The Skills for a Jobs Transition

July 2023

Future Energy Skills PROGRAMME

Contents

Executive Summary

The energy system is at the heart of many of the challenges facing the UK. Questions around the cost-of-living, the climate crisis, energy security and the productivity of our economy intersect through our reliance on imported fossil fuels and our need to move to net zero.

As employers, unions and representatives of organisations with a stake in ensuring we have the skills we need for this transition, we are optimistic about the opportunity we have to deliver a revolution that creates green jobs, lowers bills, meets our climate change ambitions, and secures energy independence.

Across political parties, industry and society there is now a consensus for the move towards net zero. The debate is about how to get there, how quickly, and how to do it in a way that is fair to everyone.

It is vital that we achieve the UK's net zero targets without destabilising the UK's energy security and economy. If cessation of production occurs before renewables sources are capable of meeting demand, the UK will have an energy gap, which will only be met from imports from overseas. This will in turn create a jobs gap- crucial jobs and skills will be lost before there are renewables industries to transition to.

Working together to overcome the challenges identified in this report, we can create the next generation of skilled jobs while ensuring that no worker or community is left behind in this dash towards a greener future.

We are positive about the future. However, as this report sets out, the Government's aim for the creation of two million jobs as the UK moves towards Net Zero, and the Opposition's ambition for an accelerated journey to that same destination, are at serious risk due to skills constraints. A step change in the urgency and scale of government response is needed if we are to make the most of the potential of this moment.

Submissions to our Programme from across those with an interest in the energy sector identified problems with skills shortages, skills gaps, and skill cannibalisation. Among the issues raised with us include:

Demographics: The existing workforce is ageing, meaning that as well as finding skilled workers for new vacancies, we will have to fill existing positions too. One-fifth of workers in the energy sector will retire by the end of this decade.

Complexity: Workers at different stages of their working lives will have to be trained or reskilled and entirely new skills and career pathways in the energy systems of the future will have to be catered to.

Labour Market Constraints: We will have to meet skills needs in the context of the constrained labour supply conditions of the UK. Multiple large-scale projects will be competing for limited labour and skills resources. The difficulty and cost of bringing skilled workers to the UK with upfront costs as much as six times higher than the average of other leading science nations.

A Lack of Apprentices: There is still an over-emphasis in our education system on academic routes over vocational education. For some, there is a lack of equivalence in status between these two educational routes while others find the vocational route is not connected to the green jobs that desperately need skilled workers.

A Lack of Graduates: The number of STEM-subject graduates in the UK is increasing but demand still far outstrips supply – and a large proportion of these choose jobs in the finance or tech sectors rather than green energy.

Inflexible Qualifications: As new technologies and new careers emerge, "add-skilling" is too difficult and slow. There is a lack of flexibility within apprenticeships and courses to add content to meet emerging demands. For example, there is no clear route to becoming a heat-pump engineer - rather you have to become an electrician or plumber first. Currently too much of existing skills funding goes unspent – for example £3bn of apprenticeship levy funds went unclaimed between 2019 to March 2022, and there are questions about how much is spent on existing workers rather than on expanding the skilled workforce.[1]

Enduring coherent fiscal, energy, industrial and carbon policy: The short-term focus of the existing policy mechanisms is a barrier to the development of a skilled workforce. Industry needs enduring coherent fiscal, energy, industrial and carbon policy that allows companies to invest for decades.

Diversity: A lack of diversity in the energy industry, with women, BAME and disabled workers; as well as workers from low-income backgrounds; severely underrepresented, makes the challenge more difficult by not attracting a large potential talent pool of skilled workers.

Data: The challenges are made more difficult to manage due to the lack of clear statistics on green jobs and, in turn, a lack of clear guidance to employers and individuals choosing a career path.

1 https://www.ippr.org/news-and-media/press-releases/over-3-billion-in-unspent-apprenticeship-levy-lost-to-treasury-black-hole-new-data-reveal#:~:text=More%20than%20%C2%A33.3%20billion,London%20Progression%20Collaboration%20(LPC).

Across the submissions to the Programme was a concern that the UK risks falling behind international competitors. After the invasion of Ukraine, and the EU's investment to ensure energy security and following the Biden administration's enormous investment into green energy, international competition for talent and investment will only increase.

We cannot assume that the move to net zero will maximise the number of jobs automatically – we have seen this already with a lack of solar and wind manufacturing in the UK. Government will have to intervene to ensure that green jobs are not offshored to places which are able to compete on the basis of exploiting lower-wage labour. Likewise, there is a risk that early-mover advantage by, for example, requiring carbon capture may be offset by losing jobs to offshoring. This emphasises the need for government support for sectors investing in such technologies and the skills associated with them.

Often, we see opportunities where good work by government is not connected to the wider need to create these skills. During the pandemic, the Government launched the Kickstart Scheme to get people back into employment, with £2bn of funding allocated to provide 6-month work placements for 16–24-year-olds on Universal Credit. However, only 1% of Kickstart jobs were in green sectors, with the UK Parliament's Environmental Audit Committee noting that "a valuable opportunity to boost green skills, experience and employment as part of a green recovery has been missed."[2] This emphasises the need for every part of government to see its role in the urgent task of creating the green skills workforce we need in the UK.

With the right decisions, the UK can exploit the advantages we have. In any plan for the future, electricity will be critical, and we've got to rewire to connect new energy- using existing North Sea assets and skills for CCUS or the existing gas network for hydrogen also offer opportunities. However, expressed across submissions was a concern that uncertainty over future government policy was a barrier to skills delivery. For example, uncertainty over hydrogen and the withdrawal of biomass subsidies were felt to have eroded confidence in making long term skills investments.

There was widespread agreement of the needs for a clear national strategy. This should be informed by convening employers, unions, and manufacturers to more clearly map the skills needs. In turn, this strategy should be overseen by a new strategic body, which can work with national, devolved, and local governments to ensure our ambitions to reach net zero are matched by the skills needed. Such as strategy needs to leverage the economic potential of government procurement to act as a market-maker.

Submissions were overwhelmingly enthusiastic about the potential for the British economy, with decisive, strategic action, and made positive suggestions for how this could be achieved. However, it will require a step change in the ambition of government policy.

With a principle that job losses should be avoided, rather than mitigated retrospectively, industry, government and unions should work on 'just transition agreements' to help workers to adapt to new opportunities. Just transition agreements should first and foremost enable the transition and retooling of existing workplaces- with reskilling or job transfer being a last resort.

2 https://committees.parliament.uk/publications/7615/documents/79773/default/, pg. 19

Looking to the future, government should give certainty of its commitment to key industries. Specifically, building a hydrogen economy, investing in small modular reactors, exploiting our competitive advantage in carbon capture, utilisation and storage, and ensuring we have the skills capacity to create an energy network to support new opportunities.

We wish to see large scale investment in energy efficiency, including offering resources to make sure that green technologies are accessible to everyone.

Government incentives, through use of procurement levers and fiscal measures should help industry overcome the risks of investing in the transition. One option, for example, would be making the commitment to a rapid transition to hydrogen, which is the best option for avoiding the negative social consequences of transition.

The skills system needs to be radically reformed to be:

- Properly funded, providing a big increase in apprenticeships.
- More flexible, allowing industry to meet needs which are linked to real jobs.
- Faster, allowing for new qualifications to be developed to meet emerging technologies.
- And fairer, enabling the targeting of support to areas which will need most support if they are to secure a jobs transition out of carbon-intensive industries.

As well as systemic changes, a culture change is needed to persuade more and more young people that the vocational route to a career in green energy is as valued and valuable as the university route. While for those taking the university route, we need to find ways to ensure more of them take STEM courses and then use those degrees in our sector.

In total we make forty-eight recommendations for governments, educational institutions and industry. These range from wholesale reorganisations of existing systems to small changes that could make a big difference.

About

The Future Energy Skills Programme- led jointly by Centrica and the GMB – has brought together business, trade union and academic leaders to help the UK succeed in meeting the twin challenges of the transition to a low carbon future and the urgent need for greater energy resilience.

The Programme has been created to examine how the UK energy sector can lead this impetus for change and build upon the work of UK Government's Green Jobs Taskforce. We considered how we can unlock the skills needed for a green economy by focusing on two key policy themes.

1. The policy steps that can be taken to ensure we create careers for the future as the UK accelerates plans for energy independence in a more geopolitically challenging environment.
2. How we can ensure there is a just transition for the UK's existing high carbon workforce as part of our pursuit of net zero.

In both policy areas we will explore how the UK can gain and sustain competitive advantage internationally.

The Programme is focused on the future and makes policy recommendations for ensuring the maximum growth of highly skilled jobs across the whole of the UK over the next ten years.

We focus on the potential for these jobs in the energy sector with a focus on energy efficiency in homes, greener workplaces and low carbon energy generation, storage, transmission, and distribution. We have examined how we create domestic and international competitive advantage from home energy efficiency, tidal stream, hydrogen, nuclear, electric vehicles, and clean heavy industry and how the existing oil and gas infrastructure can be repurposed for the future.

We also consider the direct adjacent manufacturing that will support the energy sector. We want to ensure that the high skilled jobs manufacturing the infrastructure for a more energy independent, low carbon nation are based in the UK, allowing this to become a major export revenue stream.

Throughout this report when we refer to 'green jobs' we do so using the definition offered in the Green Skills Taskforce Report: employment in an activity that directly contributes to- or indirectly supports- the achievement of the UK's net zero emissions target and other environmental goals, such as nature restoration and mitigation against climate risks.[3]

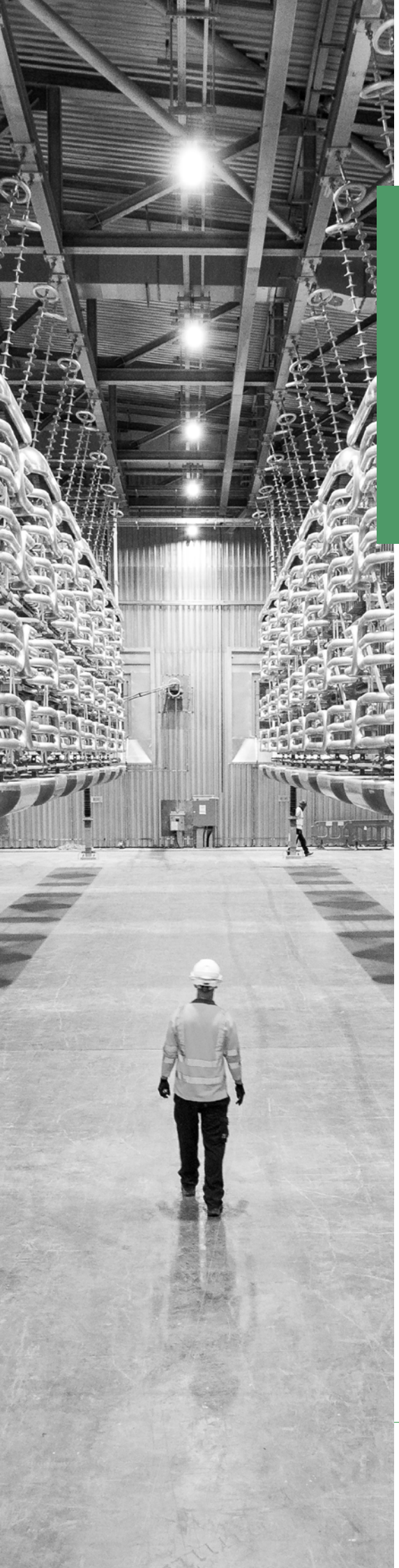
3 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1003570/gjtf-report.pdf pg. 15

Submissions

We also undertook two roundtable discussions and held one-to-ones with experts from across green energy, skills, and trade unions representing workers in the sector. We thank everyone who took part in these discussions and who submitted detailed policy analysis and positive suggestions for the future.

- Association of Colleges
- Cadent
- Climate Change Committee
- Energy Systems Catapult
- Greater Manchester Combined Authority
- Hydrogen UK
- Institute for Apprenticeships and Technical Education
- Institute of Environmental Management and Assessment
- Net Zero Technology Centre
- Newcastle College
- Professor Steve Petrie – Chair, Heat Decarbonisation Group, Skills Development Scotland
- Purpose Business Coalition
- The National Union of Rail, Maritime and Transport Workers
- Scottish Renewables
- Skills Development Scotland
- Welsh Government
- West Midlands Combined Authority

We thank all fifteen advisory board members, as well as those who submitted evidence, for their contribution to this report, and note that contribution does not equate to full endorsement of either the report's content or the recommendations.



