

Powering the labour market

Skilled work in a low
carbon energy system



Summary

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Fully decarbonising power by 2035 would distribute secure, skilled work more evenly across the UK's regions.”

With severe economic headwinds and finite government capacity, policy needs to achieve multiple objectives. Reducing the cost of living, improving energy security and levelling up can be accelerated by the transition to a low carbon power system. While shielding households from volatile fossil fuel prices, it will also drive the creation of more secure, skilled jobs across the country.

In this report, we map where new jobs in a low carbon power sector are likely to be based regionally and how skilled this work will be.

Our UK-wide analysis finds that:

- Low carbon power sources support at least three times more secure work per megawatt of capacity than gas, with solar and offshore wind supporting five times more.
- The government's energy security strategy will create secure, skilled work in offshore wind, nuclear and solar. These will predominantly be in the East, South East and South West of England, although there will be some growth in the North West, Yorkshire and the Humber, and Wales.
- Fully decarbonising power by 2035, with more ambitious targets for offshore and onshore wind, would distribute secure, skilled work more evenly across the UK's regions.

Whichever route the government takes, the power sector labour force will need to grow in every region, as the UK produces more of its own energy and reduces imports. The government should work with industry, individuals and education institutions to

upskill, retrain and educate those moving into the sector. To do that, the government will need to:

“Despite strong interest in it, the shift to low carbon work can be viewed as risky.”

1 Plan decarbonisation to maximise levelling up. This means more focus on deploying renewables, particularly onshore and solar, which distribute benefits across the country. Amending the National Planning Policy Framework will help, as well as working with communities, both on the appearance of low carbon projects and ensuring people living locally to them receive direct benefits, such as lower bills.

Legislative actions in the Energy Security Bill, such as giving Ofgem a net zero duty, will also help to achieve this, alongside reforms to the capacity market and digitalisation of the energy system.

The Treasury should focus on the tax treatment of investment in actions to cut carbon, so businesses are supported to invest in green technologies that lead to lower bills and, in the long run, economic growth.

2 Make it easier for skilled workers to change jobs Despite strong interest in it, the shift to low carbon work can be viewed as risky. However, there is unspent money in the government’s jobs plan which could be directed towards boosting the labour supply, especially in strategically important sectors like energy. This can be used to increase financial security around retraining, and through targeted grants and low cost loans that support workers. This will complement the government’s offshore training passport as a single home for worker’s qualifications, as long as their existing qualifications are recognised by new industries.

The government should aim to lower the business costs of upskilling staff, by restoring the Union Learning Fund and launching a ‘green skills super-deduction’.¹

“The government should aim to lower the business costs of upskilling staff.”

3 Ensure that green work is good work

Our focus group research, conducted by Public First in 2021, showed that it is the chance of good quality work that will attract people.² Workers need to be included in the process of moving to low carbon energy, for example through formal involvement in Local Skills Improvement Plans.

While a greater focus on solar and onshore wind will mean more communities can benefit from high skilled jobs, there will be some that still need help through the transition. This might mean assisting workers to relocate, or grants to local government to repurpose former energy assets into cultural sites, and supporting public services where communities are growing due to the expansion of low carbon work opportunities.

Introduction

“Greening the power sector is a significant industrial shift and an opportunity to lock in high quality jobs for future generations.”

The UK is experiencing a cost of living crisis.³ Post-pandemic spikes in commodity prices are being compounded by Russia’s invasion of Ukraine; energy prices will continue to skyrocket to unprecedented high levels.^{4,5} The result is a grim outlook for British households.

The UK needs a more secure and stable energy system. The government has pledged that all electricity will come from low carbon sources by 2035.⁶ Targets for new nuclear, offshore wind and solar were announced in the *British energy security strategy*, published in April 2022, while the Energy Security Bill will put the government’s ambition to deliver “cheaper, cleaner, and more secure energy” into law.⁷

The transition to low carbon power can provide new jobs and good work around the country, helping to meet the government’s aim to level up.⁸ The long term solution to rising costs must be to improve incomes and create the government’s promised “high-wage, high-skill economy”.⁹ Greening the power sector is a significant industrial shift and is, therefore, an opportunity to lock in high quality jobs for future generations.

The labour force will need to expand whichever pathway the government pursues. Some of this demand will be met by workers moving out of a phasing down fossil fuel industry.¹⁰ However, the sector labour force will still need to grow by at least 200 per cent to meet capacity targets with existing low carbon technologies. Anticipating the skills gaps in the labour market is crucial so that local authorities, businesses and workers can prepare for the transition, minimising disruption.

Where these jobs manifest depends on the legislation, targets and investment associated with different energy sources. The balance of the future energy mix will alter the number of secure, well paid, high skilled jobs that can be created.

To identify where labour demand is likely to grow, we have mapped where jobs in a low carbon power sector will be based regionally and how skilled they will be. We compare two possible pathways: the first, ‘energy security strategy’ is based on the government’s existing plans, the other we have called ‘low carbon acceleration’, with higher ambition to 2035, particularly in the pace of wind and solar energy growth.¹¹

The most significant low carbon energy sources in future capacity will be offshore and onshore wind, nuclear and solar. Low carbon energy sources are the focus of this report but we also consider projected decline in coal and gas generation and the potential of hydrogen.

Our analysis is based on credible assessments from academic literature of likely job creation and skill levels, including a recent review by the UK Energy Research Centre.¹² We take the capacity of each power source required to achieve both pathways' targets and calculate the total number of jobs that could be created, based on known values for the number of jobs required by each energy source per megawatt of capacity.

Secure jobs are defined as those in operations and maintenance, as they are permanent, in contrast to time limited work in construction and manufacturing, with the skill level determined by matching the roles to Office for National Statistics (ONS) skill level categories. (For full details and assumptions, see our methodology at green-alliance.org.uk/publication/powering-the-labour-market/).

