

Rapid review of potential labour and skills impacts



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Introduction

This paper collates and analyses existing data and evidence that has been produced in relation to the labour and skills impacts of developments in the green economy (with a particular focus on offshore wind)

It is part of a wider project led by Rocket Science UK, working with SAMI Consulting and IES, to support the North East Local Enterprise Partnership in understanding future skills needs in digital and technology in health and social care and the green economy. These rapid reviews focus on a combination of:

- Known sources for relevant evidence – e.g. government funded research, independent research organisations, relevant trusts and foundations
- Research identified by the North East LEP
- Sources flagged by contacts/ colleagues with expertise in these areas

The reports also build on and include findings from earlier work commissioned by the LEP to understand the current employment and skills landscape. We did not do systematic searches of academic journals, given the time and resource available. In all, 53 reports and publications were reviewed across both strands of work.



The green economy

This rapid review focused on future demand in the green economy, which we defined as those jobs and industries directly contributing to the transition to a low/ no carbon economy. The literature reviewed broadly identifies three key segments for future growth in this economy, around:



Energy generation where the review has a particular focus on off-shore wind, due to the North East's comparative advantage and specialism in this sector (BEIS, 2019);



Buildings including energy efficiency and green construction; and



Surface transport in particular electric vehicles and batteries/ storage.

In addition to these, smaller but important growth potential is also identified in a range of other areas including:



heat networks



hydrogen power (particularly for high-use industries)



Carbon Capture and Storage



Green services (like finance, consulting and IT).

Recent estimates by the ONS suggest that around 225 thousand people were directly employed in low carbon and renewable energy in 2018, and that this was growing by between five and ten thousand jobs a year¹. This is equivalent to around 0.7% of all employment.

The ONS estimated that just over 150 thousand of these jobs (more than two thirds) were in energy efficiency and monitoring, with around one in six jobs in energy (of which 7 thousand were in off-shore wind) and around one in sixteen in low emission vehicles.



The green economy

Future demand

Achieving Net Zero

Even before the government had legislated to achieve 'net zero' carbon emissions by 2050, the low carbon economy was expected to grow far faster than the economy as a whole over the coming years.

In their 2017 Clean Growth Strategy (BEIS, 2017), the government forecast that low carbon economy could grow by 11 per cent a year between 2015 and 2030, which at that time would be four times faster than the projected growth of the economy as a whole. Since then, achieving net zero will require far more accelerated growth in low carbon, and the wider economy has weakened with the Covid-19 recession – so low carbon will represent an even larger share of future economic growth.

The Committee on Climate Change (CCC), in their Sixth Carbon Budget (which proposes emissions ceilings for 2033-37) state that emissions will now need to fall by 78% by 2035 (compared with 1990 levels) in order to remain on track to Net Zero – so more quickly than has previously been legislated for (CCC, 2020b). They set out various scenarios to Net Zero, but on their central, 'Balanced' Pathway they state that low carbon investment will need to add "around £50 billion annually by 2030 (compared to current economy-wide investment of nearly £400 billion)" – driven by low carbon power, retrofitting and batteries/ infrastructure for electric cars. In their accompanying Policy Report (CCC, 2020c) they see the growth in the low carbon economy in two key phases:



Scaling up with the 2020s as the key phase for building supply chains and new markets for low-carbon products and services, "so that these can scale from being niche offerings to dominate the market"; and



Rolling out where from the 2030s onwards these scaled solutions then replace existing stock, particularly in heating and transport – with the CCC stating that electricity is in effect already in the 'rollout' phase, with costs falling and rollout already close to the required levels for its central path to net zero.

In terms of future labour demand, work by Ecuity consulting for the Local Government Association (Ecuity, 2020) estimates that there could be up to 700 thousand direct jobs in the low carbon economy by 2030 in England – so around half a million more than currently.

They estimate that around a quarter (160 thousand) would be in electricity generation; the same number in heating, one fifth (145 thousand) in energy efficiency, and one in seven (95 thousand) in low emissions vehicles and batteries. Looking further ahead, Ecuity estimate that there could be up to a further 500 thousand jobs in the low carbon economy by 2050, so bringing total employment to 1.18 million.

The green economy

Offshore wind

The government's recent Energy White Paper (BEIS, 2020) sets out the extent of the impact of decarbonisation on our energy mix – with estimates that it will lead to a doubling in electricity demand and a four-fold increase in low carbon power generation.

These estimates are based on the CCC's most recent Carbon Budget, which forecasts that phasing out of fossil fuels will lead to demand for electricity rising from around 300 TerraWatt hours today to 460 TWh in 2035 and 610 TWh by 2050.