Opportunities and Challenges

The transition to a net-zero economy will impact all our lives over the coming years as the UK seeks to tackle climate change, achieve a jobs transition away from a fossil fuel economy, and become more resource efficient.

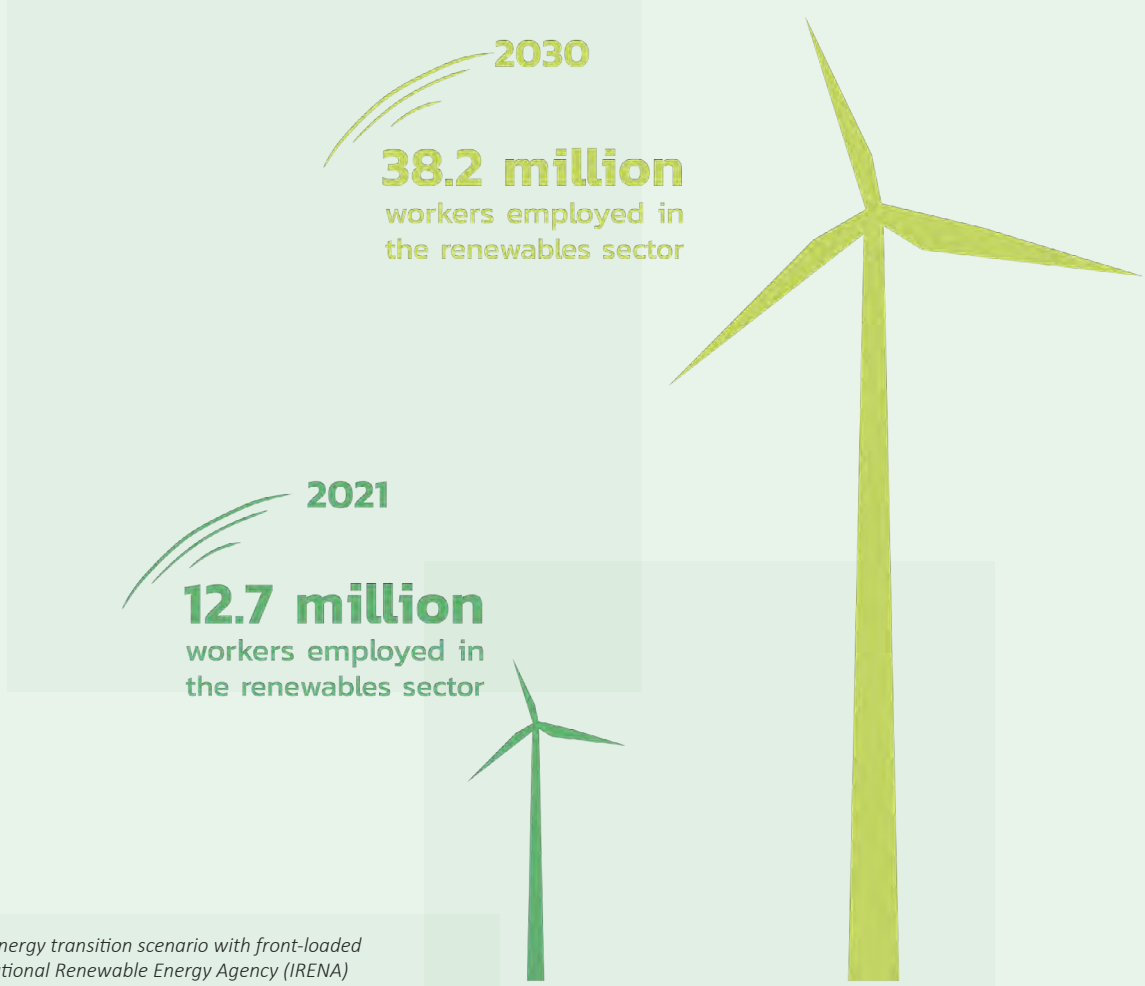
There are huge opportunities in these changes for employers and employees, and we need to ensure British workers and businesses are well-placed to make the most of these opportunities. This energy transition must be just- supporting affordability, attracting investment, and sustainability while providing high-quality, secure employment opportunities for British workers in the new green economy.

The UK's mission towards net zero is taking place against a backdrop of a cost-of-living crisis, geopolitical uncertainty, and recovery from the pandemic. Russia's invasion of Ukraine will have a long-term impact on our efforts to address climate change and reach net zero. The conflict has raised significant questions over the UK's energy security and added fresh impetus to securing our energy independence.

This historic shift presents enormous opportunities for job creation and career development in various industries, including renewable energy generation, energy storage, energy efficiency, hydrogen, nuclear and carbon capture and storage. In the UK, data from PwC's annual green jobs barometer shows the number of jobs being created in the renewable energy industry is growing four times faster than the overall UK employment market. Data shows that 2.2% of all new UK jobs have been classified as "green" with the number of green jobs advertised trebling in the last year to 336,000 roles.[4]

However, we cannot assume that the move to net zero will maximise the number of jobs in the UK automatically – we have seen this already with a lack of solar and wind manufacturing in the UK. There will need to be a plan to ensure that green jobs are not offshored to places which are able to compete on the basis of exploiting lower-wage labour. Likewise, there is a risk that early-mover advantage in areas such as requiring carbon capture may be offset by losing jobs to offshoring. This emphasises the need for government support for sectors investing in such technologies and the skills associated with them.

4 https://www.pwc.co.uk/press-room/press-releases/green-jobs-growing-at-four-times-the-pace-of-the-overall-employm.html



Figures based on an ambitious energy transition scenario with front-loaded investments, provided by International Renewable Energy Agency (IRENA)

The UK's transition takes place in a competitive international environment. According to a report by the International Renewable Energy Agency (IRENA) the renewable sector employed 12.7 million workers in 2021 and has the potential to create over 38 million new jobs worldwide by 2030.[5]

After the invasion of Ukraine, and the EU's investment to ensure energy security and following the Biden administrations enormous investment into green energy, international competition for the talent and investment that can secure these jobs can only increase.

The Place Based Climate Action Network has outlined that as a result of the transition, approximately 6.3 million workers will require skills which could experience an increase in demand.[6] Workers in construction and installation; engineering; operations; and maintenance will need reskilling, upskilling or will need to use their skills differently.

Already the green skills the UK needs are in short supply, including advanced engineering, nuclear, digital, and cyber, computational science, data science, and statistics.

5 https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Sep/IRENA_Renewable_energy_and_jobs_2022.pdf?rev=7c0be3e04bfa4cddaedb4277861b1b61 pg.8

6 Tracking local employment in the green economy: The PCAN Just Transition Jobs Tracker | Place Based Climate Action Network (pcancities.org.uk) pg.19

6.3 million
the number of workers who will require skills help

336,000
the number of green jobs advertised last year

£1.5 billion
the annual cost of the STEM skills shortage to the UK economy

Research from the Green Alliance has shown that every major sector in the UK needs to close a significant skills gap to enable them to reach net zero. Furthermore, the sectors requiring the most pressing emissions reductions by 2030 face the most immediate skills shortages, including housing and transport.[7]

To take the example of housing, if we are to meet the UK's climate target, the vast majority of the UK's current housing stock needs to be retrofitted with energy efficiency measures and low carbon heating systems, such as heat pumps. A May 2022 report from the UK Parliament's Environmental Audit Committee described the current shortage of workers in the energy efficiency and retrofit sector as "chronic" and criticised the lack of concerted action in government to address the issue.[8]

Concerningly, a recent report from energy think-tank E3G has shown that more than £2bn of funding committed to home retrofits has not yet been spent by the UK government.[9] This represents a third of the total funding pledged for this Parliament to make buildings energy efficient and decarbonise heat. This does not provide the long-term certainty the industry needs to plan and invest in skills and supply chains, thereby creating the wider economy 'green growth' opportunities associated with both enabling and realising energy efficiency gains.[10] [11]

With analysis from the IPPR indicating that 750,000 construction workers could retire, or be on the verge of retirement, by 2035, the need to get more skilled workers into the building sector could not be more urgent.[12]

If we cannot develop and attract these skills, there will be serious opportunity costs to the UK economy in falling behind the global race to secure a foothold in future markets. Losing first-mover advantage because of a lack of readily available skills could inhibit UK economic growth against other countries.

An inability in the UK to attract and retain skills that will help deliver the energy transition could affect the UK's global trading position, and the development of a UK solution in areas where it isn't prudent to rely on imports, such as energy production. These skills will also be required across both civil and defence industries, so if the UK doesn't have access to talent, particularly home grown, then this also could affect the UK's defence capability and national security. Key strategic industries will be competing with each other rather than complementing each other's contribution to the UK economy.

Despite the scale of the challenge set out in this paper the UK has the education, industry, and infrastructure to avoid these risks. However, doing so will require political capital and both public and private investment beyond current commitments. It will need long term decision making, a clear strategy and greater certainty for those making investment decisions and preparing workers for the green jobs of the future.

7 https://9f619a1f292e437dbef8.b-cdn.net/wp-content/uploads/2022/01/Closing_the_UKs_green_skills_gap.pdf pg. 2
8 https://committees.parliament.uk/publications/22427/documents/165446/default/ pg.64
9 https://www.e3g.org/wp-content/uploads/The-spring-budget-and-the-retrofit-revolution_E3G-briefing.pdf pg.2
10 https://strathprints.strath.ac.uk/82777/
11 https://green-alliance.org.uk/publication/green-uplift-how-a-net-zero-economy-can-reduce-fuel-and-transport-poverty/
12 https://www.ippr.org/files/2021-02/skills-for-a-green-recovery-feb2021.pdf pg.3

Local Government

The green skills challenge needs every part of government to work together, and to work flat out. The UK cannot transition to a green economy and meet its net-zero targets without the contribution of local government. In addition to providing public investment, local councils and combined authorities have devolved powers to direct strategic local measures to promote green skills.

Local authorities are uniquely placed to understand their local employment market and identify challenges that will arise from the net-zero transition. Using their relationships with local industry and education providers, local authorities can tailor support and investment in the skills which will protect jobs and promote a jobs transition.

Councils are also responsible for many of the economic levers which will help to spread green technology and jobs. From management of local transport networks to investment in, and approval of, green tech projects, the net-zero transition is heavily dependent on ambitious action from local authorities.

Research from a recent Local Government Association (LGA) report suggests that there could be as many as 694,000 direct jobs employed in the low-carbon and renewable energy economy by 2030 in England alone, rising to over 1.18 million by 2050.[13] The LGA notes that the net-zero transition presents a major strategic opportunity for every region of England, but that this requires concerted action from local authorities to ensure that green jobs are fairly spread across the UK.[14]

Local councils need to seize existing regional advantages to create new green jobs, for example wind capacity and nuclear operations in the North West, Carbon Capture Utilisation & Storage (CCUS) in the North East, and gigafactories in the Midlands.

It is vital that local authorities take a proactive approach in identifying local skills gaps and work constructively with industry and central government to support increased training opportunities.

It is encouraging that many local authorities have already developed, or are in the process of developing, localised strategies setting out their long-term approach to skills and training within the low-carbon sector. The West of England Combined Authority, for example, commissioned a Green Skills Market Analysis to highlight the green jobs that will be required locally to meet their 2030 net-zero target, and how they can best support local people to access these jobs and skills.[15]

We also received evidence from the West Midlands Combined Authority (WMCA) referencing their Adult Education Budget Strategy which sets out how their investment in skills is being designed to promote jobs in low-carbon industries and ensure a just transition for local workers.[16] These are welcome examples of local authorities taking a

13 https://gemserv.com/wp-content/uploads/2021/06/Local-green-jobs-accelerating-a-sustainable-economic-recovery_final-1.pdf pg.7
14 https://gemserv.com/wp-content/uploads/2021/06/Local-green-jobs-accelerating-a-sustainable-economic-recovery_final-1.pdf pg.12
15 https://www.westofengland-ca.gov.uk/wp-content/uploads/2021/07/WECA_Green-Jobs-and-Skills_Phase-2-Report_Final_01_06_2021.pdf
16 https://www.wmca.org.uk/media/5423/wmca-adult-education-budget-2022-2025-strategya6ab43e0b-fce22820d3180bc2104a098bd3e1d03702673a69bf4fae4ee6f53f1.pdf

proactive and ambitious approach to supporting local green jobs, and we encourage all local authorities across the UK to take a similar approach.