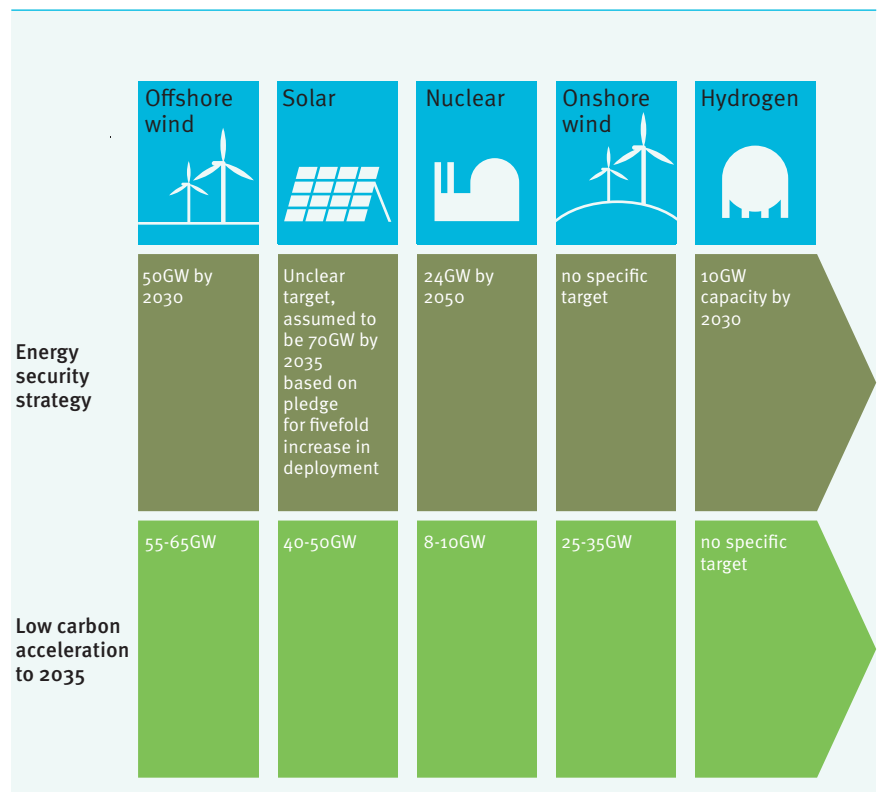
Two pathways to low carbon power

We have analysed and mapped potential jobs in a low carbon power sector under two possible power decarbonisation pathways: 'energy security strategy', based on the government's existing plans and 'low carbon acceleration', which has higher ambition to 2035, particularly for wind and solar (see below).

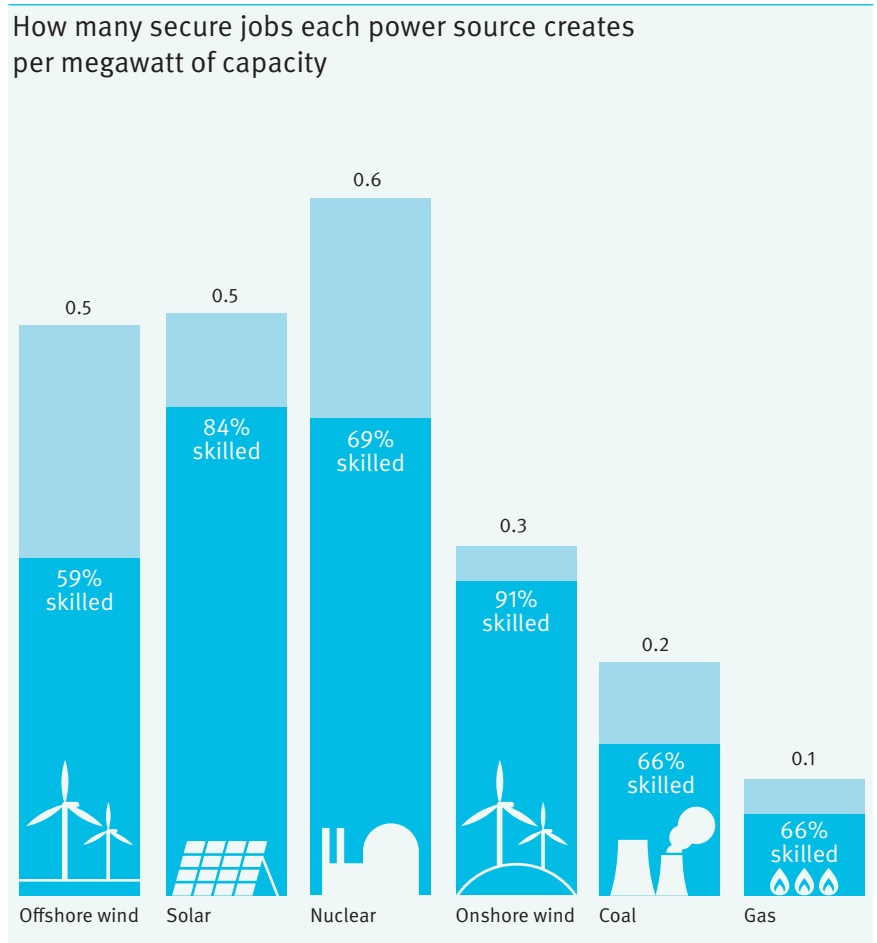
Regardless of which pathway is taken, the low carbon power sector will support more secure, skilled work than one that remains reliant on fossil fuels.

Every low carbon power technology creates more secure, skilled work, per megawatt of capacity, than coal or gas. Offshore and onshore wind respectively support five and three times as many secure, skilled jobs per megawatt of capacity as gas, while solar supports five times and nuclear six times as much.

Permanent jobs in the operation and maintenance of low carbon power sources have a similar or higher skill level to jobs in coal or gas generation.



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 power technology
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The amount of secure, skilled jobs that can be created will depend on the strategy taken to cut carbon. Generally, building renewables requires a burst of temporary employment in manufacturing and construction before it can support secure work in operation and maintenance.