In addition to this, their central scenario also assumes 120 TWh of hydrogen power by 2050, produced through surplus power generation (CCC, 2020b).

Wind, and particularly off-shore wind, is described by the CCC as "the backbone of the system, providing 265 TWh of generation in 2035 and 430 TWh in 2050."

Their scenario assumes that this will require the deployment of 3 GW per year of new wind capacity, alongside "repowering of older sites as they reach the end of their (25-30 year) operating lives." (CCC, 2020b).

The CCC predict that the government is on course to hit its goal of 40GW of capacity from offshore wind by 2030, and are "on a path to 65-125 GW by 2050."

With the market in offshore wind now relatively mature, the recent Energy White Paper (BEIS, 2020) and the government's Ten Point Plan for a Green Industrial

Revolution (HMG, 2020) focus mainly on how it will use its existing Contracts for Difference process to reduce risk for future investment in windfarms. However it does include specific commitments around:



Seeking to scale up the growth in floating off-shore wind farms;



Investing £160 million in ports and coastal infrastructure to support win manufacturing; and



A target to increase exports of wind goods and services fivefold by 2030, to £2.6 billion.

In all, the government estimates that this will lead to a trebling in employment in the wind sector, to around 30 thousand jobs, with a further 30 thousand indirect jobs created or supported.

However, it should be noted that offshore and onshore wind technologies have relatively low labour intensity, both compared with other electricity generation industries and the wider low carbon economy (Ecuity, 2020).

Potential future export opportunities for wind are also emphasised in research conducted for the North East LEP by Cambridge Econometrics.

This identifies in particular the potential for steady growth in Europe and stronger growth in current "untapped markets" in the United States, China and wider East Asia.

They point out that this is more likely to be in services and expertise rather than manufacturing or construction, given the tendency for trade barriers to focus more on the latter than the former (Cambridge Econometrics, 2020).

The green economy

Buildings

Decarbonising how we heat our homes and businesses, and improving energy efficiency of our buildings, are identified in all of the literature as being central to achieving Net Zero and key drivers of future demand.

By the mid-2030s, we will need to have fully transitioned away from installing new fossil fuel boilers, and have addressed the fact that two thirds of all homes are energy rated D or worse.

The government estimates in its Energy White Paper that this will require at least £100bn of investment, predominantly by households and business (BEIS, 2020).

The White Paper and Ten Point Plan set out commitments to achieve 600 thousand heat pump installations each year by 2028; to ramp up green construction and energy efficiency; and to improve financial incentives to switch to low carbon and improve efficiency.

It is estimated that these measures would support up to 50 thousand new jobs by 2030, and mobilise £11 billion in private investment.

However, it is not clear that these measures will be enough and so we may yet see further steps that will boost labour and skills demand in these areas.

The CCC in particular state that we would need to be installing 15 heat pumps per 1,000 people per year by 2030 (which translates into roughly one million installations a year) and that we need staggering increases in efficiency

measures – with their central path to Net Zero based on loft insulations rising from 27 thousand a year to 700k thousand by 2025; cavity wall insulation rising from 41 thousand a year to 200 thousand; and solid wall insulation rising from 11 thousand a year to 250 thousand (CCC, 2020b).

They forecast that achieving Net Zero would require £360 billion of total investment by 2050 in upgrading buildings, of which £250 billion would be domestic homes (with £55 billion on energy efficiency measures alone).

Importantly, this sector is also relatively jobs rich – with heating installations, maintenance and energy efficiency measures in particular among the most labour intensive parts of the low carbon economy (Ecuity, 2020).



The green economy

Surface transport

The North East region is clearly very well placed for future growth in electric vehicles – as home to a cluster of sector-leading businesses in electric power trains and battery technology, the most successful electric vehicle in Europe, and the only Gigafactory in the continent (NELEP, 2020).

In order to achieve Net Zero there will need to be rapid growth in all aspects of electric transport, including production and manufacturing, battery development, storage, and charging networks and infrastructure.



The CCC pathway to net zero assumes that by 2035 nearly half of all road vehicles would need to be electric (28 million vehicles in all) (CCC, 2020b).

So far the government's announcements on support for this growth are relatively modest, with the Ten Point Plan announcing £1 billion of investment on production and manufacturing (including to support more Gigafactories and battery manufacturing); and £1.3 billion to support new charging infrastructure (HMG, 2020). They predict that this will be accompanied by around £3 billion in private investment by 2030 and will support up to 40 thousand new jobs.