Both WMCA and Greater Manchester Combined Authority (GMCA) argued that with greater devolved powers, they could deliver more for local residents. It is therefore encouraging that GMCA agreed a 'trailblazing' devolution deal with the Government in March 2023, which gives the authority the ability to create the country's first integrated technical education city-region, in addition to further skills devolution and flexibilities to enable GMCA to respond to local need.[17] A similar deal for WMCA was agreed at the same time, giving the authority greater powers to invest in local skills and priorities.[18] These deals represent a positive framework that can be replicated across the UK.

17 https://www.greatermanchester-ca.gov.uk/news/greater-manchester-strikes-trailblazing-new-devolution-deal-new-era-for-english-devolution/

18 https://www.gov.uk/government/publications/west-midlands-combined-authority-trailblazer-deeper-devolution-deal/west-midlands-combined-authority-trailblazer-deeper-devolution-deal

The International Context

The global context in which we are approaching our net zero skills challenge has changed dramatically in recent months. The level of global competition has leapt forward since governments in the UK prepared their green transition strategies and, as the world has changed, so must our approach.

The invasion of Ukraine by Russia has forced the European Union to act with much greater purpose and clarity on energy supply and reducing the reliance on fossil fuels. The European Commission has produced its policy proposal REPowerEU.[19]

This policy proposal seeks to urgently shift the member countries of the EU from a reliance on fossil fuels to decarbonised power generation and higher levels of energy efficiency. To enable this to happen, the European Commission proposes to bring forward significant levels of investment on scales not previously seen. Some €210 billion euros in additional investment is now proposed alongside targeted policies to support renewable generation such as solar and wind.[20]

Alongside the developments in Europe, the United States has passed into the law the US President's 'Build Back Better' proposals which are largely contained within the 'Inflation Reduction Act'.[21] These proposals represent the most ambitious set of policies yet to

19 https://eur-lex.europa.eu/resource.html?uri=cellar:fc930f14-d7ae-11ec-a95f-01aa75ed71a1.0001.02/DOC_1&format=PDF
20 https://eur-lex.europa.eu/resource.html?uri=cellar:fc930f14-d7ae-11ec-a95f-01aa75ed71a1.0001.02/DOC_1&format=PDF pg.12
21 https://www.congress.gov/117/bills/hr5376/BILLS-117hr5376enr.pdf

enable the US to decarbonise its economy. It is anticipated that some additional 500,000 new 'green jobs' will be created in the energy sector alone on the back of some $369 Billion investment in the green economy.[22]

Modelling from the Energy Futures Initiative suggests that the US Inflation Reduction Act will create an additional 1.5 million jobs in the U.S. economy by 2030 compared to a Business as Usual (BAU) scenario, while reducing greenhouse gas (GHG) emissions by 37% relative to a 2005 baseline.[23] One of the key sectors to experience growth as a result of the IRA is manufacturing, increasing by 150,000 jobs compared to a BAU scenario.[24] This dispels the notion that decarbonisation inevitably leads to deindustrialisation and increased unemployment. With bold government action, it is possible to boost industry and jobs while delivering net-zero.

The impact of the IRA in the US could be replicated in the UK, should the UK government demonstrate similar levels of ambition. Indeed, a recent joint study by the LSE and the Resolution Foundation was clear that there is no reason that the move to net-zero in the UK should replicate the deindustrialisation during the 1970s and 1980s which drove up unemployment, particularly in certain parts of the country.[25] The study demonstrated that the transition to net-zero, while representing a structural change in the labour market just as radical as that of the 70s and 80s, is manageable and can be delivered in a way that protects jobs and boosts industry. However, that requires government to be proactive in investing in the clean technologies and green skills of the future, crucially to secure first or early mover advantages and avoid the negative GDP, jobs and emissions outcomes of offshoring where possibly (for example in carbon capture and other identified industrial decarbonisation solutions[26]).

Both the European and US measures contained are a significant boost to the global renewable power industry, however they are also protectionist by design, meaning that any allocation of resources remains driven by domestic needs which are themselves significant. Concerns have been expressed that the measures contained within the Inflation Reduction Act might ignite a green jobs/investment/technology trade war with Europe. Although this is likely exaggerated it is possible that investment flows will be impacted to benefit the US and European sectors at the expense of the UK.

We can also see around the world other nations taking decisive action in order to create markets and provide investment certainty. For example, the Netherlands mandated that gas connections would not be permitted for new-build housing from 2019 and electric heat pumps are now the default solution in this sector. In 2021 over 80% of new-build homes had a heat pump installed as the primary heating system and this is expected to grow further until the expansion of heat networks catch up near the end of this decade.

While the argument we make here is primarily an economic one, there are strong security and values-based arguments for considering these matters in an international context. Few in the UK wish our future to be beholden to energy reserves controlled by the Russian President or other authoritarian leaders. We know too that relying on energy

22 https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/08/16/remarks-by-president-biden-at-signing-of-h-r-5376-the-inflation-reduction-act-of-2022/
23 https://energyfuturesinitiative.org/wp-content/uploads/sites/2/2023/03/NDC-Report-January-17-v2.pdf pg. iv
24 https://energyfuturesinitiative.org/wp-content/uploads/sites/2/2023/03/NDC-Report-January-17-v2.pdf pg.12
25 https://economy2030.resolutionfoundation.org/wp-content/uploads/2022/06/Net-zero-jobs.pdf
26 https://doi.org/10.1016/j.ecolecon.2021.106978

infrastructure manufactured elsewhere in the world can lead to moral compromises – such as the presence of polyciliate allegedly produced by Uyghur slave labour.

It is in this context that we make our argument that it is more important than ever that governments act to create the right environment here in the UK.

There is a platform to build on. On 30th March 2023, the UK Government announced a comprehensive package of policy announcements which add much-needed detail and direction of how the Government intends to reach net-zero fossil fuel emissions by 2050 while achieving independence from fossil fuel imports.[27]

The announcements deliver on several of the policy initiatives which the Future Green Skills Programme has been arguing for, including the start of a competitive process for Small Modular Reactors, moving forward with Carbon Capture, Utilisation and Storage (CCUS) and hydrogen projects, and additional investment in training opportunities. While a welcome step forward, the announcements do not match the scale of ambition demonstrated in the US Inflation Reduction Act or the EU Net Zero Industry Act.[28]

Therefore, our first recommendation is that Government should expand the ambition of its green investment to match the scale of plans recently set out by the United Sates, European Union nations and other G7 peers. Greater public investment to decarbonise and retool UK industry and supply chains, protect local jobs and economies, and maintain international competitiveness is especially important for high carbon sectors already impacted by the transition, e.g., steel production.

27 https://www.gov.uk/government/news/shapps-sets-out-plans-to-drive-multi-billion-pound-investment-in-energy-revolution

28 https://single-market-economy.ec.europa.eu/publications/net-zero-industry-act_en

A Just Transition

Alongside the policy announcements made by the Secretary of State on the 30th March, the Government published The Net Zero Growth Plan, a document which sets out a delivery framework for the UK's long-term decarbonisation trajectory, with a view to improving the competitiveness of the UK economy.[29]

We welcome that the Plan acknowledges that achieving net-zero relies upon the UK having the right workforce with the right skills and in the right locations across the UK. We support the Government's commitment to taking a proactive approach to working with industry to identify and address workforce challenges and skills gaps.

While the Plan did not detail fully how the Government intends to deliver on these commitments in practice, it is to be welcomed that the Plan commits to publishing a joint government-industry Net Zero and Nature Workforce Action Plan in the first half of 2024. We hope that the insights and recommendations contained within this paper will help to shape this Action Plan, ensuring that it meets the scale of ambition required and supports a jobs transition to net-zero.

> "For us a just transition means a jobs transition.

Submissions were anxious that government and industry should learn lessons from the past record of managing the winding down of extractive industries, and the very mixed experience of retraining after past economic dislocations. Today, coalfield communities have only 55 employee jobs per 100 residents of working age, compared to a national average of 73.[30]

Throughout the transition to Net Zero, the UK will continue to rely on oil and natural gas – industries that supported more than 200,000 jobs in 2021.[31] Failure to recognise this, and to plan for the future of both individual workers and communities supported by these sectors, risks a 'lost generation', repeating the mistakes of the phasing out of the coal industry.

The principle for policy makers should be ensuring a transition that avoids job losses. This means taking an approach that prioritises the adaptation of existing jobs and making the best use of the skills of the existing workforce. In an already tight labour market with skills shortages, we cannot afford to see high skilled workers retire prematurely or move to lower skilled occupations.

While the assumptions should be towards transition rather than job losses, the UK should provide equivalent funding the EU's just transition fund to help communities diversify and develop alternative industries. This could be funded by ring-fencing treasury windfalls from green industries – such as crown estate leases for offshore wind – or ring-fencing revenues from current windfall taxes on energy firms.

29 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147457/powering-up-britain-net-zero-growth-plan.pdf
30 https://www.coalfields-regen.org.uk/wp-content/uploads/2019/10/The-State-of-the-Coalfields-2019.pdf pg.5
31 https://oeuk.org.uk/skills-shortages-threaten-the-uks-energy-transition-and-security/

Carbon capture, utilisation and storage and hydrogen development offer the potential to safeguard jobs in existing areas of carbon-intensive sectors, and the potential to revitalise other areas that have experienced industrial dislocation. Likewise, offshore wind will be a major source of employment for those transitioning from high-carbon energy jobs.

Our offshore workforce is one of the best trained and equipped in the world, and sets the gold standard for health, safety, and environmental operations here in the North Sea. We owe it these workers, and to the country, to ensure that we maximise use of these highly skilled people. And we can do it.

A study by Robert Gordons University on transferability[32] concluded that 90% of existing jobs in oil & gas have medium or highly transferable skills and therefore training gaps should be largely contextual. In 2020 Offshore Energies UK (OEUK) commissioned RGU's Energy Transition Unit to carry out employment modelling in related sectors: specifically, the electrification of offshore facilities; carbon transport and storage (but not capture); and hydrogen production. RGU looked at three scenarios, derived from the government's British Energy Security Strategy. These indicate that the size of the workforce, on and offshore, will range between 8,000 and 26,000 by 2030, depending on investment: that is the potential size of the prize.

We should not assume that a cluster effect will transfer from old carbon-intensive industries to new low carbon ones. In offshore wind, for example, more of the jobs will be 'on the beach' rather than at sea, with greater potential to be spread geographically around the country.

The installation and maintenance of green infrastructure will not naturally be focussed around existing areas of carbon-intensive industry and jobs. Rather it is likely to be spread across the UK and much of it in the future will be in people's homes and places of work – where energy will be generated and consumed in many cases. Working in people's homes and workplaces will be a new experience for many oil and gas professionals and will require a degree of coaching and training as well as the technical product and associated core skills training such as plumbing and electrical skills. Offshore and onshore windfarms will require relatively low maintenance and operational skills compared with the Oil and Gas Industry resulting in fewer employment opportunities for people displaced by the introduction of this new technology.

The experience of offshoring manufacturing jobs must be avoided in the future (through firm relocation decisions and/or import substitution if decarbonisation solutions in the UK fail to be delivered in competitive ways[33] [34]). Even if we can ensure that jobs remain in the UK, as manufacturing facilities for new technologies emerge, we may see a migration of jobs and skills away from current economic hotspots resulting in individuals being forced to and being made available to reskill in more mobile installation roles for emerging energy technologies.

There will be a move from traditional skills to more manufacturing and clustered based skills in addition to the traditional skills required to install these new products such as plumbers, electricians etc. Without interventions, this will result in jobs moving away

32 UK Offshore Energy Workforce Transferability Review 2021, Robert Gordon University 2021
33 https://strathprints.strath.ac.uk/78032/
34 https://doi.org/10.1080/14693062.2022.2110031

from their traditional locations to new clusters of skills, many of which will bring a different experience for employees – more factory like, with lower rates of pay and more demanding and higher levels of productivity. The skills they will need will be much more specific and less general and will either be located around manufacturing sites or in consumers properties.