Each energy source produces a different proportion of skilled labour and a different balance between long and short term work:

- Nuclear and onshore wind create a greater proportion of long term, skilled jobs in manufacturing and construction than solar or offshore wind. But their construction is less labour intensive overall, so there are fewer total jobs to increase capacity, compared to solar and offshore wind.
- Offshore and onshore wind support roughly the same amount of skilled work. The proportion of highly skilled jobs in operation and maintenance is 60 per cent for offshore and 90 per cent for onshore, but offshore wind supports more permanent jobs overall. This is likely to be related to the labour intensity of offshore work, including access for operations and maintenance.
- Solar and offshore wind create the most temporary ‘job years’ per megawatt of capacity. Around 40 per cent of these are highly skilled.

Regional distribution

Government policy will affect how significant each power source becomes in the future energy mix. This will, in turn, shape how work is distributed across regions. The transition will require significant upskilling, retraining and targeted education, as this labour market will grow in every region.

Energy security strategy

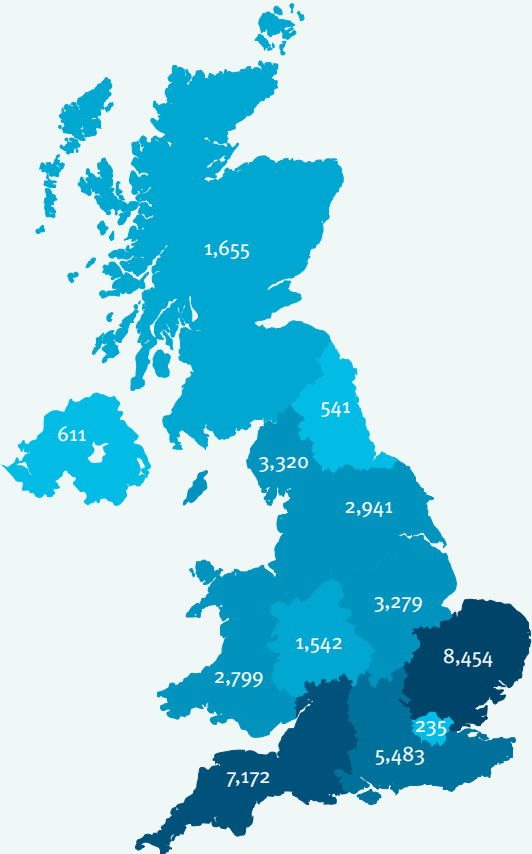
This will skew future employment away from areas the government wants to level up, as it creates work predominantly in the East, South West and South East of England. Under this strategy, the power sector labour force in the South West will need to increase by 353 per cent and in the West Midlands by 415 per cent, to fill operation and maintenance roles.

Low carbon acceleration

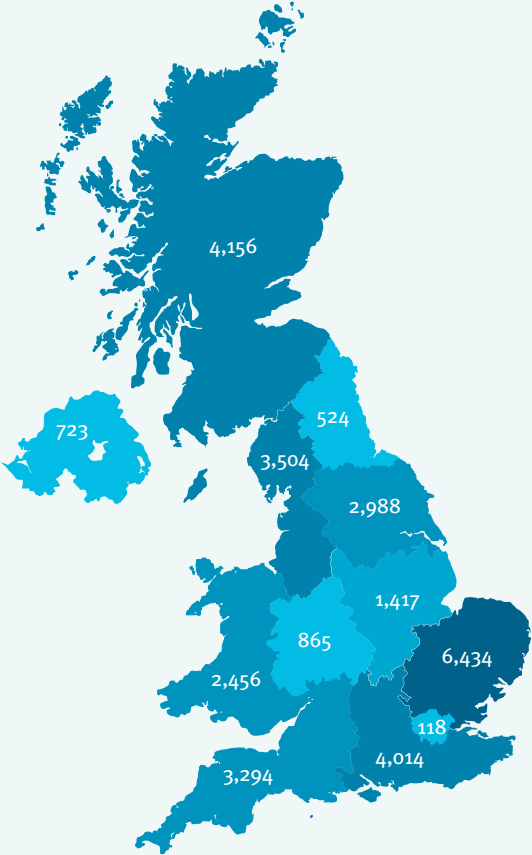
This would create more secure jobs in the North West, Yorkshire and the Humber, and Scotland, balancing employment more equally between regions. Under this route, the power sector labour force in Wales, Yorkshire and the Humber, the West Midlands, East of England, the North, South West and the South East will need to increase by over 200 per cent. In the North West the rise will be over 300 per cent.

Potential number of additional secure, skilled jobs under two pathways to low carbon power

Energy security strategy



Low carbon acceleration



Additional secure, skilled jobs required



Jobs potential by energy source

Here we present our analysis of the work potential for each energy source under the 'energy security strategy' and 'low carbon acceleration' pathways. We show the differences between them, in the distributions and compositions of jobs around the UK.



Offshore wind

To decarbonise power by 2035, the East of England will need around

4,500

more skilled workers in operation and maintenance.

Summary

Offshore wind capacity in the UK is currently 10GW. The 'energy security strategy' pathway implies a five fold increase in the UK's capacity to 50GW by 2030 while 'low carbon acceleration' would increase this six fold to 60GW.

Offshore wind is skewed towards the East of England. The region's geographic importance for wind farms off the coast of East Anglia means around 30 per cent of additional secure, skilled jobs in the offshore wind industry will be in this region.

In total, nearly 80 per cent of offshore wind jobs are in the East of England, the North West, Yorkshire and the Humber, and the South East.

Overall, offshore wind creates five times as many secure jobs per megawatt of capacity as gas. Around 60 per cent of jobs in the operation and maintenance of offshore wind are highly skilled.

