

Skills, Economy and Growth Scrutiny Commission

All Members of the Skills, Economy and Growth Scrutiny Commission are requested to attend the meeting of the Commission to be held as follows:

Monday 22 November 2021

7.00 pm

Council Chamber, Hackney Town Hall, Mare Street, London E8 1EA

The press and public are welcome to join this meeting remotely via this link:

If you wish to attend please give notice and note the guidance below.

Mark Carroll
Chief Executive, London Borough of Hackney

Contact:
Timothy Upton
☎ 020 8356 3312
✉ tracey.anderson@hackney.gov.uk

Members: Cllr Polly Billington (Chair), Cllr Clare Potter (Vice-Chair, in the Chair), Cllr Steve Race, Cllr Gilbert Smyth, Cllr Richard Lufkin, Cllr Nick Sharman, Cllr Sam Pallis, Cllr Patrick Spence, Cllr Vincent Stops, Cllr Mete Coban and Cllr Carole Williams

Agenda

ALL MEETINGS ARE OPEN TO THE PUBLIC

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|----------|----------------|-------------------|
| 1 | Agenda | (Pages 7 - 294) |
| 2 | Minutes | (Pages 295 - 308) |

Access and Information

Public Involvement and Recording

Public Attendance at the Town Hall for Meetings

Scrutiny meetings are held in public, rather than being public meetings. This means that whilst residents and press are welcome to attend, they can only ask questions at the discretion of the Chair. For further information relating to public access to information, please see Part 4 of the council's constitution, available at <https://hackney.gov.uk/council-business> or by contacting Governance Services (020 8356 3503)

Following the lifting of all Covid-19 restrictions by the Government and the Council updating its assessment of access to its buildings, the Town Hall is now open to the public and members of the public may attend meetings of the Council.

We recognise, however, that you may find it more convenient to observe the meeting via the live-stream facility, the link for which appears on the agenda front sheet.

We would ask that if you have either tested positive for Covid-19 or have any symptoms that you do not attend the meeting, but rather use the livestream facility. If this applies and you are attending the meeting to ask a question, make a deputation or present a petition then you may contact the Officer named at the beginning of the agenda and they will be able to make arrangements for the Chair of the meeting to ask the question, make the deputation or present the petition on your behalf.

The Council will continue to ensure that access to our meetings is in line with any Covid-19 restrictions that may be in force from time to time and also in line with public health advice. The latest general advice can be found here - <https://hackney.gov.uk/coronavirus-support>

Rights of Press and Public to Report on Meetings

Where a meeting of the Council and its committees are open to the public, the press and public are welcome to report on meetings of the Council and its committees, through any audio, visual or written methods and may use digital and social media providing they do not disturb the conduct of the meeting and providing that the person reporting or providing the commentary is present at the meeting.

Those wishing to film, photograph or audio record a meeting are asked to notify the Council's Monitoring Officer by noon on the day of the meeting, if possible, or any time prior to the start of the meeting or notify the Chair at the start of the meeting.

The Monitoring Officer, or the Chair of the meeting, may designate a set area from which all recording must take place at a meeting.

The Council will endeavour to provide reasonable space and seating to view, hear and record the meeting. If those intending to record a meeting require any other reasonable facilities, notice should be given to the Monitoring

Officer in advance of the meeting and will only be provided if practicable to do so.

The Chair shall have discretion to regulate the behaviour of all those present recording a meeting in the interests of the efficient conduct of the meeting. Anyone acting in a disruptive manner may be required by the Chair to cease recording or may be excluded from the meeting.

Disruptive behaviour may include moving from any designated recording area; causing excessive noise; intrusive lighting; interrupting the meeting; or filming members of the public who have asked not to be filmed.

All those visually recording a meeting are requested to only focus on recording Councillors, officers and the public who are directly involved in the conduct of the meeting. The Chair of the meeting will ask any members of the public present if they have objections to being visually recorded. Those visually recording a meeting are asked to respect the wishes of those who do not wish to be filmed or photographed. Failure by someone recording a meeting to respect the wishes of those who do not wish to be filmed and photographed may result in the Chair instructing them to cease recording or in their exclusion from the meeting.

If a meeting passes a motion to exclude the press and public then in order to consider confidential or exempt information, all recording must cease, and all recording equipment must be removed from the meeting. The press and public are not permitted to use any means which might enable them to see or hear the proceedings whilst they are excluded from a meeting and confidential or exempt information is under consideration.

Providing oral commentary during a meeting is not permitted.

Advice to Members on Declaring Interests

Advice to Members on Declaring Interests

Hackney Council's Code of Conduct applies to all Members of the Council, the Mayor and co-opted Members.

This note is intended to provide general guidance for Members on declaring interests. However, you may need to obtain specific advice on whether you have an interest in a particular matter. If you need advice, you can contact:

- Director of Legal, Democratic and Electoral Services
- the Legal Adviser to the Committee; or
- Governance Services.

If at all possible, you should try to identify any potential interest you may have before the meeting so that you and the person you ask for advice can fully consider all the circumstances before reaching a conclusion on what action you should take.

You will have a disclosable pecuniary interest in a matter if it:

- i. relates to an interest that you have already registered in Parts A and C of the Register of Pecuniary Interests of you or your spouse/civil partner, or anyone living with you as if they were your spouse/civil partner;
- ii. relates to an interest that should be registered in Parts A and C of the Register of Pecuniary Interests of your spouse/civil partner, or anyone living with you as if they were your spouse/civil partner, but you have not yet done so; or
- iii. affects your well-being or financial position or that of your spouse/civil partner, or anyone living with you as if they were your spouse/civil partner.

If you have a disclosable pecuniary interest in an item on the agenda you must:

- i. Declare the existence and nature of the interest (in relation to the relevant agenda item) as soon as it becomes apparent to you (subject to the rules regarding sensitive interests).
- ii. You must leave the meeting when the item in which you have an interest is being discussed. You cannot stay in the meeting whilst discussion of the item takes place, and you cannot vote on the matter. In addition, you must not seek to improperly influence the decision.
- iii. If you have, however, obtained dispensation from the Monitoring Officer or Standards Committee you may remain in the meeting and participate in the meeting. If dispensation has been granted it will stipulate the extent of your

involvement, such as whether you can only be present to make representations, provide evidence or whether you are able to fully participate and vote on the matter in which you have a pecuniary interest.