This change will require industry to work with governments and their agencies to firstly forecast the demand which will exist in locations around the UK for the installation of these products and then secondly establish where the most beneficial locations are for the manufacturing sites are to be located in terms of jobs, investment, skills, and access to colleges and universities.

Another assumption we should avoid is that carbon intensive jobs will be replaced with greener jobs of equivalent salary levels. Ongoing monitoring of employment impact and skills requirements by geography will be needed.

New research suggests that the wage premium associated with green jobs (where it previously existed) is already being eroded, and that new jobs will be not necessarily be created in the areas where other jobs are anticipated to be lost.[35] There are also concerns that while some parts of carbon-intensive industries have higher levels of union recognition and partnership working between employer and worker, this is not always the case with new industries. Environmental and social objectives need not be in conflict, but the early signs indicate that- without a robust intervention from trade unions, employers, and ministers- many workers may be left behind.

New jobs must be good jobs: government should use its influence to set standards and competencies in emergent industries and ensure jobs are secure, well-paid, and with the right skills provision. While the focus of this paper is on careers considered as more highly skilled, those jobs considered less skilled should still be good jobs with decent pay and dignified conditions.

High carbon industries should prepare 'Just Transition Agreements', with their workforce. Protecting job quality in existing sectors requires giving workers and their unions a voice in how we make those jobs part of our net zero future. Important lessons can be learnt from the collaboration between EDF and Unite, Prospect and GMB in the successful creation of transition pathways for workers at Cottam coal power station before its closure.[36] The UK can also learn from the positive experience of agreements between employers and unions that helped deliver infrastructure projects for the 2012 Olympics as an example of how to deliver big things with the enthusiastic support of workers. Trade Unions play a crucial role to play in protecting lifelong learning in workplaces, a role that will become more important as we seek to retain jobs in industries in transition.

35 https://doi.org/10.1016/j.ecolecon.2021.106978
36 https://www.unionlearn.org.uk/case-studies/prospect-helps-energy-workers-transfer-skills

Creating the Right Environment

Investment in renewables, hydrogen and nuclear can support the UK in becoming a net exporter of energy, and energy-efficient industries can create domestic competitive advantages. To maximise the potential of these sectors, government needs to introduce policies that incentivise investment and remove barriers to entry. Unlocking the investment needed to generate long-term skilled jobs for our energy security will need a stable policy and regulatory environment that provides certainty and incentivises investment in the energy industry.

Uncertainty over future Government policy is an important barrier to skills delivery. Doubts over the paths to decarbonisation postpones climate action and raises the risk of job losses and cuts to pay and terms and conditions.

For example, there is no clarity yet over whether Ministers will require new boilers to be hydrogen-ready, despite active plans to gradually blend hydrogen into the grid. This is a particular problem in the UK, where home heating relies on a fragmented employment model, with many small or sole traders.

> "It is not enough for government simply to make correct choices; they must also be consistent and backed by a political consensus that lasts between eventual changes of government.

Abrupt policy changes make it harder to plan for changes in skills requirements. The withdrawal of solar and biomass subsidies are examples of sudden policy shifts that make it harder to justify the investment of limited resources in planning for transition.

To ensure clear, consistent choices as we decarbonise our economy, there was widespread agreement across submissions received on the needs for a clear national strategy to underpin the transition. We would welcome cross-party discussions on such a strategy, and on which institutions should oversee it, as a way of creating the certainty that industry needs.

To offer confidence to investors, industry, and individual workers, those contributing to the programme felt it was essential that government 'throw it's hat over the wall' and signal commitment to key green industries. Specifically, this means committing to:

- Ensuring adequate upgrades to energy networks, supported by a skilled workforce.
- Building a Hydrogen Economy
- Investment in Small Modular Reactors
- Exploiting our competitive advantage in carbon capture, utilisation and storage.

We will look at each of these specific sectors in turn, and their associated skills needs in sections below.

Energy Efficiency

This transition will take place in large industrial sites but also in homes and businesses across the country.

The energy efficiency sector is also a key area of opportunity for job creation, with the potential to create jobs in areas such as insulation installation, building retrofitting, and energy management services. The UK Government's Clean Growth Strategy includes a target to improve energy efficiency in homes and businesses, which could create up to 20,000 new jobs by 2030, according to a report by the Committee on Climate Change. Moreover, research at the University of Strathclyde's Centre for Energy Policy has consistently shown that such action to enable improved energy efficiency unlocks potential for sustained and greener economic growth as producers and consumers use resources more productively and unlock real incomes and spending power for other activities.[37]

We call for large scale public investment in decarbonising homes, including free installation for low-income households and subsidised loans for heat pumps or hydrogen boilers. We support the Sustainable Energy Associations call for a clear, committed policy roadmap for heat and buildings all the way through to 2050.

In the recent consultation document, Improving Boiler Standards and Efficiency it has been proposed that 'all newly installed natural gas boiler installations must be accompanied by an electrical heat generation element or other renewable or low-carbon system'. We would like to see this implemented sooner than 2028.

Committing to a large-scale programme of support will help ensure equity in transition and build market confidence to invest in the necessary skills. The cost of this should be compared to current government costs in subsidising energy costs.

Too often, the UK's approach to delivering home insulation schemes has been through reliance on lowest-cost contractors who use techniques where training requirements are low. This has resulted in a missed opportunity with little long-term employment effects or investment in skills. This employment model- coupled with poor training- resulted in relatively high levels of consumer complaints, and low unionisation rates that has undermined cross-party political support for those programmes.

We call for a new approach to home energy efficiency programmes that recognise this as an essential, and skilled profession. We believe that the best way of ensuring job quality in these programmes is delivery through direct labour by Local Authorities or large energy companies with a public mandate, or a combination of both.

Making clear decisions is just the start, however. Government will need to encourage widespread public awareness raising to help create the market for new technologies. According to the 'Home is where the heat is' progress report,[38] more than one in five homeowners in the UK still have no plans to make improvements to the environmental sustainability of their homes in the next decade and those who are eager are put off

37 https://strathprints.strath.ac.uk/82777/
38 https://www.worcester-bosch.co.uk/img/home_is_where_the_heat_is/NatWest_home_is_where_the_heat_is.pdf

by the effort needed just to understand the options confidently enough to make an investment decision.

We would like to see a government backed public information campaign on energy saving measures, how they can benefit consumers and how to access and fund them. This could be something similar to the current Smart Energy GB Smart Meter campaign as this will benefit installer confidence and improve carbon reduction.

Supply Chains

There is a need for central and local government to be more joined up on the benefits of expediting decisioning making in low carbon sectors. For instance, establishing business models and enabling projects to take Final Investment Decision which translates to orders and manufacturing, and therefore jobs. In recent years, too much manufacturing has been permanently lost internationally due to global competition, so opportunities offered by new technologies cannot be allowed to be lost.

In recent years the UK has also suffered from interrupted global supply chains and rising prices for basic goods. As recognised in the Integrated Review of Security, Defence, Development and Foreign Policy[39] there is need for a new strategy on supply chains and imports and refresh our approach to delivering the Critical Minerals Strategy. This is especially relevant to energy technology. As noted above, this is also a matter that touches on the moral issues of the risk of renewable supply chains being compromised by slave labour.

39 https://www.gov.uk/government/publications/integrated-review-refresh-2023-responding-to-a-more-contested-and-volatile-world/integrated-review-refresh-2023-responding-to-a-more-contested-and-volatile-world

Providing the Right Incentives

Clearing the blockages currently preventing companies from showing the level of ambition on investment that is needed to create new green jobs requires a supportive policy, fiscal, and regulatory environment. The Government should consider introducing a range of policies, including tax incentives, financial support, and grants to help companies overcome the initial capital costs of investing in green technologies.

The need for state intervention was set out in the recently published Chris Skidmore review on net zero which found that economic opportunities are being lost due to a lack of consistent long-term policy or investment and called for Government funding to ensure the UK doesn't fall behind the US, EU, and others in this space.[40]

The Mission Zero Review urged the Government to replicate the business tax incentives contained in the US Inflation Reduction Act. The Review argued that incentives should not only support businesses developing the green technologies of the future, but that tax reliefs should also be offered to businesses using low carbon technologies in operations.[41]

We would support introducing tax incentives for investment in low-carbon technologies, which would stimulate investment and create new jobs. Government could offer financial support to companies looking to invest in renewables, hydrogen and nuclear or provide grants to help them overcome the initial capital costs.

To signal confidence we recommend that governments across the UK consider introducing long-term contracts for low-carbon energy, such as power purchase agreements, to provide investors with greater certainty over revenue streams.

Government should also consider introducing a low-carbon procurement policy, which would require public sector organisations to purchase low-carbon goods and services, creating a market for green technologies.

In line with our commitment to good work, all incentives to business that are recommended should be made with conditions around decent work, including pay in line with collective agreements (or the Living Wage where those don't exist), high standards on skills provision at work, and Just Transition Agreements within the high-carbon sectors.

40 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1128689/mission-zero-independent-review.pdf

41 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1128689/mission-zero-independent-review.pdf pg. 136

We Need a New Strategic Body

Alongside a clear strategy, there is a need for clear leadership.

> "There is a need for a new strategic body, bringing together employers, workers, education, and government at every level, to oversee a skills strategy and to monitor skills needs.

The establishment of the strategy and strategic oversight should be informed by convening employers, unions, and manufacturers to more clearly map the skills needs. This should be about creating a new relationship of mutual accountability between government and industry. For its part government needs to provide frameworks and, in many cases, subsidies in order to drive the transition. However, government can and should demand things in return beyond development. Detailed plans on jobs and skills requirements per year per project from industry would assist government planning. A central body could therefore sit on an aggregated jobs and skills plans from all companies that could be shared with universities, colleges and others with a stake in meeting the skills challenge.

Ofgem's regulatory role should also be enhanced to become more long-term in focus and to encourage skills development. The regulatory framework for energy as set by Ofgem appears to preclude longer term investments in workforce numbers or capacity as it is driving the best outcomes for consumers over the regulatory period.

This is problematic as demand in the short term does not match anticipated needs for energy workers. Thus, holding back any plans to decarbonise the economy and creating significant logjams when demand does pick up. Without Government intervention in this area, a severe impediment is placed at the heart of achieving net zero more widely.

Clarity at the centre of government should be matched with greater devolution and flexibilities around skills for local, regional, and devolved governments.

If it is to be successful and, crucially, to create political consensus, all planning of transition pathways to Net Zero must involve workers' representatives.

As we consider the skills requirement for a future home heating conversion, we believe that we should draw on the experience of the natural gas programme that successfully oversaw the conversion of the mains gas network and some 35 million appliances in more than 13 million households.

This complex and disruptive project had been delivered on time and under budget, while withstanding the heat of Parliamentary and tabloid scrutiny, and retaining Ministerial confidence across two changes of governing party. That programme could not have been delivered without an extensive training programme that was developed by employers and unions working together.