The details

Energy security strategy

- ➔ Operation and maintenance under this pathway would support around 20,000 additional jobs, of which around 11,700 would be highly skilled. Decarbonising by 2035 would support around 25,000 additional jobs, 14,600 of them highly skilled.
- ➔ To meet the strategy's targets, the East of England will need around 3,500 more highly skilled workers in operation and maintenance. The North West will need to fill at least 2,000 extra highly skilled roles. This figure is lower, but still at least 1,500, in both Yorkshire and the Humber and the South East.

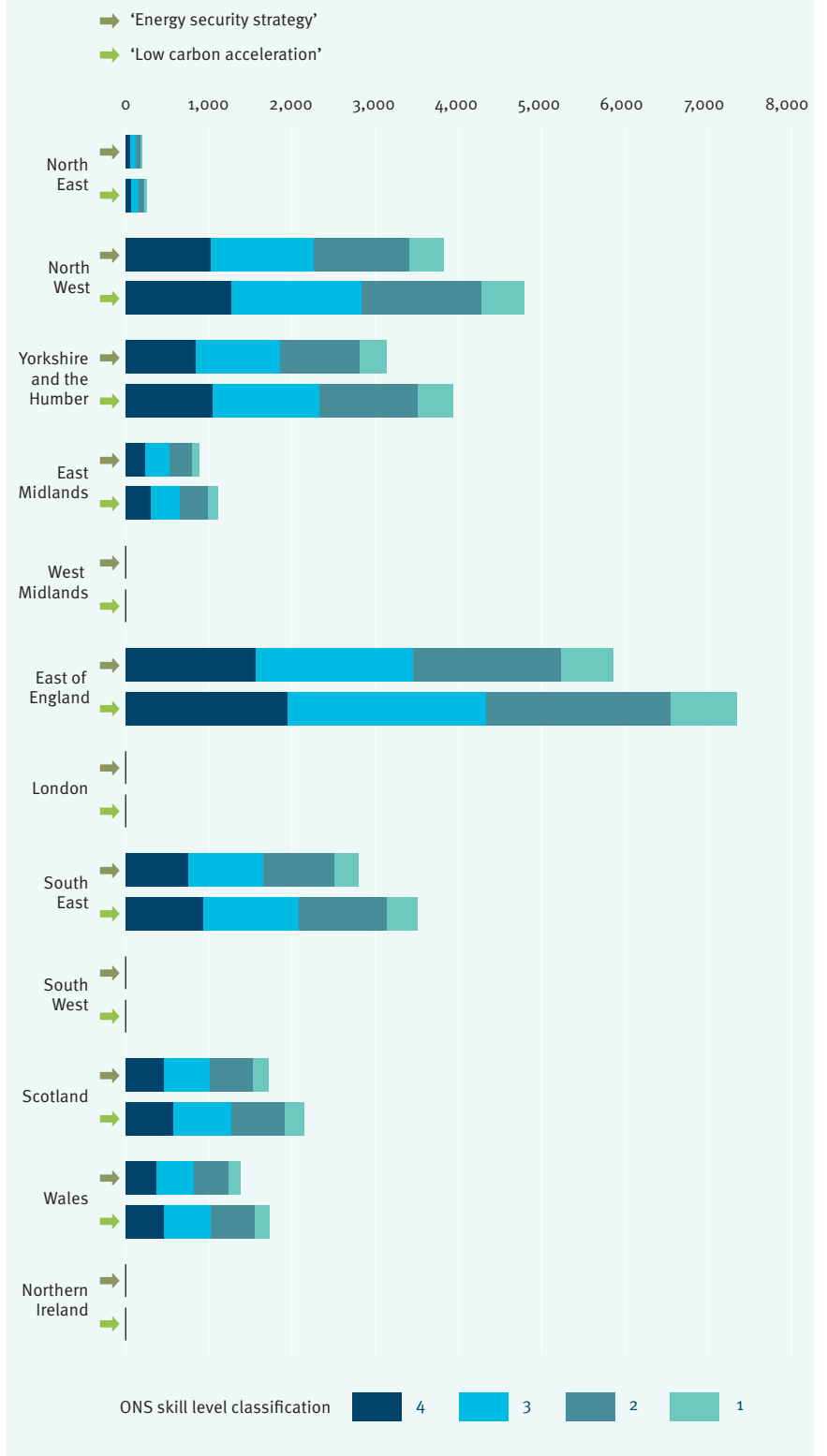
Low carbon acceleration

- ➔ To decarbonise power by 2035, the East of England will need around 4,500 more skilled workers in operation and maintenance. There will be at least 2,000 additional secure, skilled jobs available in each of the following regions: Yorkshire and the Humber, the North West and the South East.

Job creation potential in offshore wind

ONS skill level	Example role	Responsibilities	Type	Skills required
4	Civil and structural engineers	Design and optimisation of planned plant or site layout, including ensuring the safety of structural components, such as nuclear cooling towers	Indoor, desk based	<p>General University degree in relevant field or equivalent period of work experience</p> <p>Specific Masters degree in engineering, accreditation from professional association</p>
3	Technicians	<p>Installation of components on site, eg installing solar panels onto roofs or at solar farms</p> <p>Maintenance of components in operation, including repair.</p>	Indoor and outdoor, manual or desk based	<p>General Significant post-compulsory, vocational training related to the role, not necessarily to degree level</p> <p>Specific Vocational technical qualification related to renewables installation and repair</p>
2	Machine operators	Operating machinery related to manufacturing components, eg wind turbine blades	Indoor, manual work	<p>General Good general education and a long period of work-related training</p> <p>Specific On-site training related to safe and effective operating of machinery</p>
1	Ship crew	Transporting workers and components to offshore sites, such as offshore wind farms	Outdoor, manual work	<p>General Compulsory education and on job training related to specific requirements of the role</p> <p>Specific Training on operation and management of the ship</p>

Regional skills gaps: offshore wind



Solar

Operation and maintenance under the strategy supports around 28,000 jobs, of which around

24,000

jobs are highly skilled.

