to Wales TUC's proposed green recovery investment package) has found that the majority of the skills shortages identified are in areas relating to construction, heating, and electrical installation (Chapman & Kiberd 2021).

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

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

Commitments include guaranteeing all young people under 25 the offer of work, education, training, or self- employment; creating 125,000 all-age apprenticeships; and delivering quality jobs, training and innovation by decarbonising more homes through retrofit, using local supply chains. Work is currently underway to develop a Net Zero Wales Skills Action Plan by Autumn 2022 (Welsh Government 2021b).

Wales' high priority measures and concrete actions

The Welsh Government has a political commitment and a strategic plan for Wales' transition to Net Zero. The legislative pathway for the transition is described in the policy document "Net Zero Wales Carbon Budget 2". The steps required each year during the period 2021-2025 are outlined within the document, providing a *de facto* roadmap for Wales' transition pathway. Beyond the current Carbon Budget, there are concrete plans for future budgets to cover the period up to 2035. In addition, sectoral decarbonisation route maps are being developed e.g. for housing, and for the Welsh public sector (see TRACER Deliverable 6.4).

Key priorities identified in the TRACER stakeholder consultation for the measures needed to reach net zero are shown in Figure 6. These priorities remain relevant as the net zero legislative pathway progresses in Wales, and as relevant government policies and strategies emerge.

Figure 6: TRACER stakeholder priorities for transition to net zero in Wales

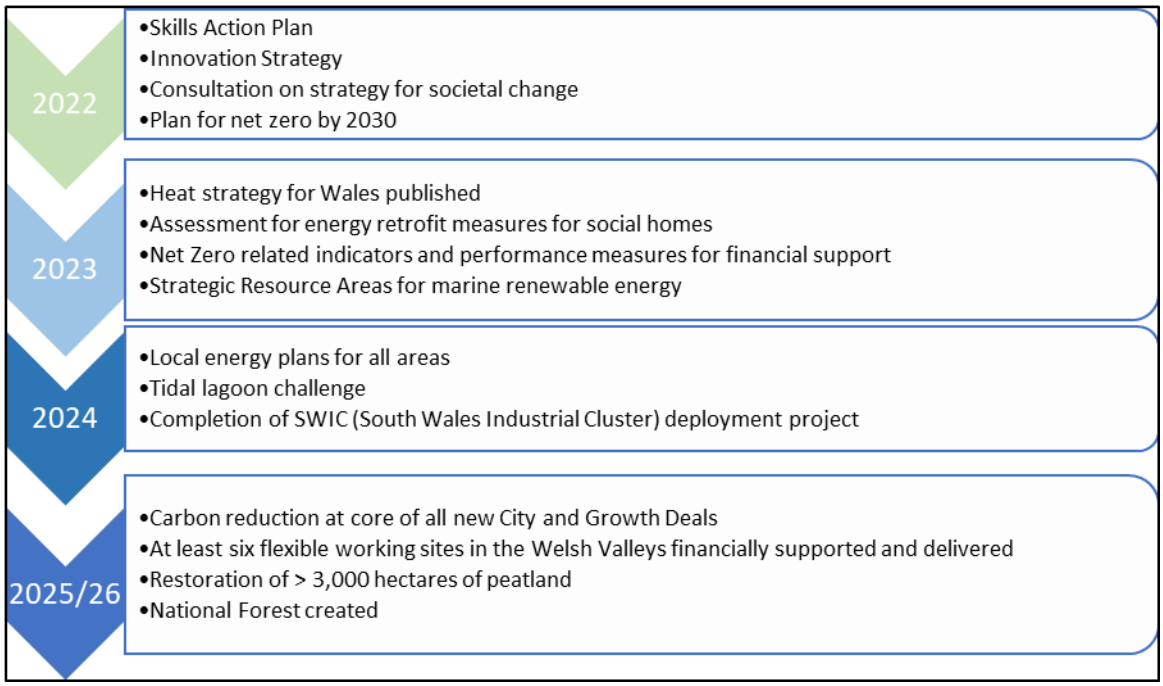
Key priorities	A clearer path to help planning for the future, including for jobs and skills
	High quality jobs and fair work practices
	Synergies between action in innovation policy, education and skills and energy policy
	Prioritisation of connectivity to create employment in areas where well paid jobs are less readily available
	Provision of training for more deprived communities, especially those previously reliant on the coal industry

Alongside the Carbon Budget, Welsh Government's high priority measures for decarbonisation have been outlined across several policy documents during the last few

years.[7] More recently, a series of recommendations has been published following a 'deep dive' on renewable energy (Welsh Government, 2021d). These focus on: strengthening grid connections; streamlining consenting, licensing and supporting advisory arrangements; exploring options for financing the sector; scaling up community and local energy in Wales; maximising economic and social value in Wales; and supporting innovation.