Approximately 11,000 converters were employed at the height of the programme- most of whom were new entrants to the gas industry. While the programme was delivered by

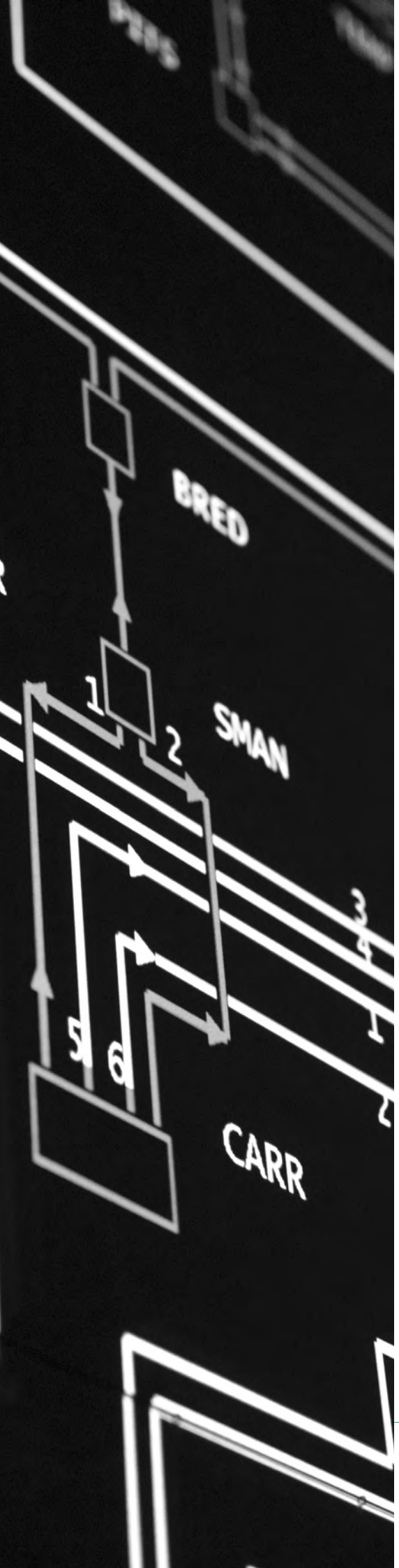
a mixture of players, there was a common curriculum that was drawn up and amended in consultation with the GMWU (a predecessor of today's GMB Union).

This curriculum involved a minimum of three to four weeks study and instruction across a network of regional education centres, followed by several weeks 'live' experience under the supervision of an experienced engineer. The various employers that delivered the programme negotiated a national recognition agreement with the GMWU which other trade unions later became signatories of, and this agreement delivered a stable industrial relations environment that was later seen as critical to the overall success of the programme.[42]

While of course the industrial relations environment has changed significantly since the 1960s and 1970s there are clear lessons that can be learned. The planners of the previous national conversion programme benefited from a powerful strategic body, the Conversion Executive that coordinated the industry and integrated training with technical negotiations with manufacturers.

This experience adds to the belief that a central co-ordinating body with responsibility for skills co-ordination, underpinned by a national agreement with the recognised unions, is essential for a successful future conversion programme.

42 This account is based on C. Elliott, The History of Natural Gas Conversion in Great Britain, Cambridge Information and Research Services Limited in association with the British Gas Corporation, 1980; F. Morton / Ministry of Technology, Report of the Inquiry into the Safety of Natural Gas as a Fuel ['The Morton Report'], HMSO, July 1970; and National Archives records.



Electricity Networks

In addition to the skills needed to build new renewable technology or to install low carbon appliances in homes, businesses, and factories; the UK also needs more skills to build and manage the electricity networks. Delivering Net Zero targets requires increased power flow on, and capacity of, our electric networks to bring higher quantities of power – from new sources and locations of electricity generation – to where it's needed.

Electricity networks will be a critical enabler to accelerating the clean energy transition, but industry must invest at pace and scale to achieve the UK's ambitions.

The scale of this is huge. For example, to reach an ambition of 50GW of offshore wind by 2030, National Grid must deliver more than five times the amount of electricity transmission infrastructure in the next seven years than has been built in the past 30 years. National Grid are also predicting that Electric Vehicles will grow in number by 23 times the current number of vehicles on the road and that heat pumps use will grow in number by 13 times.

Overall, National Grid will be investing over £16bn in the UK in the five-year period out to April 2026, to upgrade its networks and support the clean energy transition. This includes connecting low carbon sources of energy, as well as preparing for the wide-spread roll out of clean transport and low-carbon heat and innovating across new technologies needed for an increasingly flexible energy system.

Transforming the energy system to deliver the UK's decarbonisation targets can also drive economic growth and provide an opportunity to create well paid, high quality, green jobs across the country.[43] This is linked to the scale of infrastructure build required and the development of new technologies as part of the transition.

However, the energy sector currently faces a significant skills challenge with a loss of existing talent, competition with other sectors, a lack of diversity and a diminishing pipeline of people taking up STEM subjects. Given the vast number of jobs required to support the clean energy transition, diversity specifically presents both

43 https://www.sciencedirect.com/science/article/pii/S0140988322001736

a challenge and an opportunity, and this is an area where responsible businesses have a role to play to attract people into the sector that haven't previously considered a career in energy before, including through apprenticeships.

Ofgem confirmed in December 2022 that National Grid will deliver 17 major transmission infrastructure projects (including joint projects with its Scottish counterparts) as part of its Accelerated Strategic Transmission Investment (ASTI) programme.

Delivering this will require an increasing number of skilled roles including Power System Engineers, Linespersons, Cable Jointers, Civil Engineers, Commissioning Engineers, Project Managers, Consents & Land Rights Specialists, Quantity Surveyors, Control Engineers, Cyber specialists, HVDC (offshore cable) specialists, and Digital specialists.

For example, the number of Linespersons (specialists in overhead electricity lines) required will significantly increase this decade to deliver the volume of overhead line construction and refurbishment projects. The demand for Cable Jointers is also rising. Cable Jointers, of which there are limited numbers in the UK, are highly trained professionals that lay, joint, terminate and repair underground power cable. It takes around ten years to fully train a jointer. There is already not enough availability today, and further reductions are possible from retirements due to an ageing demographic and competition with other sectors and infrastructure projects.

Building a Hydrogen Economy

As the UK works towards net-zero greenhouse gas emissions by 2050, hydrogen can be a crucial element in the transition to a low-carbon energy system.

The development of a hydrogen economy in the UK has the potential to create a significant number of new jobs across various industries.

> "The UK should make the commitment to hydrogen and undergo a rapid transformation to decarbonised gas supply.

While this will require reskilling, it helps ensure a transition for existing workers. The strong hydrogen demand forecast in the future reflects that it is the most effective decarbonisation option in many sectors and complements alternative low carbon solutions in other sectors.

Certainty on business and regulatory models would provide certainty for investment in jobs and infrastructure. Overall, the development of a hydrogen economy in the UK presents numerous opportunities for job creation across various industries. These opportunities include the production of green hydrogen, the development of hydrogen fuel cell vehicles and refuelling infrastructure, the retrofitting of homes and businesses for hydrogen heating, and the manufacturing of hydrogen production equipment.

According to 2021 analysis by DESNZ, the UK hydrogen sector could be worth £900 million and support 12,000 jobs by 2030 across hydrogen production, transport, and storage technologies for domestic and export markets. By 2050, in a high hydrogen scenario, the hydrogen economy could be worth up to £13bn and support up to 100,000 jobs.[44] This represents a significant opportunity for the UK's economy and job market.

However, in recent months businesses have turned to the US to develop and support funding for hydrogen and other green projects. Johnson Matthey, which manufactures key components for generating hydrogen power, said the UK risks falling behind in the race to become a global hydrogen leader, citing a lack of certainty and clarity in government policy.[45]

Recruiting and training new talent is not without its challenges for the energy industry, which, as we have set out above, is already facing talent shortages and a skills bottleneck. Therefore, supporting the current energy workforce to transition into emerging green growth industries has become a huge priority for both government and industry.

Submissions to the programme recognised the advantage the UK already has with large numbers of skilled gas engineers and technicians. Hydrogen for home heating, alongside other technologies, offers the opportunity to utilise the skills of the existing workforce - and the best option for avoiding the negative social consequences of transition from carbon intensive energy sources.

44 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1092353/hydrogen-sector-development-action-plan.pdf pg. 26

45 https://news.sky.com/story/uk-at-risk-of-falling-behind-in-race-to-become-green-hydrogen-global-leader-johnson-matthey-says-12876852

The UK Government updated its Hydrogen Strategy last year with a hydrogen sector development plan, which stated that "hydrogen must be a core part of the UK's future energy security as well as plans to meet our legally binding commitment to achieving net zero by 2050."[46] By 2035, hydrogen could support as much as a 78% reduction in country-wide carbon emissions, and by 2050, as much as a third of the country's energy consumption could be hydrogen-based.[47]

We welcome that, in March 2023, the Government announced that fifteen hydrogen projects had progressed to the next application round for funding under the £240m Net Zero Hydrogen Fund.[48] However, this must be accompanied by a clear government strategy to retrain and upskill workers in carbon-intensive sectors to ensure the hydrogen industry has the skills it needs.

While many of the skills needed for the hydrogen economy are said to already exist in the UK, individuals with these skills still need to be retrained and upskilled, and many of them are already being utilised in other industries and sectors such as power, water, nuclear, and gas. Industry experts estimate there are currently circa 1,000 to 2,000 individuals in the UK who have very specific hydrogen-related skills, such as innovation, strategy, investment, safety, policy and advisory, assurance, engineering, manufacturing, research and development, senior leadership, and domestic heating.[49] These individuals work across high-carbon sectors such as oil and gas, chemicals, and wider engineering sectors.

However, there is a pressing need to support the creation of hydrogen-related jobs now and upskill relevant organisations' existing workforce with hydrogen skills and training. The demand for workers with relevant hydrogen experience is on the verge of skyrocketing, and the skills gap and the market's future needs will become even wider unless addressed now. Over the next 10 to 15 years, there will be significant challenges in terms of skill supply and demand, not to mention finding the right skills to fuel the UK's hydrogen transformation.

As hydrogen use and production begins to increase, the requirement for more hydrogen skills along the supply chain will also increase. Jobs that will be affected, among others, include gas fitters, plumbers, and mechanics. Tradespeople working with hydrogen production and storage will also require new knowledge, while installing appliances and understanding how a fuel cell works are also practical skills that are needed. The industry also needs more researchers who can spearhead projects into cheaper electrolysers, storage systems, and engines and processes that can use the fuel.

To address these challenges, organisations in the hydrogen sector need to start working on how we draw in the right skills from other related industries (nuclear, utilities, energy, and engineering), so that together they can create enough scale to hit those transformation targets.

It is vital that we make provision for re-skilling of those who have previously worked or currently working in high carbon sectors. For instance, it is estimated that between 2018 and 2030, 42,000 direct and indirect workers in the UK oil and gas industry will

46 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1092353/hydrogen-sector-development-action-plan.pdf pg.4
47 https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035
48 https://www.gov.uk/government/publications/net-zero-hydrogen-fund-strand-1-and-strand-2
49 https://www.rullion.co.uk/employers/knowledge-hub/blog/other/developing-the-skills-for-hydrogen-starts-now/

be transferred to clean growth industries like hydrogen (OGUK, 2019).[50] The good news is that skills for hydrogen are readily transferable from the gas sector (both for residential and for industrial scale dealing with things such as Control Of Major Accident Hazards Regulations regulations). However, there are significant risks that transferring to clean industries may not command the same salary or be concentrated in the same communities as before.

Without certainty from Government, we risk a 'dead band' of new talent coming into the sector which then, if there is a decision from Government, to grow the hydrogen sector more (such as hydrogen heating or hydrogen for storage) the industry will experience a shortage of skills and talent due to lack of new recruits coming into the sector. Messaging from Government is so crucial and particularly for emerging sectors which look to repurpose existing skills.

We have seen this in the biomethane sector where from 2016 to 2020 there was a delay from moving from the renewable heat incentive (RHI) to the Green Gas Support Scheme. This led to a lot of developers losing good talent to other sectors so when Government decided to put a new scheme in there is now a significant delay (and target missed) on new biomethane plants. The same happened in the wind sector.

Without clear signals Government risks impacting industry and making young early careers candidates feel less attracted to a decarbonised gas sector.

Governments should commit to a national retraining programme/s which equips existing carbon-intensive workers, and new workers in areas where carbon-intensive industries are concentrated with hydrogen skills.

50 https://mail.humberindustrialclusterplan.org/files/Economic%20Impact%20Report%202023.pdf pg. 52

Committing to New Nuclear

The UK Government has committed to the biggest new nuclear programme outside China over the next decade, projecting that 38% of the country's power will come from nuclear by 2035. This will include a mix of provision, including large-scale nuclear, small, and advanced modular reactors.

Delivering a network of 16 small modular reactors (SMR) throughout the UK, that will help secure clean, sustainable, secure energy, could create up to 40,000 jobs and add £52bn of economic value to the UK. Nuclear power will also provide low carbon energy to produce net-zero synthetic aviation fuels and hydrogen.

The development of engineering and nuclear industry skills, such as those required in developing SMRs can help maintain and strengthen the UK's defence capability. These skills could also be used to ensure the UK's nuclear submarine capability remains operational and world leading.