Do you have any other non-pecuniary interest on any matter on the agenda which is being considered at the meeting?

You will have 'other non-pecuniary interest' in a matter if:

- i. It relates to an external body that you have been appointed to as a Member or in another capacity; or
- ii. It relates to an organisation or individual which you have actively engaged in supporting.

If you have other non-pecuniary interest in an item on the agenda you must:

- i. Declare the existence and nature of the interest (in relation to the relevant agenda item) as soon as it becomes apparent to you.
- ii. You may remain in the meeting, participate in any discussion or vote provided that contractual, financial, consent, permission or licence matters are not under consideration relating to the item in which you have an interest.
- iii. If you have an interest in a contractual, financial, consent, permission, or licence matter under consideration, you must leave the meeting unless you have obtained a dispensation from the Monitoring Officer or Standards Committee. You cannot stay in the meeting whilst discussion of the item takes place, and you cannot vote on the matter. In addition, you must not seek to improperly influence the decision. Where members of the public are allowed to make representations, or to give evidence or answer questions about the matter you may, with the permission of the meeting, speak on a matter then leave the meeting. Once you have finished making your representation, you must leave the meeting whilst the matter is being discussed.
- iv. If you have been granted dispensation, in accordance with the Council's dispensation procedure you may remain in the meeting. If dispensation has been granted it will stipulate the extent of your involvement, such as whether you can only be present to make representations, provide evidence or whether you are able to fully participate and vote on the matter in which you have a non-pecuniary interest.

Further Information

Advice can be obtained from Dawn Carter-McDonald, Director of Legal, Democratic and Electoral Services via email dawn.carter-mcdonald@hackney.gov.uk

Getting to the Town Hall

For a map of how to find the Town Hall, please visit the council's website <http://www.hackney.gov.uk/contact-us.htm> or contact the Overview and Scrutiny Officer using the details provided on the front cover of this agenda.

Accessibility

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Induction loop facilities are available in the Assembly Halls and the Council Chamber. Access for people with mobility difficulties can be obtained through the ramp on the side to the main Town Hall entrance.

Further Information about the Commission

If you would like any more information about the Scrutiny Commission, including the membership details, meeting dates and previous reviews, please visit the website or use this QR Code (accessible via phone or tablet 'app')
[Skills, Economy and Growth Scrutiny Commission](#)



Overview & Scrutiny

Skills Economy and Growth Scrutiny Commission

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Monday, 22nd November 2021 at 7.00 pm

Hackney Town Hall, Mare St, E8 1EA

The press and public are welcome to join this meeting remotely via this link:

<https://youtu.be/PfZubKzLsSw>

If you wish to attend otherwise, you will need to give notice and to note the guidance below.

Contact: Timothy Upton, Overview & Scrutiny Officer

☎ 0783 537 8527/ 0203 356 1872

✉ Timothy.Upton@Hackney.gov.uk

Mark Carroll

Chief Executive, London Borough of Hackney

MEMBERS: Cllr Polly Billington
Cllr Clare Potter
Cllr Richard Lufkin
Cllr Sam Pallis
Cllr Steve Race
Cllr Nick Sharman
Cllr Gilbert Smyth
Cllr Patrick Spence
Cllr Vincent Stops

VACANT: 1 Opposition

Agenda

ALL MEETINGS ARE OPEN TO THE PUBLIC

- 1 Apologies for absence**
- 2 Urgent Items/ Order of Business**

- 3 Declarations of Interest**
- 4 Work Programme for the Commission for 2021/22**
- 5 Skills Enquiry**
- 6 Minutes of the Previous Meeting**
- 7 Any Other Business**

Access and Information

Public Involvement and Recording

Guidance on public attendance during Covid-19 pandemic

Scrutiny meetings are held in public, rather than being public meetings. This means that whilst residents and press are welcome to attend, they can only ask questions at the discretion of the Chair. For further information relating to public access to information, please see Part 4 of the council's constitution, available at <https://hackney.gov.uk/council-business> or by contacting Governance Services (020 8356 3503)

The Town Hall is not presently open to the general public, and there is limited capacity within the meeting rooms. However, the High Court has ruled that where meetings are required to be 'open to the public' or 'held in public' then members of the public are entitled to have access by way of physical attendance at the meeting. The Council will need to ensure that access by the public is in line with any Covid-19 restrictions that may be in force from time to time and also in line with public health advice.

Those members of the public who wish to observe a meeting are still encouraged to make use of the live-stream facility in the first instance. You can find the link on the agenda front sheet.

Members of the public who would ordinarily attend a meeting to ask a question, make a deputation or present a petition will be able to attend if they wish. They may also let the relevant committee support officer know that they would like the Chair of the meeting to ask the question, make the deputation or present the petition on their behalf (in line with current Constitutional arrangements).

In the case of the Planning Sub-Committee, those wishing to make representations at the meeting should attend in person where possible.

Regardless of why a member of the public wishes to attend a meeting, they will need to advise the relevant committee support officer of their intention in advance of the meeting date. You can find contact details for the committee support officer on the agenda front page. This is to support track and trace. The committee support officer will be able to confirm whether the proposed attendance can be accommodated with the room capacities that exist to ensure that the meeting is covid-secure.

As there will be a maximum capacity in each meeting room, priority will be given to those who are attending to participate in a meeting rather than observe.

Members of the public who are attending a meeting for a specific purpose, rather than general observation, are encouraged to leave the meeting at the end of the item for which they are present. This is particularly important in the case of the

Planning Sub-Committee, as it may have a number of items on the agenda involving public representation.

Before attending the meeting

The public, staff and councillors are asked to review the information below as this is important in minimising the risk for everyone.

If you are experiencing covid symptoms, you should follow government guidance. Under no circumstances should you attend a meeting if you are experiencing covid symptoms.

Anyone experiencing symptoms of Coronavirus is eligible to book a swab test to find out if they have the virus. You can register for a test after checking your symptoms [through the NHS website](#). If you do not have access to the internet, or have difficulty with the digital portals, you are able to call the 119 service to book a test.