Welsh Government's pathway to net zero includes plans for a number of concrete actions which are significant in terms of the context of the TRACER project, including measures related to renewable energy, the environment, innovation and skills (see Figure 7). Although the transition out of coal in Wales is largely historic, the socio-economic impact of the end of the coal mining industry is still felt in specific geographic locations in Wales. Consequently, the net zero pathway includes plans for continued economic intervention in the Welsh Valleys.

Figure 7: Timeline for planned Welsh Government actions in the transition to Net Zero



Source: adapted extract from Welsh Government (2021b)

The TRACER project focuses on the themes of R&I and skills related to energy transition, and within Wales key steps are planned during the course of 2022 which will represent a major step forward in terms of planning the transition to net zero – in particular, publication of a new Innovation Strategy (discussed in TRACER Deliverable D6.2) and a new Net Zero Skills Action Plan (discussed in TRACER Deliverable D6.3). This work involves extensive evidence-gathering and engagement with stakeholders. At the same time, stakeholders such as industry and the higher and further education sectors, as well as local government and bodies such as the Regional Skills Partnerships, are undertaking their own preparatory activities in parallel. As this work progresses, it is important that there is ongoing coordination and cross-sectoral engagement and collaboration, as demonstrated within the Net Zero Wales: Skills Economies Advisory Forum (N0W SEAF). N0W SEAF has met monthly since its launch following a TRACER stakeholder meeting in December 2021. The Terms of Reference of the group highlight the actions it will undertake to help progress the net zero skills agenda in Wales while preparation of the Welsh Government Skills Action Plan is underway. This includes the provision of advisory services to support planning and policy and strategy development, supporting cross-sectoral collaboration, communication and representation, and promoting public engagement.

7 These include (among others): "Prosperity for All: A Low Carbon Wales" (Welsh Government 2019a); "Prosperity for All: A Climate Conscious Wales" (Welsh Government, 2019b); the "Economic Action Plan" supporting the delivery of the "Prosperity for All" national strategy (Welsh Government, 2017b).

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

Welsh Government has stated in Carbon Budget 2 that "*in some areas we do not yet know what the right path looks like*". They also estimate that around 60 percent of the changes needed in Wales are influenced by powers mostly reserved to UK-level government. The next two carbon budgets for Wales will cover the periods 2026-2030 and 2031-2035. By the end of 2024, Welsh Government has committed to scaling up local energy plans to create a national energy plan, mapping out future energy demand and supply for all parts of Wales. They have also committed to lead the development of a strategic plan for the future energy grid to 2050. Developments being considered include the creation of a Wales System Architect to oversee offshore and onshore investment to support the Celtic Seas developments, supporting business cases for whole system planning and bringing together of plans across South, Mid and North Wales and the development of a detailed whole system plan for gas and electricity transmission and distribution networks. These developments, together with the Net Zero Skills Action Plan and new Innovation Strategy, should soon provide more clarity on the pathways beyond 2035 to 2050.

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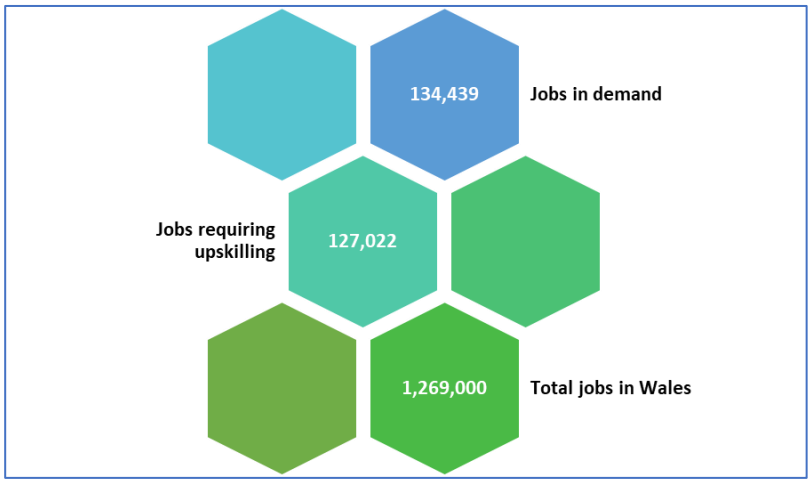
ANNEX - Wales Blueprint Benchmark

UNITED KINGDOM
WALES

	2021
SURFACE (km^2)	20,779
POPULATION (inhabitants)	3,107,500
GDP PER CAPITA (€)	28,040 (2019)
UNEMPLOYMENT RATE (%)	4.1

Map source: UKPhoenix79, https://commons.wikimedia.org/wiki/File:Uk_map_wales.png



EXPECTED IMPACT OF TRANSITION ON JOBS IN WALES

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

SELECTED WELSH GOVERNMENT ACTIONS IN THE TRANSITION TO NET ZERO

Source: adapted extract from Welsh Government (2021) Net Zero Wales Carbon Budget 2 (2021-25)