In addition, small modular reactors could be built in decommissioned nuclear areas; communities that have heritage and often a need to be rejuvenated. Furthermore, factories to build the SMR modules will create UK jobs and industry currently not available.

Rolls Royce Small Modular Reactors could create up to 6,000 jobs in the next five years and 40,000 jobs by 2050. 34,000 long-term jobs are targeted by the mid-2030s, mostly high-value manufacturing roles, if the right skills are there.

The first SMR unit will be operational within 10 years of the first order. However, the UK workforce's expertise is currently dominated by decommissioning rather than in nuclear new build. This means that many of the country's qualifications, skills and standards in the required areas are either out of date, or simply do not exist. Investment in nuclear education and training is needed now with a key focus on advanced fission (including SMRs) and fusion reactor concepts.[51]

51 https://blog.policy.manchester.ac.uk/posts/2022/07/the-skills-gap-for-long-term-nuclear-future/

The recent establishment of 'Great British Nuclear' to deliver a new nuclear programme, starting with a competitive process to select the best Small Modular Reactor technologies, is to be welcomed. However, it is vital that sufficient government support is given to building the workforce needed to sustain an ambitious SMR programme.

Skills currently viewed as of particular concern in this sector are:

Nuclear Construction Workforce	Nuclear Operations
Civil Engineers; Engineering Construction Welders, Engineering Project Managers	Control and instrumentation engineers, Mechanical Engineers
Pipe welders, Pipe fitters, Mechanical fitters, Plate welders, Construction trade supervisors, Electricians	Project planners/managers
Project planners/managers, Schedulers, Logistics, Project Quantity Surveyor	Safety Case Authors, Reactor operators, Nuclear Engineers
NDT Technicians, Chargehand Riggers, Lifting Supervisors	Cyber Security Specialists Rolls

The next stage of selection of SMR technology is due at the end of this year. This is a welcome advancement but it's imperative that the published timetable does not slip so that the UK economy can benefit from the jobs, investment and energy provision as early as possible.

Making the Most of Our CCUS Advantage

Carbon capture, utilisation and storage (CCUS) is another area where the UK can create new jobs and careers. These opportunities come from both the activity involved in delivering carbon sequestration services within the UK and in exploiting new export opportunities for those services and existing/emerging supply chains.

The UK government has committed to developing and deploying CCUS technology as part of its efforts to reach net-zero emissions by 2050, and associated industry activity has the potential to create jobs in areas such as delivering and operating CCUS, as well as a range of linked engineering, construction, and research and development areas.

In March 2023, the Government announced that eight projects had been selected to move to Phase 2 of Track 1 of the Government's CCUS clustering process. A selection process to bring in further CCUS projects within the Track 1 clusters by 2030, is due to commence later this year.[52] The Government also released a guidance document around further development of CCUS, setting out objectives and eligibility terms for the way in which this will work.[53]

The UK has a competitive advantage in a fairly wide range of activities involved in designing, deploying and operating CCUS technology and systems in ways that could equate to the emergence of new industrial activity and trading opportunities.[54] However, there is strong international competition in across the field. For example, the United States, through the Inflation Reduction Act, is investing heavily in fiscal incentives to develop US leadership on developing, deploying and operating CCUS technology, while, the Netherlands, through the Porthos project at the Port of Rotterdam[55], is just one European oil and gas producing nation already taking substantive 'early mover' steps in operating a potentially international CO2 transport and storage network.

Research commissioned by the UK Government estimates that activity around CCUS could create up to 50,000 jobs by 2030 and deliver 8.3bn in potential total UK captured

52 https://www.gov.uk/government/publications/cluster-sequencing-phase-2-eligible-projects-power-ccus-hydrogen-and-icc/cluster-sequencing-phase-2-track-1-project-negotiation-list-march-2023
53 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1148026/cluster-sequencing-for-ccus-track-2-guidance.pdf
54 https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2021/09/Seizing-Sustainable-Growth-Opportunities-from-CCUS-in-the-UK_FULL-REPORT-1.pdf
55 https://www.porthosco2.nl/en/

turnover from CCUS by 2050.[56] More conservative estimates from the Net Zero Technology Centre put the number of jobs by 2050 at 15,000.[57] While research by the University's Centre from Energy Policy stresses that employment outcomes depend crucially on labour supply conditions and funding models adopted.[58]

However, there is broad agreement that job creation opportunities will arise from a range of new employment linked to both domestic CCUS activity and emerging export opportunities. These range from actually transporting and storing CO2 generated both within the UK and overseas, to UK-based CCUS supply chain actors potentially also exporting equipment, services and expertise through project initiation, construction deployment and operational stages to decommissioning and end-of-life stages.[59] While CCUS is often spoken about in terms of utilising infrastructure from carbon-intensive industries, this does not mean that CCUS as an industry will replace the job numbers or economic impact of those jobs in particular areas, rather CCUS technology may both help transition and create new jobs across the economy, for example in smaller distributed manufacturing.

Generally, significant employment opportunities exist and are emerging. In terms of the core CCUS activity of transporting and storing CO2, to take just one example, research at the Centre for Energy Policy linked to the publicly funded Scotland Net Zero Infrastructure (SNZI) project, involving economy-wide scenario simulations[60], suggests around 760 direct and indirect jobs could be supported by a new industry built around the Scottish Acorn project[61] that only services emissions generated in the Scottish cluster. However, around an additional 340 jobs could be supported if links to available storage capacity in the North Sea are extended to enable a larger Scottish transport and storage industry. This would involve developing capacity to service export demand mapping to around 2.5million tonnes a year of CO2 generated overseas but stored in UK reservoirs.[62]

Crucially, the SNZI research shows that developing such a new export base in activity that helps replace oil and gas extraction would provide a new source of tax revenue that could help offset the public funding costs of supporting domestic CCUS within the Scottish cluster. Other proposed CCUS network cites – such as the proposed Viking development in the northeast of England – also have the potential to develop an export base in the transport and storage element of CCUS, similarly enabling additional job creation and new revenue sources.

A 2019 report from the Business, Energy and Industrial Strategy Committee noted that failure to deploy CCUS could double the cost of meeting our climate targets, rising from approximately 1% to 2% of GDP per annum in 2050.[63] It would also mean the UK could not credibly adopt a 'net zero emissions' target in line with the Paris Agreement's 1.5°C aspiration.

56 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/845655/energy-innovation-needs-assessment-ccus.pdf
57 https://www.netzerotc.com/reports/closing-the-gap-technology-for-a-net-zero-north-sea/
58 https://doi.org/10.1016/j.ecolecon.2022.107547
59 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/984308/ccus-supply-chains-roadmap.pdf
60 https://doi.org/10.1177/02690942211055687
61 https://www.theacornproject.uk/
62 https://doi.org/10.17868/strath.00084117
63 https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/2644/2644.pdf https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/1094/1094.pdf

Thus, it is crucial for the Government to act quickly on enabling, incentivising and de-risking CCUS not only to meet domestic emissions reductions targets but to enable the UK's entry to the emerging international market for CO2 transport and storage services and not be left behind as actors from Norway, the Netherlands and Denmark in particular take early mover step. The UK shares the comparative advantage established through having invested in and hosted the oil and gas industry for five decades in taking fossil fuels out of the reservoirs that CO2 emissions generated at home and abroad can now be returned to. In short, entering emerging international CCUS markets represents a very obvious opportunity to secure continued economic gains in ways help deliver the energy jobs transition and provide sustained revenue flows.

Here, there are fundamental and relatively simple steps that can be taken to make investment more attractive, such as reforming the Development Consent Order process for nationally significant infrastructure projects through reducing planning regulatory burdens to reduce the cost and time of the planning process.

> A step change in the urgency and scale of government response is needed if we are to make the most of the potential of this moment.

Our People Problem

Throughout these four critical sectors, and across the submissions to the programme, the same concern was raised again and again. The government's aim for the creation of two million jobs as the UK moves towards Net Zero, and the Opposition's ambition for an accelerated journey to that same destination, are at serious risk due to skills constraints.

Investment by the private sector in infrastructure and technology, and by workers in their own skills, demonstrates the commitment to rise to this challenge. However, a step change in the urgency and scale of government response is needed if we are to make the most of the potential of this moment.

The net zero transition will have far-reaching consequences for the UK labour market, with one in five workers projected to experience either increased demand for their skills or a need for reskilling as a consequence of it. Whilst demand for skills across the energy sector is increasing at pace and scale, the UK is facing big challenges that could constrain supply.

The UK continues to report a persisting pattern of record job vacancies while many businesses face recruitment challenges. Labour challenges are acute in the energy sector specifically, with competition for skilled workers being seen across the energy landscape, and this is expected to increase as activity levels both onshore and offshore rise.

Submissions to the programme recognised three key challenges on skills.

- **Skills shortages:** finding and keeping enough people, with the right skills across all disciplines.
- **Skills gaps:** the challenge of training and upskilling the 80 percent of the 2030 workforce who are already in the workforce today.
- **Skills cannibalisation:** the risk of keeping people in the sector and in the country, a particular risk in a sector where many workers are already internationally mobile.

Research suggests low carbon jobs are systematically more skills-intensive than others in the economy, with greater demand for technical, managerial, social, and digital skills, risking a significant net zero skills gap if such workers are in short supply.[64] We will have to meet skills needs in the context of the extremely constrained labour supply conditions of the UK. Multiple large-scale projects will be competing for limited labour and skills resources.

Today, almost half of engineering employers report skills shortages in recruitment, along with 45% reporting skills gaps internally. The greatest gap is in advanced skilled roles requiring A-Level, advanced apprenticeships, and other Level 3 qualifications, followed closely by highly skilled roles requiring university degree (Level 6) and higher.[65]

Dealing with this will be challenging and complex.

Workers at different stages of their working lives will have to be trained or reskilled and

64 https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2023/01/Skills-and-wage-gaps-in-the-low-carbon-transition_Comparing-job-vacancy-data-from-the-US-and-UK.pdf
65 https://www.theiet.org/media/9234/2021-skills-survey.pdf

entirely new skills and career pathways in the energy systems of the future will have to be catered to.

The existing workforce is ageing, meaning that as well as finding skilled workers for new vacancies, industry will have to fill existing positions too.

> "One fifth of people currently working in the energy sector are set to retire by 2030 as the 'baby boomer' generation reaches pensionable age.[66]

Current plans to increase headcount in green energy will barely replace this ageing workforce. Workers who are retiring take with them a vast amount of experience and the ability to pass that experience on to younger less experienced workers. Today only 12% of the UK's gas workforce is under the age of 30 while around 35% are over the age of 50. In the electricity sector over 50% of the workforce are over 45.[67]

This problem is not unique to the UK. European competitors are already acknowledging the challenge and beginning to address it. Work undertaken by Eurelectric[68], the trade body for the electricity industry, and trade unions in that sector, looked at the issue of skills requirements for the industry going forward and measures that could be adopted to enable improvements to be delivered.

A two-year project was undertaken reviewing the skills needs in the industry. This was carried out considering the structural changes arising from global developments, regulatory decisions and technological innovation as well as the commitment to decarbonise the sector and the impact of digitalisation on workplaces and workers.

It was recognised that in order to enhance the competitiveness of the electricity sector, efforts were needed to make it attractive to the young workers and provide them with the right skills, qualifications and good working conditions and environment. At the same time the social partners were also concerned about the change of job profiles and what these mean for the workforce and the need to adapt its skills and competences to match new requirements.

In the context of an ageing workforce, we need an unprecedented influx of young people into skilled trades in the energy sector. However, too many young people are choosing the academic route over vocational education. This is partly due to a lack of equivalence in status between these two educational routes.