Summary

The government's energy security strategy has pledged a five fold increase in the deployment of solar infrastructure by 2035 but it is unclear whether this refers to total capacity or rates of installation. If the latter, it will mean an increase in the UK's current capacity of 14GW would bring solar infrastructure to 70GW by 2035. Under the 'low carbon acceleration' pathway, solar capacity would increase to 40-50GW.

Overall, solar supports five times as many secure jobs per megawatt of capacity as gas. Eighty per cent of jobs in the operation and maintenance of solar are highly skilled.

Solar will support secure, skilled work in every region of the UK. The main beneficiaries are the sunniest parts of the UK, the South West, South East, East of England and the East Midlands, with over two thirds of all operation and maintenance jobs located in those regions.

The details

Energy security strategy

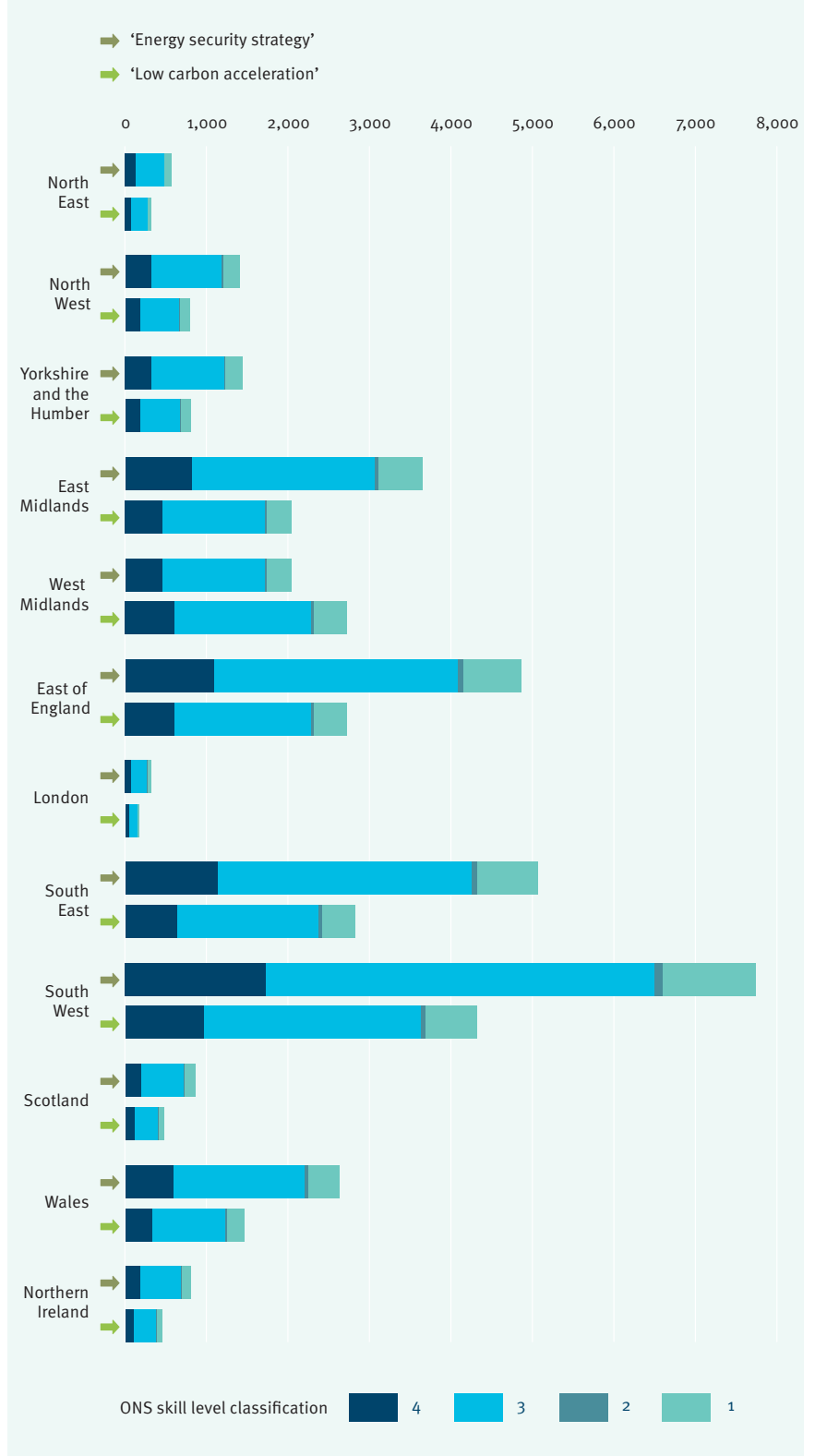
- ➔ Operation and maintenance supports around 28,000 jobs, of which around 24,000 are highly skilled. Decarbonising by 2035 would lead to 15,500 jobs, of which around 13,000 are highly skilled.
- ➔ To meet the strategy's target for solar, the South West will need around 6,000 additional skilled workers in operation and maintenance, of which around 1,500 will be directors, engineers or legal, financial or scientific professionals. The South East and East of England will need at least 3,500 additional skilled workers each, while the East Midlands will need nearly 3,000.

Low carbon acceleration

- ➔ To decarbonise power by 2035, for solar, the South West will need around 2,400 additional technicians, associate professionals, electricians and skilled metal or construction workers, in addition to over 850 directors, engineers and legal, financial or scientific professionals.

“**Eighty per cent of jobs in the operation and maintenance of solar are highly skilled.**”

Regional skills gaps: solar



Nuclear

Nearly

70%

of jobs in nuclear operation and maintenance are highly skilled

Summary

The government's energy security strategy has pledged a three fold expansion of civil nuclear by 2050, up to 24GW of capacity. 'Low carbon acceleration' would involve a much lower reliance on nuclear, anticipating no increase in nuclear capacity by 2035 (based on current capacity of 8GW).