If you're an essential worker and you are experiencing Coronavirus symptoms, you can apply for priority testing through GOV.UK by following the [guidance for essential workers](#). You can also get tested through this route if you have symptoms of coronavirus and live with an essential worker.

Availability of home testing in the case of people with symptoms is limited, so please use testing centres where you can.

Even if you are not experiencing covid symptoms, you are requested to take an asymptomatic test (lateral flow test) in the 24 hours before attending the meeting.

You can do so by visiting any lateral flow test centre; details of the rapid testing sites in Hackney can be found [here](#). Alternatively, you can obtain home testing kits from pharmacies or order them [here](#).

You must not attend a lateral flow test site if you have Coronavirus symptoms; rather you must book a test appointment at your nearest walk-through or drive-through centre.

Lateral flow tests take around 30 minutes to deliver a result, so please factor the time it will take to administer the test and then wait for the result when deciding when to take the test.

If your lateral flow test returns a positive result then you must follow Government guidance; self-isolate and make arrangements for a PCR test. Under no circumstances should you attend the meeting.

Attending the Town Hall for meetings

To make our buildings Covid-safe, it is very important that you observe the rules and guidance on social distancing, one-way systems, hand washing, and the wearing of masks (unless you are exempt from doing so). You must follow all the signage and measures that have been put in place. They are there to keep you and others safe.

To minimise risk, we ask that Councillors arrive fifteen minutes before the meeting starts and leave the meeting room immediately after the meeting has concluded. The public will be invited into the room five minutes before the meeting starts.

Members of the public will be permitted to enter the building via the front entrance of the Town Hall no earlier than ten minutes before the meeting is scheduled to start. They will be required to sign in and have their temperature checked as they enter the building. Security will direct them to the Chamber or Committee Room as appropriate.

Seats will be allocated, and people must remain in the seat that has been allocated to them. Refreshments will not be provided, so it is recommended that you bring a bottle of water with you.

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Skills Economy & Growth

22nd November 2021

**Item 4 - Skills Economy & Growth
Work Programme 2021/22**

Item No

4

OUTLINE

Attached is the work programme for the Skills Economy & Growth commission for 2021-22. Please note that this is a working document and regularly updated.

ACTION

The commission members are asked for any comments, amendments or suggestions for the work programme.

Skills Economy and Growth SC - Rolling Work Programme for 2021-22 as of 8th October 2021

Dates	Proposed Item	Description, Comment and Purpose of item	Contributors
18th October 2021 <i>Agenda Dispatch: 8th October Papers</i> <i>Deadline: 1st October</i>	Community Involvement in Planning & Area Regeneration	<p>The commission would like to learn more about and discuss tools and leavers that the council has to influence community engagement with economic & area regeneration.</p> <p>1. Slide Deck on 'Community involvement in planning and area regeneration'. Suzanne Johnson & Natalie Broughton/ Kate Glasgow</p> <p>2. Presentation from Alex of Hackney Wick. Methods the HWDCT use to engage residents, what the measures of success are, and any insight into what the future holds for this process (i.e., what has been learned through all the various engagements with residents.).</p>	<p>Suzanne Johnson, Head of Area Regeneration, London Borough of Hackney.</p> <p>Natalie Broughton, Head of Planning, London Borough of Hackney.</p> <p>Katie Glasgow, Deputy Manager, Planning & Regulatory Services, London Borough of Hackney.</p> <p>Alex Russell, Executive Chair, Hackney Wick Development Trust.</p>
22nd November 2021 <i>Agenda Dispatch: 12th November Papers</i> <i>Deadline: 5th November</i>	Skills Enquiry	<p>The commission wants to discover what the council knows about the need to shift to new skills that are related to net zero, the demand for net zero skills, the creation of net zero jobs, and what the responsibility of the council is on that. The commission is particularly interested in the construction, transport & energy sectors.</p> <p>Opportunities and risks for our working population as we shift to net zero, what is the role of the council and other players (FE colleges, private sector) in being able to support people to be able to shift. E.g., What happens to mechanics working on combustion engines in the railway arches when the sector is moving toward EV's.</p>	<p>Cllr Carole Williams, Cabinet Member for Employment, Skills and Human Resources</p> <p>Andrew Munk, Head of Employment, Skills & Adult Learning, London Borough of Hackney</p> <p>Department of Work and</p>

		(Andrew Munk) Emerging green jobs, the skills demand, how residents will fit in, and what the shortfall of skilled labour to emerging green roles is like.	Pensions New City College
	Energy Strategy	The commission is to hear from the Head of Procurement & Head of Energy and Carbon Management to present on the scope of Hackney's work on energy when it comes to its potential for supporting economic growth, impact on the local economy, the development of a local supply chain and local businesses. Hackney's net-zero energy strategy and decarbonisation commitments to existing building stock and any new regeneration, in terms of building material, as well as solar energy. Update on work being undertaken on energy when it comes to its potential for supporting economic growth, impact on the local economy, the development of a local supply chain and local businesses.	Rotimi Ajilore, Head of Procurement, London Borough of Hackney Mary Aladegbola, Head of Energy and Carbon Management, London Borough of Hackney
15th December 2021 <i>Agenda Dispatch: 8th December Papers</i> <i>Deadline: 1st December</i>	Transport for a Cleaner, Greener Hackney	As the borough moves towards a cleaner & greener economy & net-zero, clean transport will be of great importance. In addition to hearing from the cabinet lead, we will collect evidence from young people in Hackney on their views on: transport plan, public-transport post-pandemic, cycling & walking schemes, school streets, LTNs, and the '15 minute city'. Our aim is to identify which strands of the clean-transport work sound most attractive, and which least, and to illustrate young people's present travel habits. This will help the commission identify strands which are quick starters, and others which may experience a slower uptake by residents, and in so doing, help to form recommendations to feed into emerging policy work.	Cllr Mete Coban, Cabinet Member for Energy, Waste, Transport and Public Realm Andy Cunningham, Head of Streetscene, London Borough of Hackney Aled Richards, Strategic Director Sustainability and Public Realm, London Borough of Hackney
24th January 2022 <i>Agenda Dispatch: 14th January Papers</i> <i>Deadline: 7th January</i>	Cabinet Question Time		Cllr Nicholson, Deputy Mayor for Housing Supply, Planning, Culture and Inclusive Economy
	Night-time Economy		