Other potential drivers of increased demand

Beyond the three broad themes set out above, the literature points to a number of other industries or areas where there is likely to be growth potential, albeit on a somewhat smaller scale, including:



Hydrogen and nuclear power which are both cited by the CCC and government as key parts of the energy mix in order to support high-intensity industries as well as to help deal with peaks in demand. The White Paper (BEIS, 2020) suggests modest or uncertain near-term growth in these areas, but the NELEP's clean growth pitch does also emphasise hydrogen power as an area of innovation and potential future growth (NELEP, 2020).



Carbon capture and storage where the government is aiming for four industrial clusters by 2030, and the North East highlighted as a potential location for one or more of these. The Ten Point Plan sets aside £1bn in infrastructure funding for these, and predicts that CCS could support up to 50 thousand jobs by 2030 (HMG, 2020).



Local heat networks which again the NELEP clean growth pitch identifies as a particular opportunity for the region (NELEP, 2020).



The natural environment including flood defences, tree planting and re-wilding – with the Ten Point Plan suggesting that these could support more than 20 thousand jobs over the next decade (HMG, 2020).

The green economy

Future skills needs

These increases demand and transition to Net Zero will have profound implications for skills across the economy, although the literature reviewed is very sparse in the extent to which these impacts have been quantified and articulated.

At the very highest level, research by the Grantham Institute (Robins, Gouldson, Irwin, & Sudmant, 2019) suggests that one fifth of all jobs will be affected by the transition to Net Zero, with about half of this driven by new opportunities and demand (which they term as “transition aligned”) and half by a need to re-skill in jobs that may be more adversely affected (which they describe as needing “transition reskill”).

The Grantham Institute research predicts that these “re-skilling” needs are likely to be most pronounced in construction (affecting 30% of jobs), transport (26%) and manufacturing (17%).

Their regional analysis suggests that in the North East, skills transitions needs will be broadly in line with figures for the UK as a whole – with 10.5% of future jobs ‘transition aligned’ and 10.0% needing to reskill.

However this is clearly a much larger scope than those jobs directly in the green economy.

Perhaps the best current source on skills needs for these jobs is the work by Ecuity Consulting for the LGA, which suggests that by 2050:



Around two fifths of jobs (490 thousand) will be in construction and installation of low carbon technologies;



Just over one third (410 thousand) will be supporting operations and maintenance; and



Around on quarter (280 thousand) will be engaged in manufacturing and production of low carbon technology (Ecuity, 2020).

Perhaps in recognition of some of the gaps in our understanding of future skills needs, the Energy White Paper has committed to a new ‘Green Jobs Taskforce’ that will explore skills demands and supply and is expected to produce an Action Plan in Spring 2021 (BEIS, 2020).



The green economy

Energy and offshore wind

Overall across the energy sector, work for the National Grid suggests that there could be up to 400 thousand jobs in low carbon energy over the next 30 years, of which 260 thousand will be new jobs and the remainder will be replacement demand for those leaving the sector (CCC, 2020b).

The CCC and Ecuity both point to specific skills demand in the power sector around construction, manufacturing and engineering – with construction jobs relatively low to mid skilled, and jobs around design, engineering and planning much higher skilled.

Work by the Carbon Trust suggests that immediate workforce demands in off-shore wind have been successfully met so far through “a combination of repurposed oil and gas employees and new recruits” (Jennings, Andrews Tipper, Daglish, Grubb, & Drummond, 2020).

Planned new investment in the White Paper for port and coastal manufacturing is likely to lead to demand for up to 2,000 new construction workers (BEIS, 2020), although the CCC point out that in general there are relatively long lead-in times for windfarms and power generation and so scope to prepare for future needs (CCC, 2020c).

In nuclear power on the other hand, Ecuity (2020) point to more significant immediate demand for skills – both relatively low skilled construction workers and higher skilled specialist roles, with the latter also facing competition from the Defence industry.

Finally, a number of sources emphasise the importance of building and supporting supply chains, particularly around components and manufacturing. The CCC point out that industrial policy has not prioritised growing domestic supply chains and so has been reliant on imports (with associated carbon costs) (CCC, 2020b). This has led the government to commit in its offshore wind sector deal to commit that at least 60% of spending would flow through to UK companies (BEIS, 2019). If this happens, then this would increase demand for domestic construction and manufacturing jobs in particular.

Surface transport

The literature reviewed had far less to say on skills demands for future electric vehicles and battery production – beyond that these would be in engineering, manufacturing and production (CCC, 2020b).