Nuclear work is highly sought after as it is both skilled and secure. It creates six times as many secure jobs per megawatt of capacity as gas, and nearly 70 per cent of jobs in operation and maintenance are highly skilled.

The exact location of nuclear jobs depends on which projects come through the complex process of government approval and investment. Current progress indicates that, by 2050, new jobs in nuclear could be located in the East, South West and North East of England, and Wales. However, due to the long construction timescales associated with nuclear, in 2035 it is likely that only Hinkley Point C in the South West and Sizewell C in the East will be completed.

The details

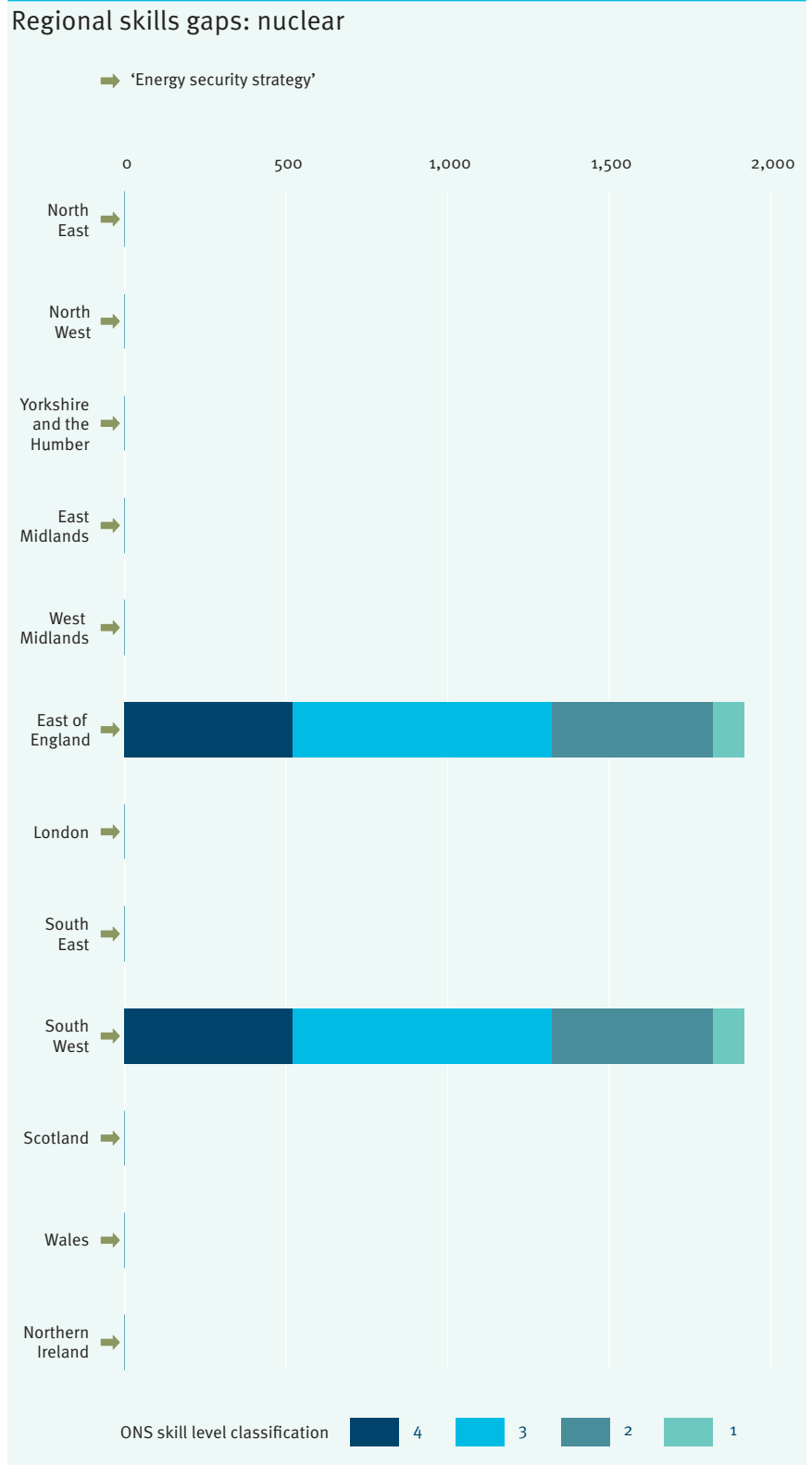
Energy security strategy

- ➔ Operating and maintaining the nuclear capacity outlined in the strategy will support around 3,800 jobs in operation and maintenance by 2035, of which around 2,600 will be highly skilled.
- ➔ Under the strategy, the East of England and the South West will need an additional 800 technicians, associate professionals, electricians and skilled metal or construction workers, and a further 520 directors, engineers and legal, financial or scientific professionals.

Low carbon acceleration

- ➔ This pathway would not support any additional jobs in nuclear.

“The East of England and the South West will need an additional 800 technicians, associate professionals, electricians and skilled metal or construction workers.”



Onshore wind

Forty per cent of jobs are in managerial, engineering or other professional posts and over

50%

of jobs are in technical or skilled trade roles.

Summary

Onshore wind generation supports a higher proportion of permanent, high skilled jobs than other low carbon sources of power. Forty per cent of jobs are in managerial, engineering or other professional posts and over 50 per cent are in technical or skilled trade roles. Onshore wind supports three times as many secure jobs and nearly four times as many secure, skilled jobs as gas.