7th February 2022 Agenda Dispatch: 28th January Papers Deadline: 21st January	Decarbonising Hackney's Economy		
	Supporting SMEs to Decarbonise		
9th March 2022 Agenda Dispatch: 2nd March Papers Deadline: 23rd February	Economic Stocktake (incl. Highstreets)		Cllr Nicholson, Deputy Mayor for Housing Supply, Planning, Culture and Inclusive Economy
	Health of Microbusinesses		Suzanne Johnson, Head of Area Regeneration, London Borough of Hackney.
	Voluntary Sector		Cllr Carole Williams, Cabinet Member for Employment, Skills and Human Resources

Skills Economy & Growth 22 nd November 2021 Item 5 – Skills Enquiry	Item No 5
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OUTLINE

The commission is conducting a skills enquiry to ascertain what the council and its partners know about the need to shift to new skills that are related to net zero, the demand for net zero skills, the creation of net zero jobs, and what the responsibility of the council is on that front. The session will explore the construction, transport & energy sectors when discussing future skills requirements and opportunities for residents.

Invited Speakers

- Andrew Munk, Head of Employment, Skills & Adult Learning, London Borough of Hackney
- Simone van Elk, Strategic Delivery Manager, London Borough of Hackney
- Alison Arnaud, Principal: Hackney and Tower Hamlets Colleges, New City College Group
- Steve Hanshaw, Senior Partnership Manager, Department for Work and Pensions

Skills, Economy & Growth (SEG) Scrutiny Commission Green Economy

November 2021

Mission-based definition: sectors for a London based green jobs definition ([WPI research](#))

Net zero focus

- 1. Homes and buildings:** Including retrofit, building new energy-efficient homes, heat pumps, smart devices and controls, heat networks and hydrogen boilers.
- 2. Low carbon transport:** Including low or zero emission vehicles, aviation and maritime, rail, public transport and walking or cycling.
- 3. Power:** Including renewables (such as wind, solar and hydropower), nuclear power, grid infrastructure, energy storage and smart systems technology.
- 4. Industrial decarbonisation, hydrogen and carbon capture and storage:** Including hydrogen production and industrial use, carbon capture, utilisation & storage (CCUS) and industrial decarbonisation.
- 5. Green Finance:** The concentration of financial activity in Central London means that in our context Green Finance could be a key area to identify separately.
- 6. Climate change research & development:** Including private sector, academic and public research.
- 7. Climate change strategy, policy, monitoring and planning:** Including public, private and NGO sector strategy and policy, outreach to citizens, environmental monitoring and use of planning system to achieve net zero.
- 8. Climate adaptation:** Including flood defences, retrofitting of buildings to be resilient to extreme climate events, nature-based solutions to reduce climate impacts and civil and mechanical engineering for infrastructure adaptation.

Broader environmental goals (may have some impact on climate change goals)

- 1. Reducing localised pollution:** Including air pollution, water pollution and noise; London has ambitious goals across all three of these areas.
- 2. Reduce, reuse, recycle:** Including waste management and circular economy.
- 3. Green infrastructure:** Within a London context this will focus on urban green infrastructure, and include activity aimed at increasing biodiversity directly or through offsetting.

Key findings WPI's research

Green jobs now

- The term “green job” is directly related to policies aiming to deliver environmental goals, so we define **green jobs as those jobs that facilitate meeting net zero and broader environmental goals**
- We estimate there were some **234,300 green jobs** in the capital in 2020, **4.4% of total employment**. The largest sectors were Power (83,000 jobs), Homes and Buildings (58,200) and Green Finance (50,700)
- Green jobs in London are predominantly high-level managerial, professional and associate professional/technical roles. There is also an overrepresentation in skilled craft jobs (**19%, compared with 6% of all jobs in London**)
- The green workforce is male dominated (66% as compared to 54% of all workers in London are men) and there is a lower proportion of workers from Black, Asian and Minority Ethnic backgrounds in comparison with all sectors in London (30% as compared with 36% of all workers).
- The green workforce is highly qualified, and two thirds have first degrees or equivalent or higher qualifications. Among those with vocational qualifications the most common subject areas are building and civil engineering, and electricity and energy

Skills supply considerations

- Green sectors tend to draw staff from other sectors, rather than straight from education: around **1% of the workforce enter straight from full-time education each year, compared with 3% across all sectors**
- There is a substantial pool of relevant skills in other sectors, but this is **lowest for homes and buildings and the associated skilled-craft occupations**

Key findings WPI's research

Green jobs in the future

- Our central projection finds a potential for green jobs to increase to **505,000 by 2030 and over 1 million in 2050** in London if a net zero pathway is followed. Green jobs would increase by **8% per year** this decade, which is double the rate of the fast-growing Information and Communication sector in the decade preceding the pandemic
- There is substantial uncertainty in projecting green jobs; projections made in the report present a range of **0.6 to 1.8 million green jobs**.
- These are not net jobs as existing jobs may be lost and replaced with green jobs. However, we find that **net jobs in London could increase by around 50,000 in 2030** due to positive macroeconomic impacts.
- The central projection implies **an increase of around 140% in skilled craft workers by 2030** (including electricians, gardeners and landscape gardeners, and plumbers and heating & ventilation engineers). Nationally, there are currently skills shortages for many of these occupations – electricians, plumbers, and production managers in construction, In particular. We also project **an increase of around 120% in managerial and professional employment**; however, there is currently a greater pool of people with relevant skills in non-green jobs.
- To ensure a sufficient supply for these new jobs, there is an urgent need to increase education provision in relevant subjects and courses, increase the proportion of those taking relevant courses who progress to green employment, and increase the flows from other, non-green, sectors into green sectors, including through re-skilling training. This is most urgent in skilled craft occupations.