This relative paucity likely reflects that the transition to electric vehicles is largely seen as a labour force and skills transition too, from petrol/ diesel engines too – so in as far as there was any analysis of future skills demand it focused on the need to support an effective transition for the automotive industry and workers to EV production (Ecuity, 2020).




The green economy


Buildings


Jobs and skills demand in supporting the transition to low carbon buildings will be significantly higher than demand in power generation.


The CITB estimates that greening buildings will lead to an extra 200 thousand full-time equivalent workers from 2030, with this rising to 250 thousand from the mid-2030s to mid-2040s (unpublished research, quoted in CCC, 2020b).

These will be jobs in construction, manufacturing and installation. Within this, CITB predicts that the key drivers will be:

 Heat pump installation – rising to 100 thousand FTE jobs by the late 2030s;

 Retrofitting and efficiency – up to 50 thousand extra jobs;

 Heating, ventilation and air conditioning – 30 thousand jobs; and

 Electrical trades and general construction trades – 20 thousand jobs each.

These areas are backed up in other research too, with both the Energy White Paper and Sixth Climate Budget reporting that work to support installations and retrofitting are the areas of highest immediate skills need. Ecuity too, reporting on interviews with experts and stakeholders, point to particular skills demand and current skills gaps related to heat pump sales, installation and servicing, and that energy efficiency smart metering will also need to continue to grow to meet demand (Ecuity, 2020).

The CCC make the point that in the immediate term, much of this – especially on retrofitting – could be mobilised very quickly (CCC, 2020c), but that it is urgently needed. In their progress report to Parliament last summer, in particular, they state that “new support to train designers, builders and installers is urgently needed for low-carbon heating (especially heat pumps), energy and water efficiency, passive cooling, ventilation and thermal comfort, and property-level flood resilience” (CCC, 2020a).


They also make the point that not all of these jobs will be in manufacturing, construction and installation – with demand too for skills in associate services too – particularly engineering services, procurement and construction management.

Innovations

One further area worthy of noting here was around potential future demand for skills that would support innovation and growth in new technologies and practices to support a transition to Net Zero.

The 2019 BEIS Energy Innovation Needs Assessment explored this in some detail, suggesting that jobs at the frontiers of innovation would also be relatively high quality and well paid.

The CCC (2020b) and the Energy White Paper and Ten Point Plan also point to the scope for growth in emerging technologies, which are set out in more detail in the demand section above.

 Importantly though, the NELEP clean growth pitch makes clear that innovation is also a key potential strength for the North East region – particularly around energy and electric vehicles (NELEP, 2020).

The green economy

Skills supply

Across a number of sources, there was a recognition that improving skills supply will be absolutely central to achieving Net Zero.

As the CCC put it in their policy report, "Delivering the changes required to meet the Sixth Carbon Budget will only be possible if comprehensive programmes of infrastructure and skills are developed over the same period." (CCC, 2020c) So far, the market rather than state intervention has taken more of the strain on meeting demand in low carbon jobs, with research by the Carbon Trust suggesting that in offshore wind in particular the increase in scale and longevity in the market has made it more attractive and better able to compete with oil and gas (Jennings et al, 2020).

The same report also suggests that "competition on cost reduction has also rewarded those companies with the best workforce, reinforcing those with the best skills and improving their ability to train and develop their workforces."

The offshore wind sector deal seeks to put more structure and planning around this, with proposals specifically for a sector-wide standardised curriculum that can then improve quality and transferability of training, alongside greater use of apprenticeships and T-levels to support vocational routes (BEIS, 2019). Subsequently, the government and industry have also now set a target of supporting 3,000 apprenticeships in the sector².

Looking forward, a number of sources point to the importance of the oil and gas industry in helping to meet future demand too – with 145 thousand people currently employed in that sector.

The CCC (2020c) and the Energy White Paper (BEIS, 2020) both make the point that this may become particularly acute if oil prices continue to fall or carbon taxes are increased – as the CCC puts it: "If suppressed oil prices continue to affect jobs in the North Sea, we must retrain and redeploy this highly-skilled workforce in the UK's future low-carbon industries, including CCS."

On buildings, there is more detailed analysis in forthcoming CITB research on particular skills supply problems and deficits.

This is expected to identify challenges across a range of areas, and in particular related to repair and maintenance work, and skills for working on traditional buildings (CCC, 2020b).

The report is also expected to state that there are structural challenges around both the supply of 'Net Zero ready' training and the demand for it; and is expected to call for a major expansion of skills capacity, a reskilling of workforce and a stronger focus on quality. This points to a wider issue around a lack of coherent thinking or planning on how we will make a transition to a "Net Zero Workforce".