The details

Energy security strategy

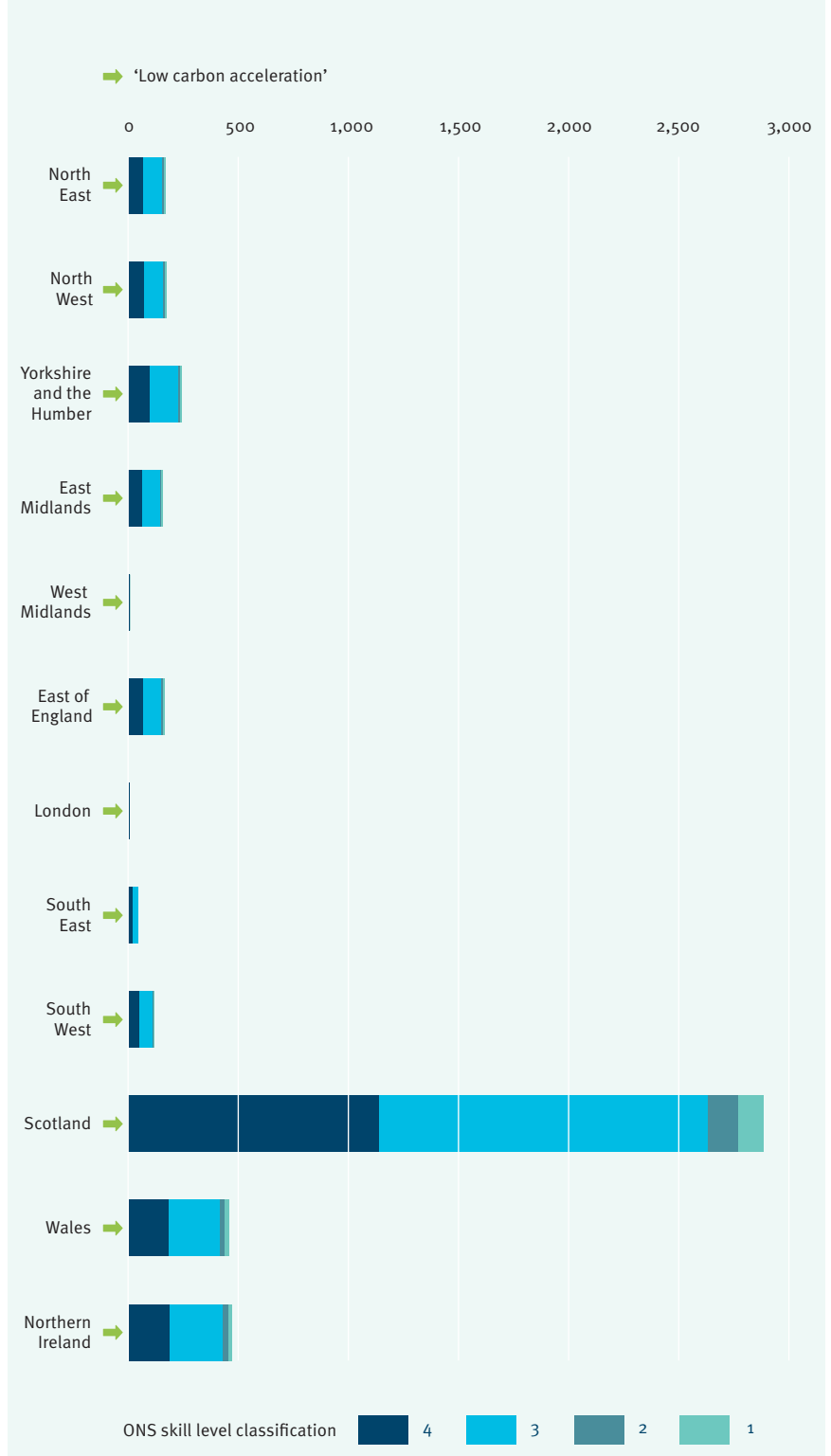
- The strategy has no target for onshore wind, and so there are no associated jobs numbers. Although onshore wind will be included in future rounds of contracts for difference (the government's scheme for procuring sources of low carbon power at fixed prices) it was deprioritised in favour of nuclear.

Low carbon acceleration

- This would require 25-35GW of onshore wind capacity, which would make it the third most significant power source, after offshore wind and solar. The UK will need around 4,300 additional highly skilled workers to operate and maintain onshore capacity to meet targets under this pathway, but over 2,500 of these will be concentrated in Scotland.
- If the regional concentration of future onshore wind capacity follows the distribution of current onshore infrastructure, nearly 60 per cent of future operation and maintenance jobs would be in Scotland. Over 1,000 jobs would be supported across Northern Ireland, Wales and Yorkshire and the Humber but, together, these regions only account for 24 per cent of total employment created in this industry.

**“
Nearly 60% of
future operation
and maintenance
jobs would be in
Scotland.”**

Regional skills gaps: onshore wind



Hydrogen

**“
Many jobs in
green hydrogen
have significant
competency
overlap with gas
employment.”**

Summary

The government’s energy security strategy pledges to double UK hydrogen capacity to 10GW by 2030, with at least half coming from low carbon electrolytic production (known as ‘green hydrogen’ if produced from renewables or ‘pink hydrogen’, if from nuclear). There is no hydrogen target in the ‘low carbon acceleration’ pathway. However, as data is unavailable for the labour intensity of hydrogen, due to the early development stage of the technology, we were unable to model jobs per megawatt of capacity.

Research indicates hydrogen will be a highly political energy source, as the technology is concentrated in industrial clusters across competitive constituencies. What is crucial for skills provision is that many jobs in green hydrogen have significant competency overlap with gas employment.

The details

- Scaling up hydrogen in the UK could support 75,000 direct and indirect jobs by 2035, according to the UK Hydrogen Taskforce.¹³
- A significant proportion of the employment in hydrogen will be located around the UK’s largest industrial clusters in Humberside, South Wales, Teesside, Merseyside, Southampton and Grangemouth.¹⁴
- Under the Zero Carbon Humber project, 2,090 secure jobs could be supported by 600MW of hydrogen production. While HyGreen Teesside is aiming for 500MW of capacity by 2030.^{15,16} Hydrogen capacity in Aberdeenshire will support 13,000 jobs in 2036 and 2,500 secure jobs by 2050.¹⁷ HyNet North West will add a further 6,000 permanent jobs through an increase in hydrogen capacity, from 3TWh per year in 2025 to 130TWh per year by 2050.¹⁸

Our recommendations

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Policy will need to support retraining and new entrants to the labour market.”