The UK is also experiencing a STEM skills shortage which is estimated as costing the economy £1.5 billion per year. There is a shortfall of over 173,000 workers in the STEM sector and an average of 10 unfulfilled roles per business in the UK, with half of engineering companies struggling to recruit staff with the necessary skills.[69] The

66 https://www.nationalgrid.com/document/126256/download#:~:text=One%20fifth%20of%20people%20currently,-Boomer'%20generation%20reaches%20pensionable%20age.&text=Unaddressed%2C%20both%20of%20these%20challenges,when%20they're%20needed%20most

67 https://www.ecitb.org.uk/wp-content/uploads/2022/01/Census-Report-OG-Final.pdf pg. 5

68 https://www.epsu.org/sites/default/files/article/files/Final%20-%20Social%20partners%27%20roadmap_1.pdf

69 https://committees.parliament.uk/writtenevidence/112046/pdf/

number of A level candidates for Physics and Maths needs to increase by 24% and 19% respectively just to maintain the pipeline of qualified talent Britain needs.[70]

The number of STEM-subject graduates in in the UK is increasing but demand still far outstrips supply – and a large proportion of these choose jobs in the finance or tech sectors rather than green energy. At present, more than 40% of physics graduates – a crucial target market for the energy sector – are opting for careers in banking, finance, or technology.[71]

Various parts of the energy industry have different skills needs and are often in competition with each other. For example, the Nuclear Skills Strategy Group (NSSG) estimates at least 3,200 new staff need to be recruited each year in the civil nuclear sector alone, with 40,000 or more workers required by 2030.[72] Many of these require generic rather than nuclear-specific skills, such as project management and engineering, which are in demand across the economy.

Likewise, different regions have different needs. The House of Commons Environmental Audit Committee highlighted the need for government to focus on the needs of people in regions where jobs will be affected by the net zero transition. Ensuring they can access new, attractive opportunities in 'green jobs' is essential if livelihoods and public support for net zero plans are to be sustainable.[73]

Finally, a lack of diversity in the energy industry, with women and BAME workers both severely underrepresented, makes meeting all of these challenges more difficult by excluding a large potential talent pool. Today, more than 75% of women who leave engineering after maternity leave or career breaks want to return but are put off due to inflexible working hours and practices.[74]

While we frame this report in term of the cost to our sector and to the UK's green transition, a failure to provide these opportunities, or to match young people to opportunities when they do exist, also comes with great social cost. Young people not engaged in education, employment or training is back at the level it was at a decade ago.

Creating a skilled workforce is crucial to ensure that labour supply matches growing demand as we strengthen energy resilience. To achieve this, we need to invest in apprenticeships, upskilling programmes, and training initiatives to develop the skills and knowledge required to work in the energy industry of the future. We recommend that government, industry and workers come together to develop a comprehensive skills strategy that identifies the skills gaps and training requirements in the energy sector and provides targeted support for training and development.

To help with this discussion, we make the recommendations below.

70 Development Economics research, November 2019
71 https://luminate.prospects.ac.il/what-graduates-do
72 https://www.nssguk.com/media/2154/nssg-assessment-brochure-web.pdf
73 House of Commons, Environmental Audit Committee, Green Jobs, Third Report of Session 2021–22 https://committees.parliament.uk/publications/7615/documents/79773/default/
74 EU Skills Workforce Renewal and Skills Strategy 2020, https://www.euskills.co.uk/wp-content/uploads/2017/11/ Workforce-Renewal-and-Skills-Strategy

A Better Understanding of the Challenges

Government and industry cannot tackle a problem if we do not understand it. Workers and future entrants to the labour market cannot take advantage of an opportunity unless they know it is there.

The green skills challenge is made more difficult to manage due to the lack of clear statistics, and associated analysis, on green jobs. This hampers the ability of industry and government to plan; makes it harder for existing and future workers to plan their career paths; and makes it more difficult to track the transition to ensure that individuals and communities are not being left behind.

The renewable energy sector is not currently defined in national statistics published by either the UK or Scottish Governments. We urgently need much more robust data collection to understand how the renewable energy industry is performing and evolving across the UK. This will support transparency and accountability for government and industry economic and environmental targets.

The need for better gathering and sharing of data on skills shortages is not a matter for government alone. Industry must share their projected workforce needs as early as possible through the 2021 DESNZ supply chain questionnaire. All those undertaking major projects in a nation or region should have to share their new project workforce needs as accurately as possible. The DESNZ supply chain plan questionnaire should provide the impetus and methodology for this.

This will mean that the job-level data can provide a true and accurate picture of workforce needs over a period of 10 years. The government should then identify the top 2-4 gaps and proactively pre-empt in a way that attracts the growth and benefit to the host community.

This is not just an economic one but one of public awareness and political consensus-building. Government needs to put into place frameworks that encourage the lowest cost way to decarbonise, and make these frameworks stable and transparent. Getting to net zero will have a financial cost but that cost will be lower than that of not getting there, and we know that the longer we wait the more expensive it will become. Decarbonising in a way that is more expensive than it needs to be, will mean higher than necessary energy prices, fewer job opportunities, and, in turn, less political support for bold action.

A Skills System Fit for Purpose

A particular concern raised again and again in submissions was around apprenticeships and tertiary education.

Businesses are not currently capitalising on skills development that could be unlocked through the Apprenticeship Levy because of limitations to the current framework on how businesses can train employees – represented by over £3bn worth of Levy funds being unclaimed.[75] This figure represents the base level opportunity cost to the UK economy, with every skilled employee adding greater economic benefit.

We believe the UK needs:

- A properly funded system with more apprentices and training courses.
- A more flexible system with a better focus on linking to industry opportunities.
- A faster system to meet emerging skills needs.
- A fairer system that recognises regional needs during transition.

75 https://www.ippr.org/news-and-media/press-releases/over-3-billion-in-unspent-apprenticeship-levy-lost-to-treasury-black-hole-new-data-reveal#:~:text=More%20than%20%C2%A33.3%20billion,London%20Progression%20Collaboration%20(LPC)

A Properly Funded System

The skills system needs to be demand-led and business-driven. There is a real demand from employers for more apprenticeships, and across a broader range of subjects, as shown in the case of Graduate Apprenticeships where demand from employers massively outweighs the number of placements available. Employers are currently forced to shape delivery around an allocated pot of money rather than delivering against a clear, evidenced demand from industry.

Apprenticeships help people move directly into high-value jobs and earn a wage, therefore paying tax and effectively contributing to the economy, as they learn. As such they should be a higher priority for government funds.

Funding within the system needs rebalanced. In England, the Institute for Fiscal Studies projects that government spending on adult education and apprenticeships in England will be 25% lower in 2025 than it was in 2010, despite extra funding recently allocated.[76] In Scotland, The Scottish Government invest £3.4bn into education and skills, however from this, apprenticeship funding makes up just £100million. This is 3.4% of overall budget.

We know that for every £1 invested by government, employers invest at least £10 during the period of training alone and make a longer-term commitment to employing apprentices. Governments across the United Kingdom should undertake a full funding review of universities, FE and apprenticeships with a view to unlocking the funds that are already there and, if necessary, reapportioning monies to meet this historic challenge.

A More Flexible System

We need a more an agile system – able to create apprenticeships- from inception, to development, approval, and delivery- much faster than it currently does. The life cycle needs to be quicker, leaner, and more responsive. The ability to respond rapidly to changing employer and learner demands, as a key factor in bringing us in line with other leading apprenticeship countries.

Compared to economies where apprenticeships are more numerous and more valued, such as Germany, Austria and Switzerland, the employer voice in the United Kingdom systems are under recognised and underrepresented.

To upskill the workforce of the future and take advantage of the opportunities of a green economy, changes need to be made to the Government's existing apprenticeship programs and other schemes. We recommend that the government work with industry to develop training programs that are tailored to the needs of the energy sector, and that provide apprentices with the skills and knowledge required to work in the industry of the future.

We need to focus on linking skills provision to real jobs. Currently higher and further education are too often not delivering what businesses need. We need to ask some honest questions around why we have some qualifications and swap out those within higher and further education that do not add value and do not have direct links with jobs.

76 https://ifs.org.uk/sites/default/files/output_url_files/BN344-Adult-education-past-present-and-future.pdf pg.24

Reform of the apprenticeship levy to allow for modular apprenticeships and standard frameworks would ensure apprenticeships could be tailoring according to a business' need. Modular apprenticeships a would allow companies to cross skill our apprentices to take on further relevant modules. Whilst existing funding arrangements do include the provision for any industry certifications within the specific apprenticeship programme, they do not extend to the payment of additional training certifications that exist within industry, which could be a natural extension of the current level of apprenticeship that a learner is enrolled upon.

As employers are offered more flexibility there should also be a focus on apprenticeship starts for young people. Of course, we want to make it easier for employers to fill their existing skills gaps, but we also have to ensure that the skilled workforce is growing.

> "The UK will need 44,000 heat pump installers by 2035. There are approximately 3000 installers in the UK at present.

To meet the demand, the Low Carbon Heating Technician apprenticeship standard needs to be finalised by the Institute of Apprenticeships & Technical Education as quickly as possible. This would provide training providers with the support required to ready their training teams and physical training centres to meet heat pump demand. In the meantime, we welcome the moves by government to subsidise training for heat pump installers and want to see more investment of this sort.

We would support an alternative recognised pathway into a competence scheme or qualification for existing gas engineers to be able to transfer their skills into the newer technologies such as heat pumps. Not so much as an apprenticeship as such, but a funded traineeship that's structured around an agreed standard, guided learning hours and outcomes. The TUC have written on how we can ensure training pathways to clean heat installation are on a part with existing bona fide tradesperson qualifications schemes, protecting the respected status of, for example, gas engineers today.[77]

We would like to see the minimum technical competencies for heat pump design, installation, commissioning and handover to be incorporated into training and requirements for plumbing and heating engineers. This should be supported by a competent persons scheme or green skills card for installers of low-carbon technologies, similar to Gas Safe accreditation, as this will provide consumers with an easy to understand network of installers to access for low-carbon measures.

It is a similar story in the construction industry, with the Construction Industry Training Board estimating that the industry needs to increase by 350,000 workers over the next decade to deliver the volume of work needed to reach net-zero by 2050.[78] Despite this being the case, the focus of training across the sector remains on new build, traditional and onsite construction techniques, with lack of training opportunities in disciplines such as retrofitting, which is crucial to achieving net-zero. The Government must work with industry to design appropriate courses to ramp up the skills we desperately need to improve the energy performance of homes and buildings across the country.

77 The-role-of-heat-pumps-in-building-a-high-skill-high-wage-economy11.pdf (electrifyheat.uk)
78 https://www.citb.co.uk/media/vnfoegub/b06414_net_zero_report_v12.pdf

A Faster System

Submissions to the programme felt that the current arrangements which exist in the UK for the identification of training needs, the formulation of new course content and the ongoing training and assessment of competence is out of date in relation to the new available technologies that we as a nation can now utilise.

It is currently taking too long for new courses to be created and skilled people to emerge compared to the significant pace at which employer needs and consumer demands are changing. As new technologies and new careers emerge, “add-skilling” is too difficult and slow. There is a lack of flexibility within apprenticeships and courses to add content to meet emerging demands. For example, there is no clear route to becoming a heat-pump engineer- rather you have to become an electrician or plumber first.

With a mismatch between employers needs and skills provision, too much of existing skills is poorly targeted- for example, the £3bn of apprenticeship levy funds going unclaimed.[79]

The UK is seeing relatively un-used technologies for which there has been low levels of demand from consumers such as Heat Pumps, Solar and Photovoltaic panels and Electric vehicles starting to experience significant increases in consumer awareness and green shoot signs of customer demand.

Our current Apprentice system is slow to react to new requirements and skills from employers with the current system taking around two years from the point of new skills being identified to those skills being taught in Training Centres and Colleges as part of an Apprentice Qualification. In Scotland, good work is underway to cut the time from receipt of an apprenticeship to 12 months.

We believe that apprenticeship development should take no more than a year from identification of need to delivery of qualification certification.

A Fairer System

As well as the system being more agile at looking for opportunities, it also needs to be attuned to the economic needs of communities where workers risk losing out as old industries are phased-out.

Greater devolution of skills budgets would allow local authorities and/or devolved administrations to better match skills support to geographical factors.

As outlined above, we should make the commitment to hydrogen and undergo a rapid transformation to decarbonised gas supply. While this will require reskilling, it helps ensure a transition for existing workers in those areas, but it will mean focussing investment in industry and skills in those areas, as we cannot assume the market will place new jobs where the old ones were.