Jobs in carbon intensive sectors

- The research finds that London has **390,000 jobs (7% of London employment) in carbon intensive sectors** that will need to change substantially due to the transition. Construction, land transport and aviation account for the majority of these jobs.
- **38% of people in these sectors identify as non-White** versus 11% nationally. However, this is in line with London employment more broadly, where 36% of employees identify as non-White. We also find that these sectors are likely to be male-dominated with **female workers accounting for only 18% of the employees in these sectors nationally**.

Data gaps

- Existing green businesses in Hackney
- Impact of transition to net zero for businesses in Hackney
- Need to distinguish between opportunities in green economy across London, and those in and near Hackney

GLA and London Councils priorities

GLA Green New Deal recovery mission

Tackle the climate and ecological emergencies and improve air quality by doubling the size of London's green economy by 2030 to accelerate job creation for all.

- Address inequalities by creating good quality jobs and targeting those most in need to tackle the inequality in society highlighted by the pandemic
- Green skills and training available to all Londoners, particularly the most vulnerable. This includes launching a London 'green skills academy'

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London Councils

- Seven programmes on climate change
- One on green economy

Hackney's developing approach to green economy

Commitment to net zero + Commitment to inclusive economy

Page 24 Opportunities for residents and businesses

Support the Council's delivery of net zero

Importance of just transition

Green economy work plan

- Research
- Business support: existing and new
- Green skills
- Career pathways
- Procurement, social value and supply chains

A lot relies on partner work and influence, not direct delivery

Implementation incorporated into existing work

Risks and potential limitations

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- Skills gaps in labour force could delay/disturb growth in green economy
- At the same, skills providers may be reluctant to invest in 'green' skills degrees and courses without some more certainty about demand in labour market
- Growth in green economy could exacerbate existing inequalities given industries where growth will be concentrated
- Government support for transition of SMEs may be limited/lacking
- Physical space and other market conditions will restrict types of green businesses that can operate in borough

Adult Education & Skills

- Since September 2020, the Council's Adult Learning Service has been fully integrated with the Council's wider employment & skills service - enabling delivery of a more joined up and holistic offer for our most disadvantaged residents
- The Council has 3 key areas of strategic focus for Adult Learning delivery in Hackney, aligned to our Inclusive Economy aspirations - which now frame all decision making around course delivery by the Council as well as providing a focus for partnership working and future funding decisions:
 - i) Training with a direct link to employment opportunities;
 - ii) Building general and transferable skills;
 - iii) Supporting our residents well being and positive mental health
- The service has now adopted an outcomes-based approach aligned to the GLA's strategic aims (funder for Adult Learning) and Ofsted requirement
- The set of outcomes adopted include not only progression into employment and higher level training;
but also increased levels of confidence and improved mental wellbeing

Adult education and skills

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- The Council's Adult Education provision (budget of £2.2 million) is a cog in a far wider local adult education eco-system. Eg: New City College has a significantly larger budget for its Adult Education provision in Hackney
- Alongside direct and commissioned delivery, the Council has played a key leadership role, establishing and bringing together providers based around 3 working groups:
 - Vocational skills
 - Functional skills (Maths; English)
 - ESOL and community learning
- Work is underway with key local education partners to develop a shared borough-wide:
 - evidence base;
 - approach to curriculum planning;
 - set of outcomes measures
- With the aim of a delivering a borough wide adult education offer which responds to local needs, challenges and shared priorities - including around green skills

Procurement and Planning

Employment and Skills Plans (ESPs) are part of S106 obligations, estate regeneration programmes and new procurements

Targets set by developers and contractors include commitment to promote roles in the green economy and sustainable recovery

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Ensure the impacts of procurement activities benefit the local economy and contribute to green recovery

- Engagement with local suppliers and businesses to aid green recovery
- Identifying roles in the green economy e.g. using renewable energy or sustainable technologies
- Pay the London Living Wage (LLW) to employees and apprentices

Area Regeneration and Economic Development

- Area based approach to regeneration encompassing physical, social and economic regeneration and interventions on an area basis in consultation with local residents, businesses, community groups and other stakeholders.
Working in partnership to maximise opportunities for the boroughs residents, businesses and places by ensuring regeneration and economic development is inclusive and delivers social value.
- Developing and delivering regeneration plans for areas in partnership with local communities and stakeholders such as the Dalston Plan and Hackney Central Town Centre Strategy) and delivering on the priorities set out in these plans
- Working with relevant teams across the Council to ensure that Council land and property assets generate wider social value for the borough via capital receipts from disposals and via building social value requirements into property leases.

Area Regeneration and Economic Development

- Unlocking sites for redevelopment (both Council-owned and privately owned) and ensuring the development of sites offers benefits for the borough (e.g more homes, affordable housing, workspace, new jobs). Where feasible will ensure the redevelopment of sites supports the growth of green jobs and skills.
- Business communications and engagement: Working collaboratively with local businesses to encourage them to deliver social value outputs via their business operations in the borough, connecting businesses with the Employment and Skills team/Hackney Works and other relevant internal to maximise social value opportunities
- New Economic Development function: Ensuring the borough's economic evidence base is up to date and devising an economic development strategy, working strategically with businesses to deliver social value for the borough, encouraging inward investment, protecting and delivering new workspace.

Net Zero Energy Strategy initiatives

- decarbonisation through energy efficiency, retrofitting and replacement of fossil fuel technologies in our buildings
- deployment of low carbon technology and infrastructure for our existing buildings, future developments and our fleet replacement;
- decarbonisation of fleet through EV technology
- reducing embodied carbon of our developments;
- encourage and support borough wide engagement in the net zero agenda, and promote benefits of engaging and investing in energy efficiency and low carbon energy production and utilisation.

Net Zero Energy Strategy & green jobs

Implementation of the Net Zero Energy Strategy will provide opportunities in the green economy

Across these initiatives, jobs will be created and skills required within the Green Economy to reach zero carbon targets.