Both of the power decarbonisation pathways we have modelled offer clear benefits for the government’s mission to achieve a high skill economy. But it is the balance of technologies that will dictate where the jobs are distributed.

As well as driving down carbon emissions, policy will need to support retraining and new entrants to the labour market to meet the sizeable skills gap in the sector.

We recommend the government speeds up employment benefits to be gained in this industry by increasing the availability of good, green jobs in the following ways:

Plan decarbonisation to maximise levelling up

The government’s current energy security strategy will improve the provision of high quality jobs. But greater ambition, in particular on onshore wind, will bring more new jobs to those areas it wants to level up.

There are three routes to improving the distribution of energy sources and, therefore, the distribution of jobs:

1. Focus on deploying renewables

Actions beyond legislation should focus on the deployment of renewables. They provide clean energy at the pace and scale required (unlike nuclear), to deliver skilled jobs and cheap power quickly. This should include a Clean Power Plan, setting out the government’s roadmap to decarbonise energy, as well as adjustments to the National Planning Policy Framework (footnote 54) to accelerate onshore wind deployment. Polling and focus groups, run by Public First for Green Alliance in 2021, point to clear levels of public support for new onshore wind infrastructure that lowers bills and is considerate to the local environment. Our poll showed that support for building more low carbon energy projects was high across the board (74 per cent support solar, 64 per cent support onshore wind). This support did not fall when we asked people to consider local projects, apart from nuclear where support dropped to 33 per cent.

2. Use the Energy Security Bill

The Energy Security Bill can play a part, for example by giving Ofgem a net zero statutory duty, to accelerate its focus on cleaner renewable energy. Reforms to the capacity market and

digitalisation will also provide supporting infrastructure to bring new energy sources online faster.

3. Target tax incentives for green investment

Under criticism for introducing a new investment allowance for oil and gas production, the Treasury has pointed to the super-deduction, a tax incentive for investment, as a way for businesses to finance spending on green energy. Narrowing the focus of the super-deduction to support low carbon technology only will ensure public money is better spent, offering value in the form of cheaper, more secure energy supply.

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Make the move for skilled workers easier

We know workers are interested in green work which they see as more viable in the long term.¹⁹ But switching jobs and retraining can still be a risky decision for them in the short term. Government policy needs to take the risk out of moving to employment in the low carbon power sector, given its strategic value, both to achieving net zero and energy security.

There is significant underspend in the government’s jobs plan, which set aside funds to tackle mass unemployment. But with a very tight labour market, that money can go instead towards boosting labour supply, especially in strategically important sectors.

The following incentives for both employees and employers would increase the level of action:

1. Increase financial security around job switching and retraining

Energy security is a national priority, as is the need to level up the regions. Targeting grants and low cost loans to those training and retraining in the low carbon power sector supports both. As will pushing through the government’s offshore training passport to streamline the movement of workers from fossil fuel power industries to offshore wind, creating a single digital home for offshore qualifications. That would be a start, but unless existing qualifications in, for example oil and gas offshore safety, are recognised for offshore wind requirements, it will still take time and money to recertify with equivalent qualifications.

2. Lower the investment cost of upskilling staff

Employers are worried that they will lose the value of their investment when trained staff leave. But those moving will still meet a national strategic need. Rebalancing the cost of training, by launching a ‘green skills super-deduction’ and restoring the Union Learning Fund, which helps unions work with employers to provide learning and training, would help to consolidate government approaches to decarbonisation and levelling up as a partnership with the private sector.

“
**What workers think
should be factored
into Local Skills
Improvement Plans.”**

Ensure that green work is good work

Green jobs in the power sector are vital to reach a net zero carbon economy, but they will only be attractive if individuals and communities see the value in them. Our focus group research, conducted by Public First in 2021, revealed time and again that security and working conditions are vital considerations. That means not necessarily emphasising the ‘greenness’ of a new role, but instead its long term security, ease of switching or overlap of skillsets.

The following actions would assist in communicating the value of green work:

1. Include workers’ voices in plans

What workers think should be factored into Local Skills Improvement Plans. Understanding the barriers they face and support they need, as well as existing skillsets in an industry, will lead to a more complete picture of skills supply and a plan to meet demand.

2. Support communities through the transition

While our ‘low carbon acceleration’ pathway better distributes work across the country, some areas will not benefit to the same extent as others. Where fossil fuel assets are winding down, or where workers need to relocate, communities should be supported. This may be through grants to purchase and repurpose local energy assets, for example to convert them into cultural or heritage sites, or by increasing services in places growing through new employment opportunities in low carbon power.

Maximising secure, skilled work

“Decarbonising the power sector is one of the most strategically significant industrial changes the UK will undergo in the coming decades.”

The government can lock in good work for future generations by quickly increasing renewables deployment. Every low carbon power source supports more work per megawatt of capacity than gas generation. If policy makers were to prioritise the energy sources which maximise permanent, skilled work, they could facilitate a smooth transition without demoting or deskilling employees in the oil and gas industry.

Decarbonising the power sector is one of the most strategically significant industrial changes the UK will undergo in the coming decades, but the labour force is not yet prepared for the change. The government should pay much more attention to the skills gaps that will result from policy decisions taken in the coming years.

Whichever pathway is taken, to ensure the new jobs available can be filled, the decarbonised power system will require upskilling, retraining and education programmes. These should be targeted locally, depending on the regional distribution and skill levels required for green power.

Our analysis has assumed that, for each renewable power source, the regional distribution of future infrastructure will remain proportionally the same as the current regional distribution of generation capacity. However, a concerted effort to distribute onshore wind farms around the UK, supporting a large number of secure, well paid, high skill jobs, would ensure that this industry helps to level up Britain.

Endnotes

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Powering the labour market: skilled work in a low carbon energy system

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