The CCC make this point in their most recent progress report, calling in particular for government to develop a new strategy "that ensures a 'just transition' for workers transitioning from high-carbon to low-carbon and climate resilient jobs, integrates relevant skills into the UK's education framework and actively monitors the risks and opportunities arising from the transition" – with this then linked to specific plans to boost investment and training and skills "with buildings and manufacturing being priority areas." (CCC, 2020a)

Finally, one key aspect of meeting future skills needs is around the diversity of the low carbon workforce. Women are under-represented in STEM and construction jobs, as are some ethnic minority groups.

The offshore wind deal in particular recognises this, and commits to targets to increase the share of women in the workforce from 16% to 30% by 2030, "with a desire to reach a more stretching ambition of 40 per cent"; and then a subsequent target to reach 9% employment for ethnic minority groups by 2030 ("aiming for a more ambitious target of 12% if feasible³".

The green economy

The North East

Focusing in on skills demand and supply in the North East specifically, as noted the North East has a specific existing competitive advantage on offshore wind and is identified in the offshore wind sector deal as a key industrial cluster (BEIS, 2019).



Previous research for the LEP suggests that based on current and planned offshore wind projects, direct and supply chain employment in offshore wind in the North East would peak at 4,600 jobs in 2025, with potentially a further 2,500 indirect jobs created in supporting services (Cambridge Econometrics, 2020).

This would equate to a little under 1% of total employment (0.6%) but a higher share of employment growth over the next two decades.

However looking beyond offshore wind, the analysis by Ecuity – using Business Register and Employment Survey (BRES) data and SIC mapping to estimate jobs demand by English region – estimates that the entire low carbon economy will add 84 thousand jobs in the North East.

This equates to 7% of all low carbon jobs, which suggests that the North East stands to disproportionately benefit from the green economy (as it accounts for 4% of all employment in England) (Ecuity, 2020).

This jobs growth and associated skills demand reflects the fact that the areas with highest growth potential –

buildings, heating and energy efficiency – do not have the same regional biases that industries like manufacturing, power generation and the service sector have. It may also reflect that the North East is one of the regions with the highest per capita energy efficiency needs in the UK (BEIS, 2020).

In addition, analysis for the North East LEP emphasises in particular key strengths (i.e. skills supply and demand) in innovation, infrastructure, supply chains and its existing skills base (Cambridge Econometrics, 2020), driven in particular by specialism in North East universities and industrial research and development facilities (NELEP, 2020).



The green economy

PESTLE factors

Legal and regulatory changes

Looking ahead, it appears highly likely that future legal and regulatory changes will accelerate the shift to Net Zero.

Already planned is the ending of sales of new petrol and diesel vehicles from 2030 and a modest extension of grants for electric and hybrid vehicles, while future measures have been promised for 2021 on emissions targets (HMG, 2020). Binding targets are also due to be set on air quality, waste and resource efficiency by 2022, which will drive more rapid adaptation by consumers and firms (BEIS, 2020).

However, the CCC has called for government to further and faster – including to set a target for phasing out new gas boilers by 2033; unabated natural gas burning by 2035 (CCC, 2020b); more use of carbon pricing, taxes and incentives; and more support and stronger duties on government to act in accordance with Net Zero (CCC, 2020c).

Social and Technological

A key driver of more rapid social change may well be the consequences of the Covid-19 crisis. On balance, the CCC believe that this is “likely to be transient, as [it does] not reflect structural changes in the underlying economic, energy, transport or land systems”; but at the very least we know that in a downturn, green stimulus measures are more attractive in general and are also likely to be more effective than other forms of stimulus (as they have stronger ‘multipliers’ in terms of jobs growth, earnings, revenue and spending) (CCC, 2020a).

The CCC also predict that broader social changes will need to include a stronger focus on measures to drive behaviour change (for example in diet, energy use, efficiency and insulation and travel (CCC, 2020b)); while both the CCC (2020c) and the Energy White Paper (BEIS, 2020) point to technological advances supporting more rapid change, for example in decentralised energy systems or in new forms of power generation.

Economic

Finally, the CCC has called for a range of economic measures to support Net Zero, which could have implications for future speed of transition. These include:



stronger incentives for consumers, business and investment



and improved carbon pricing, particularly to reduce costs of low-carbon electricity and increase pricing in heating and aviation (CCC, 2020c).

There is potential too, as the Ten Point Plan sets out, for green finance and new trading system to accelerate growth and investment – as well as to support job creation themselves, likely in existing finance centres (HMG, 2020).

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