Development of courses is needed across the value chain to respond to emerging technologies

Net zero energy strategy & green economy work programme

Collaborating to support green jobs;

- a) Planning now for the skills demand of young people who are yet to enter the labour market;
- b) Supporting existing workers at risk of job losses to move into new employment in a zero-carbon economy in the future.
- c) Supporting workers already in the labour market with skills valuable in a zero carbon economy but who will need to upskill

3. COVID-19 and the local labour market

3a London's economy before COVID-19

In 2019 Central London Forward¹ analysed London's labour market as part of their Skills strategy². At that point, London's economy was experiencing significant growth. More than £1 out of every £10 generated in the UK was attributable to Central London's economic success. Central London's job growth was predicted to continue to outpace the rest of London as a whole. The highest employment growth across London was expected to be concentrated in the East End of Inner London, in particular the boroughs of Tower Hamlets, Hackney and Newham. Self-reported dissatisfaction with part-time and temporary work was higher in London than the national average, and has grown alongside the increase in atypical forms of work.

There were, and are, however structural challenges to the shape of London's labour market. Many jobs in mid-tier categories such as manufacturing and wholesale have either disappeared from the labour market or were growing at a much slower rate, leaving people with mid-level skills or qualifications at a growing disadvantage. This can also be described as the 'hourglass' model of London's economy. Secondly, many of the new jobs created in recent years come with significant risks of low pay and lack of progression within the industry. These roles (e.g. hospitality and retail) are also reliant spending by people in high skilled jobs. This creates a precarious labour market if there is a macroeconomic downturn.

3b The impacts of COVID-19 on the labour market

The pandemic has had a significant impact on the economy.

ONS data from July shows that UK GDP was 11.7% below where it was in February. Current projections that the UK is not 'bouncing back' quickly from the economic downturn earlier in the year, and international forecasts lean towards a global recession. GLA economics³ estimates that most London sectors will experience historic downturns in 2020 - most notably for Accommodation & foods; Arts, entertainment & recreation; Education⁴; and Construction.

The overall employment rate for London continues to be high at 76.5% and the full impact of COVID-19 on unemployment isn't visible in these numbers yet⁵. In January there were 12,395 people on universal credit in Hackney and 13,125 in February. In September this had risen to 31,522⁶. This figure for employment includes people on the furlough scheme, many of whom are likely to become unemployed as the scheme ends. The Institute for

¹ Sub-regional partnership of the 12 boroughs in inner London focused on driving inclusive growth.

² [Skills Strategy](#), Central London Forward, 2019

³ London Recovery Board, [Overview of COVID-19 impacts to date](#), 15 Sept 2020

⁴ There are particular difficulties in measuring output in the education sector under lockdown which means GDP figures are hard to compare to previous years and subject to larger than normal revisions.

⁵ London Recovery Board, [Overview of COVID-19 impacts to date](#), 15 Sept 2020

⁶ [DWP Stat-Xplore](#), data retrieved 21 Oct 2020

Employment Studies found that nationally employers were planning to make double the number of redundancies than were made at the height of the financial crisis (380k from May to July 2020 versus 180k from January to March 2009)⁷.

Across London as per 31 August, 557,400 employments were furloughed (13% of eligible jobs), in Hackney this was 18,900 people (14%)⁸. Nationally, the highest percentage of jobs furloughed (full-time or part-time) are in the Arts, entertainment and recreation sector (33%); accommodation and food services (27%); and other service activities (23%). This last one includes personal services such as beauty treatments. The highest number of jobs furloughed are found in again accommodation and food services (592,800); but then in wholesale and retail (535,100); and administrative and support services (323,900)⁹. Notably, accommodation and food services, and retail are the lowest paying sectors in the UK economy.

The Resolution Foundation has analysed the impacts of the pandemic on workers¹⁰. They've found that in September, 17% of those who were in work before the crisis were either no longer working, were furloughed, or had lost hours and pay due to the coronavirus crisis. Workers in hospitality, leisure and other sectors affected by lockdown are much more likely in September to have stopped working, to have been furloughed, or to have lost hours and pay.

Meanwhile there are significantly less job opportunities. Nationally, vacancies are running at 25% lower than in the same week a year ago, and at 20% lower than in the week before the lockdown began. There has been a modest recovery in the number of vacancies in recent months. The IT, healthcare and teaching sectors had the highest number of vacancies amongst all profession types from March until July. Job opportunities have increased in almost all categories since July - apart from teaching; customer services; and legal related professions. However there has been a significant decline in advertised teaching jobs in August compared to previous months. This recovery in vacancies in the last few months also means that for three job types there are now more vacancies than in March – namely for logistics and warehouse; manufacturing; and domestic help and cleaning¹¹.

3c Impacts across and beyond specific industries:

The pandemic and particularly the period of lockdown in spring 2020, has shown the importance of 'key workers' in providing essential goods and services. There has been a growing recognition of the importance of other roles such as care workers, supermarket check-out staff, delivery drivers and binmen. Many of these roles are traditionally low paid and often described as low skilled. Views may be changing about how those jobs are and should be valued, although that hasn't yet translated into better contracts and working conditions; although the Council and wider public sector anchor institutions have an

⁷ Institute for employment studies, [On Notice: Estimating the impact on redundancies of the Covid-19 crisis](#), Sept 2020

⁸ [Coronavirus Job Retention Scheme statistics: October 2020 - GOV.UK](#)

⁹ Ibid

¹⁰ [Jobs, jobs, jobs • Resolution Foundation](#), 28 October 2020

¹¹ Institute for employment studies, [Monthly vacancy analysis: Vacancy trends to week-ending 13 September 2020](#)

opportunity to provide leadership in a number of these areas, in line with the inclusive economy strategy.

According to Resolution Foundation research¹², certain groups that have been more affected by the crisis include those who were working an 'insecure' job in February; younger and older workers; those working in the lowest-paid jobs; and those working for smaller employers. While this crisis has had a big impact in all parts of the country, the employment effects of the crisis so far have borne down particularly hard on London. Over 21% of workers in the most deprived quartile of the country were either not working, furloughed, or had lost hours (and pay) in early September because of coronavirus: of this group, more than 28% live in London. These are people with the least financial resilience to changes in their income.

There is clear evidence that high unemployment has a significant and long-term impact on the career prospects of school leavers and graduates. "There is significant evidence that being unemployed when young leads to a higher likelihood of long-term 'scarring' in later life in terms of subsequent lower pay, higher unemployment and reduced life chances according to much research. There is also evidence of greater mental health problems in their 40s or 50s. So the impacts of current high levels of youth unemployment will be felt by society for decades"¹³. This statement was made in February 2017, but applies just as much to the current prospects for unemployed young people.