We need government to offer financing options for modular training and upskilling to

79 https://www.ippr.org/news-and-media/press-releases/over-3-billion-in-unspent-apprenticeship-levy-lost-to-treasury-black-hole-new-data-reveal#:~:text=More%20than%20%C2%A33.3%20billion,London%20Progression%20Collaboration%20(LPC)

redeploy those currently in high-carbon sectors towards lower carbon technologies. Barriers to retraining need to be removed with innovative approaches trailed such as training sabbatical or paid time off to train in green skills.

Governments should be developing training centres for green jobs in areas at risk of dislocation and include those former coalfield areas and other communities with displaced industries.

Currently there are no uplifts in funding for apprentices from areas of multiple deprivation, consideration should be given to exploring uplifts in areas of potential dislocation as we move towards net zero.

Just transition agreements should be encouraged, following the model between employers and unions around the closure of the Cottam coal power station.

For its part, industry needs to ensure mutual recognition of training certification and supply chain standards across sectors to ease transfer of workers between businesses and sectors and maximise use of existing skills. This should include commitments to skills 'passporting' for the offshore oil and offshore wind sectors.

Signposting Green Opportunities

With the improved data collection described above, we can better signpost the opportunities of the future to new and existing workers.

The US Department for Energy produces a Green Jobs Career Map which set outs entry, mid-level and advanced careers in green energy, the salary expectations and the qualifications necessary.[80] We would like to see a similar careers map from the Department for Energy Security and Net Zero in conjunction with the Department for Work and Pensions to ensure careers advisors in schools can aptly describe hydrogen related careers to pupils.

Many young people are already engaged in the net zero agenda through changing different lifestyles, recycling and transport methods. But, for too many, a career in green energy is not something they even contemplate to be an option for them.

Government and industry should work together to create resources that connect the world of learning with future jobs. There needs to be space in the curriculum to translate subjects into real-world examples, perhaps though reintroducing formal industry experience within the secondary curriculum. A new approach is required, which could include longer placements perhaps over several terms or years and industry-related coursework. A greater focus on work experience can be particularly useful in tackling the diversity challenge we face.

STEM ambassadors play currently play a key role in motivating young people towards choosing STEM careers. To improve the diversity of those entering green jobs through the STEM route ambassadors from a range of backgrounds could inspire such pupils and bring the possibility of working in green energy related careers to life.

While there has been an uptick in college courses relevant to new green technologies, often they are not marketed as such. Colleges need to create a sense of excitement and increased level of knowledge around the opportunities of jobs in renewable energy, not just so that young people can set themselves on that course, but so that carbon-literate young workers can act as advocates within the existing workforce.

Schools need to be monitored, measured and rewarded for sending young people down a vocational route as well as to universities. There should be public information campaigns on the value of, and opportunities arising from the apprenticeship route to a career.

Moving individuals from older workforces into skills teaching is a strategy used in other countries where the link between employers and skills delivery is stronger. It is worth piloting as a potential way to better utilise the skills and experience of older workers that may soon be lost to the economy.

80 https://www.energy.gov/eere/fuelcells/hydrogen-and-fuel-cells-career-map

Improving the Status of Green Skills

In the UK, we do not currently have enough young people choosing the vocational education route, favouring the University option which is resulting in a disproportionate amount of people entering the workforce who are overqualified and who do not possess the skills we currently need and will need in the future. There is a big issue which the Country needs to address – young people in many cases do not benefit from studying for and attaining a degree.

Over the last 30 to 40 years, Vocational training – particularly Apprenticeships has suffered from a stigma amongst key influencers of young people – parents, grandparents, and teachers. This commenced during the 1980s and 1990s from which time, Schools were measured, monitored, encouraged, and motivated by the tariff point system to send young people into university.

We now have a third generation of young people making choices on their post school journey into the world of work which is being informed by parents and grandparents who see the most credible and lucrative route, being that of going to university and attaining a degree. This has resulted in apprenticeships and vocational training being perceived as a lesser or less prestigious way of finding paid employment. This has been accelerated by many employers demanding a degree qualification for roles which do not actually need this demonstrable degree of academic achievement.

Furthermore, where vocational provision is available, it is too often not connected to the career opportunities in a way that would help raise the desirability of qualifications.

If the UK takes the same approach to properly funding the apprentice model and the Government works with employers, schools – including pupils, parents, and carers to address and correct the stigma which exists by showing them the benefits of the apprentice route then we will start to see more young people choosing this career option and more employers making jobs available for apprentices.

For the system to cope with this increased demand, the apprentice system needs to be funded correctly in line with the increasing demand for this option.

By reducing the number of young people being “pushed” into the university route and potentially becoming overqualified with in some cases irrelevant qualifications, more money would be available to the UK Governments through savings in funding Student Loans and continually expanding the university footprint in the UK.

The graduate apprenticeship offers young people the ability to enter the workplace immediately after leaving School and earning as they learn – they also contribute to the nation through taxation earlier than young people going down the university route.

Conclusion

Despite setting out so many challenges for the UK if we are to meet our ambitions of a speedy transition to net zero, we remain optimistic that, working together we can achieve this. Today the UK economy still relies on the vision and infrastructure of Victorian industry and governments. Together we can be the generation that leaves behind a similar economic legacy.

This is a moment to be bold. However, we should be in no doubt how urgent this work is or how big the task is.

We need to see the same level of commitment which has been offered by the United States and the European Union in terms of government funding for the transition ahead of us. We need to see a complete remodelling of the skills system, with difficult decisions about where money goes and where our young people are directed in their career choices.

Above all we need governments to do something they are often reluctant to do: to make big economic choices and to commit to key green industries today before the UK loses its first-mover advantage and with it talent, manufacturing and jobs to other nations. It is in our interests to act now, every day we delay makes the choices here, which we believe are inevitable, more expensive. We know that if we do not act now, our international peers will.

We hope that the ideas in this paper are the start of a conversation. We will now seek to talk to politicians of all the main parties about our recommendations and will encourage them to work together in a spirit of consensus. Without that consensus the certainty and confidence that industry, investors and individual workers need to invest in a green future will be undermined.

For our part as employers and unions, industry and academics, we will continue to work together to make the case for the amazing opportunities the UK has ahead of it.

Summary of Policy Recommendations

Strategic Recommendations

1. Government should expand the ambition of its green investment to match the scale of plans recently set out by the United States, European Union nations and other G7 peers.

2. High carbon industries should prepare 'Just Transition Agreements' with their workforce.

3. We call for large scale public investment in decarbonising homes, including free installation for low-income households and subsidised loans for heat pumps or hydrogen boilers.

4. We call for a clear, committed policy roadmap for heat and buildings all the way through to 2050.

5. Bring forward, to sooner than 2028, the requirement that all newly installed gas boilers be accompanied by an electrical heat generation element or other low carbon technologies, including hydrogen.

6. Begin a government backed public information campaign on energy saving measures.

7. We call for a new approach to home energy efficiency programmes that recognise this as an essential, and skilled profession.

8. We would support introducing tax incentives for investment in low-carbon technologies, which would stimulate investment and create new jobs.

9. Introducing long-term contracts for low-carbon energy, such as power purchase agreements, to provide investors with greater certainty over revenue streams.

10. Government should consider introducing a low-carbon procurement policy, which would require public sector organisations to purchase low-carbon goods and services, creating a market for green technologies.

11. There is a need for a new strategic body for the energy sector, bringing together employers, workers, education, and government at every level, to oversee a skills strategy and to monitor skills needs.

12. Ofgem's regulatory role should also be enhanced to become more long-term in focus and to encourage skills development.

13. If it is to be successful and, crucially, to create political consensus, all planning of transition pathways to Net Zero must involve workers representatives.

14. The UK should make the commitment to low carbon technologies, including hydrogen, and offer the incentives that will enable us to undergo a rapid transformation to decarbonised gas supply.

15. The UK Government should keep to its published timetable to down-select SMR technology by the end of the year, with a clear path to deployment.

16. Reforming the Development Consent Order process for nationally significant infrastructure projects through reducing planning regulatory burdens to reduce the cost and time of the planning process.

17. We urgently need much more robust data collection to understand how the renewable energy industry is performing and evolving across the UK. This will support transparency and accountability for government and industry economic and environmental targets.

18. Industry must share their projected workforce needs as early as possible through the 2021 DESNZ supply chain questionnaire. All those undertaking major projects in a nation or region should have to share their new project workforce needs as accurately as possible.

Skills Recommendations

19. Governments across the United Kingdom should undertake a full funding review of universities, FE and apprenticeships with a view to reapportioning monies to meet this historic challenge.

20. We need to focus on linking skills provision to real jobs. Difficult decisions need to be made on prioritisation and substitution.

21. Reform of the apprenticeship levy to allow for modular apprenticeships and standard frameworks would ensure apprenticeships could be tailoring according to a business' need.

22. Existing funding arrangements do include the provision for any industry certifications within the specific apprenticeship programme, they do not extend to the payment of additional training certifications that exist within industry, which could be a natural extension of the current level of apprenticeship that a learner is enrolled upon.

23. To meet demand, the Low Carbon Heating Technician apprenticeship standard needs to be finalised by the Institute of Apprenticeships & Technical Education as quickly as possible.

24. We would support an alternative recognised pathway into a competence scheme or qualification for existing gas engineers to be able to transfer their skills into the newer technologies such as heat pumps.

25. Minimum technical competencies for heat pump design, installation, commissioning and handover should be incorporated into training and requirements for plumbing and heating engineers. Supported by a competent persons scheme or green skills card for installers of low-carbon technologies, similar to Gas Safe accreditation.

26. Apprenticeship development should take no more than a year from identification of need to delivery of qualification certification.

27. Greater devolution of skills budgets would allow local authorities and/or devolved administrations to better match skills support to geographical factors.

A Jobs Transition Recommendations

28. Governments should commit to a national retraining programme/s which equip existing carbon-intensive workers, and new workers in areas where carbon-intensive industries are concentrated with low carbon skill sets.

29. We need an approach which focuses investment in industry and skills in low carbon energy technologies, as we cannot assume the market will place new jobs where the old ones were.

30. We need government to offer financing options for modular training and upskilling to redeploy those currently in high-carbon sectors towards lower carbon technologies.

31. Barriers to retraining need to be removed with innovative approaches trailed such as training sabbatical or paid time off to train in green skills.

32. Governments should be developing training centres for green jobs in areas at risk of dislocation and include those former coalfield areas and other communities with displaced industries.

33. Currently there are no uplifts in funding for apprentices from areas of multiple deprivation, consideration should be given to exploring uplifts in areas of potential dislocation as we move towards net zero.

34. Just transition agreements should be encouraged, following the model between employers and unions around the closure of the Cottam coal power station.

35. The UK should provide equivalent funding the EU's just transition fund to help communities diversify and develop alternative industries.

36. Industry needs to ensure mutual recognition of training certification and supply chain standards across sectors to ease transfer of workers between

37. There should be skills 'passporting' for the offshore oil and offshore wind sectors.

38. We would like to see a careers map from DESNZ in conjunction with the Department for Work and Pensions so that careers advisors in schools can aptly describe green related careers to pupils.

39. Government and industry should work together to create resources that connect the world of learning with future jobs.

40. Reintroduce formal industry experience within the secondary curriculum. A new approach is required, which could include longer placements perhaps over several terms or years and industry-related coursework.

41. To improve the diversity of those entering green jobs through the STEM route ambassadors from a range of backgrounds could inspire such pupils and bring the possibility of working in green energy related careers to life.

42. Colleges need to create a sense of excitement and increased level of knowledge around the opportunities of jobs in renewable energy, not just so that young people can set themselves on that course, but so that carbon-literate young workers can act as advocates within the existing workforce.

43. Schools need to be monitored, measured and rewarded for sending young people down a vocational route as well as to universities.

44. There should be a public information campaign on the value of, and opportunities arising from the apprenticeship route to a career.

45. Moving individuals from older workforces into skills teaching is a strategy used in other countries where the link between employers and skills delivery is stronger. It is worth piloting as a potential way to better utilise the skills and experience of older workers that may soon be lost to the economy.

46. The principle for policy makers should be ensuring a transition that avoids job losses rather than mitigating them after the fact.

47. For the apprentice system to cope with this increased demand, the apprentice system needs to be funded correctly in line with the increasing demand for this option.

48. All parties should engage in this debate in a way that encourages consensus that will, in turn, create the market certainty that industry needs to rise to the investment challenge.

Future Energy Skills PROGRAMME

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