The OBR has forecast that the unemployment rate will by 6.1 percentage points between quarter 2 of 2019 and quarter 2 of 2020. The Resolution Foundation estimates that in that scenario there is 13% less chance that a recent graduate will be in employment three years after leaving education. For those with mid-level (some higher education or an A level equivalent education) and lower-level (GCSE-equivalent or below) qualifications, these figures are 27 and 37% respectively. In other words, the current crisis may reduce the employment chances of lower-skilled young adults leaving education by more than a third. In addition, the most affected sectors are ones where a large proportion of non-graduates end up working after leaving education, such as non-food retail¹⁴. This will make it even harder for young people to find employment.

The pandemic, with its restrictions on social life, the economic impacts and for some experience of trauma, has had a significant negative impact on overall wellbeing and mental health. This becomes particularly relevant in a strategy on adult skills development because of the links between employment, training and mental health. "The relationship between employment and health is close, enduring and multi-dimensional. Being without work is rarely good for one's health, but while 'good work' is linked to positive health outcomes, jobs that are insecure, low-paid and that fail to protect employees from stress and danger make

¹² [Jobs, jobs, jobs • Resolution Foundation](#), 28 October 2020

¹³ Prof Ronald McQuaid, LSE British Policy and Politics blog, [Youth unemployment produces multiple scarring effects | EUROPP](#), Feb 2017.

¹⁴ Resolution Foundation, [Class of 2020](#), May 2020

people ill”¹⁵. Improved skills open opportunities to ‘good work’, but training can also have positive impacts on people’s mental health in and of itself¹⁶.

Finally, the pandemic has significantly increased the need for digital skills as well as access to digital devices and the internet. Digital skills make people able to replace face-to-face social interactions (to an extent at least). These skills are also critical in being able to work from home in jobs where that is a possibility.

3d Economic outlook

The pandemic has had a significant impact on the economy.

ONS data from July shows that UK GDP was 11.7% below where it was in February. Current projections that the UK is not ‘bouncing back’ quickly from the economic downturn earlier in the year, and international forecasts lean towards a global recession.

Projections by GLA economics, based on the Bank of England’s August scenario point to a long recession, with output and employment not returning to pre-crisis levels before 2023. Government support schemes (especially CJRS or furlough scheme) are pushing most of the employment impacts into 2021. GLA economics estimates that most London sectors will experience historic downturns in 2020 - most notably for Accommodation & foods; Arts, entertainment & recreation; Education¹⁷; and Construction. There is significantly reduced travel into central London and intention to visit is low. This is also described as the ‘donut effect’¹⁸. For Hackney this means businesses in Shoreditch, specifically those relying on footfall, are in a comparatively worse position than businesses in Dalston and Hackney Central.

The most recent ONS Business impact of coronavirus survey¹⁹ indicates that across all UK industries, 71% of businesses said they were at no or low risk of insolvency. In the accommodation and food services industry however, 17% of businesses were at a severe risk of insolvency. 75% of businesses in arts, entertainment and recreation are experiencing a decrease in turnover, compared to 31% in IT. Across all industries the figure is 48%. In the week ending 18 October 2020, overall footfall decreased to below 70% of its level in the same period of the previous year, with footfall dropping across high streets, shopping centres, retail parks. This happened across all 10 featured countries and regions.

Potential for economic growth and job opportunities

Some sectors of the economy have clearly been more severely impacted than others. This also leaves a situation where new economic opportunities are likely to be concentrated in those sectors where business insolvencies are least likely. As mentioned above, vacancies have been highest in the IT; health and care; and education sectors.

¹⁵ [Fair Society, Healthy Lives: The Marmot Review](#), Feb 2010

¹⁶ Government Office for Science, [What are the wider benefits of learning across the life course?](#), 2017

¹⁷ There are particular difficulties in measuring output in the education sector under lockdown which means GDP figures are hard to compare to previous years and subject to larger than normal revisions.

¹⁸ London Recovery Board, [Overview of COVID-19 impacts to date](#), 15 Sept 2020

¹⁹ ONS, [Coronavirus and the latest indicators for the UK economy and society](#), 22 Oct 2020

Health and care

As well as introducing new changes and opportunities the pandemic has also accelerated some trends. For example, the nature of the crisis has created more demand for skills in health and care. In fact, in the immediate aftermath of the crisis social care and healthcare and nursing were two of only three sectors (the third being domestic cleaning) with positive growth for job vacancies in both central London and at a UK level. This trend in job growth and skill demand in these sectors is expected to rise on account of the aging population long after the pandemic and the expected impact of new immigration policies. Currently, 24% of workers in health and social care were born abroad. In London, 45% of key workers, and 53% of workers in health and social care, were born abroad²⁰. The government's proposed new immigration rules mean many essential social care roles will not qualify for a Health and Social Care visa or Skilled Worker visa²¹. This will lead to increased vacancies in social care.

IT and digital

The IT sector has the least percentage of businesses at risk of insolvency. It's also the sector where the least amount of businesses have experienced a decrease in turnover and has one of the highest numbers of vacancies. The move to a more online way of working across large parts of the economy will increase the need for skills in IT and digital technologies. It seems reasonable to expect the IT sector to be one of the most reliable industries for jobs and growth in the coming year at least.

Public sector and education

Demand for jobs in the public sector is holding up. As with most recessions, public sector spend and demand for jobs becomes more important as a proportion of the economy. Although the education sector has shrunk significantly early in the year, this may be explained to a large degree by difficulties in measuring educational output in the normal way with schools having to revert to online teaching. It is also worth repeating that education was one of the sectors with the highest number of vacancies between March and July, although this dropped significantly in August. There have been particular concerns about the economic prospects for nurseries and early years provision, as forced closure earlier in the year significantly impacted income for these businesses²². The need for employees with child care qualifications may therefore be slow to recover.

A greener economy

Another trend in the economy accelerated by the pandemic has been the move to a greener economy. This is a broad term but generally means jobs and economic processes where natural assets are managed sustainably. This applies to both new jobs, such as developing new and greener products, and jobs that improve existing work to make it 'greener'. Similar to digital skills the skills for a greener economy are not limited to low carbon and environmental skills but cut across many sectors of the economy including SMEs and manufacturing as well as energy, waste and transport. Some skills demand will be met by a new response but others can be met by existing routes with a refocus on environmental

²⁰ ONS, [Coronavirus and non-UK key workers](#), 8 October 2020

²¹ Welsh Centre for LPublic Policy, [UK migration policy and the Welsh NHS and social care workforce](#), 28 Sept 2020

²² [Survey of Childcare and Early Years Providers and COVID-19](#), Department for Education, survey conducted between 2-20 July

technologies. For example, plumbing and electrical skills will remain in demand with retrofitting of more efficient technologies. Other business systems such as resource efficiency will create demand for skills such as business management and project management. Additional demand for skills in general infrastructure and construction can also be expected connected to some additional central government funding (e.g. home insulation).

Other sectors of the economy

In addition to the sectors of the economy discussed above the pandemic has created additional skills demand in logistics (e.g. driving, warehouse operatives). In addition the financial and insurance sectors in London are associated sectors that will continue to create well paid and attractive employment opportunities.



'GREY TO GREEN':

THE ROLE OF NCC HACKNEY IN LONDON'S NET ZERO JOURNEY

WHY SHOULD THE COLLEGE CARE?

- 16-34 year old demographic are the most worried about climate change
- 28/32 London boroughs have declared a climate emergency
- The majority of our young people's working lives will be impacted by FNZ strategy- or failure to meet it.

PASSION: NOT POSTCODE

Our learners on every campus tell us every day
that they are worried for the planet.

They were way ahead of us in prioritising this:

Student environmental Officers

Friends of the Earth

Campaigning for climate change.

We need to channel this into healthy, productive
and legal action.

Their passion is our power.



NEW GREEN STRATEGY

Climate Action Roadmap for FE Colleges

Climate Commission for UK Higher and Further Education | Nous Group

LAST UPDATED 25 JUNE 2020



TEACHING ABOUT ENVIRONMENTAL SUSTAINABILITY

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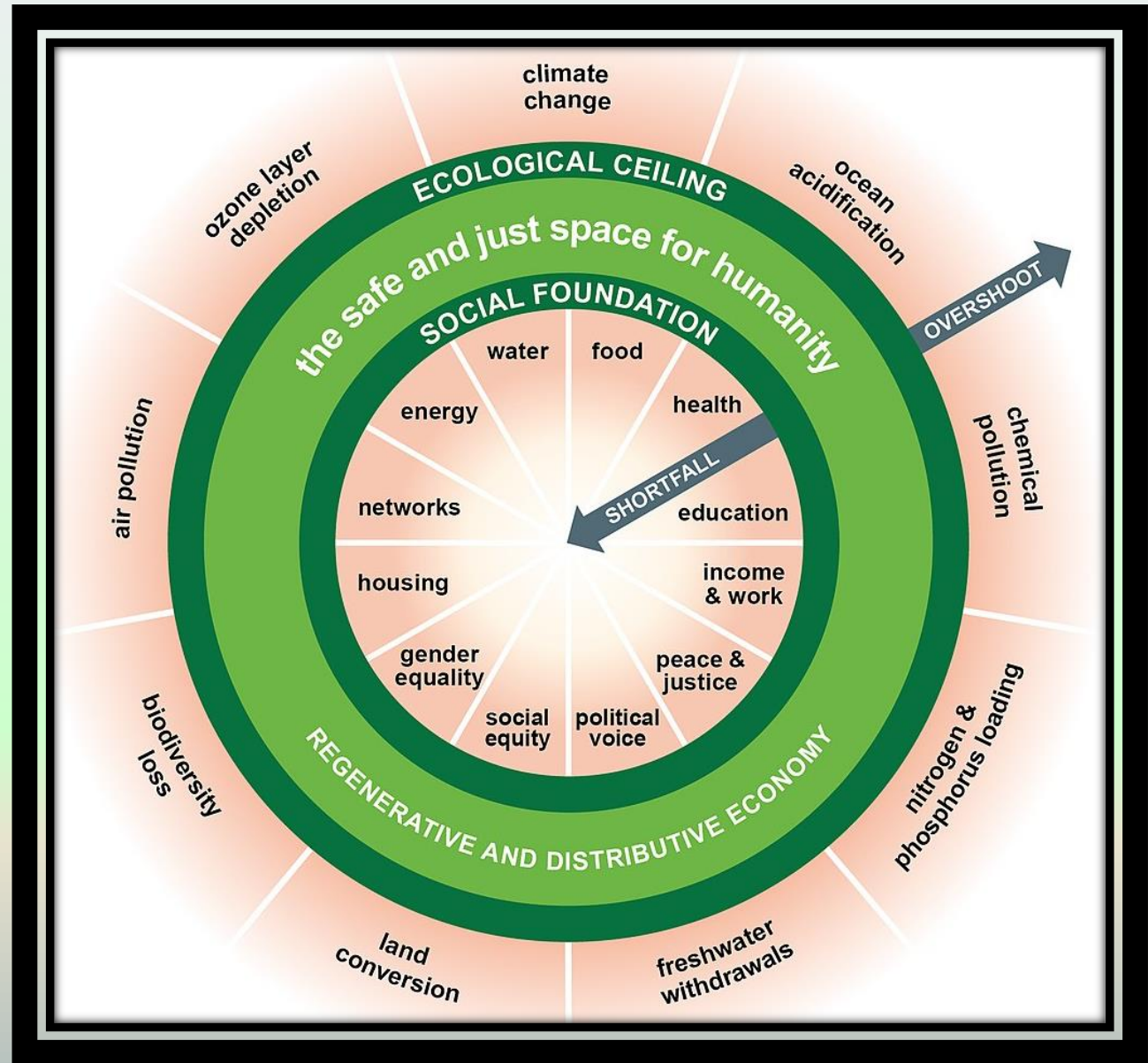
**Carbon Literacy
Project**



**MEAT FREE
MONDAYS**



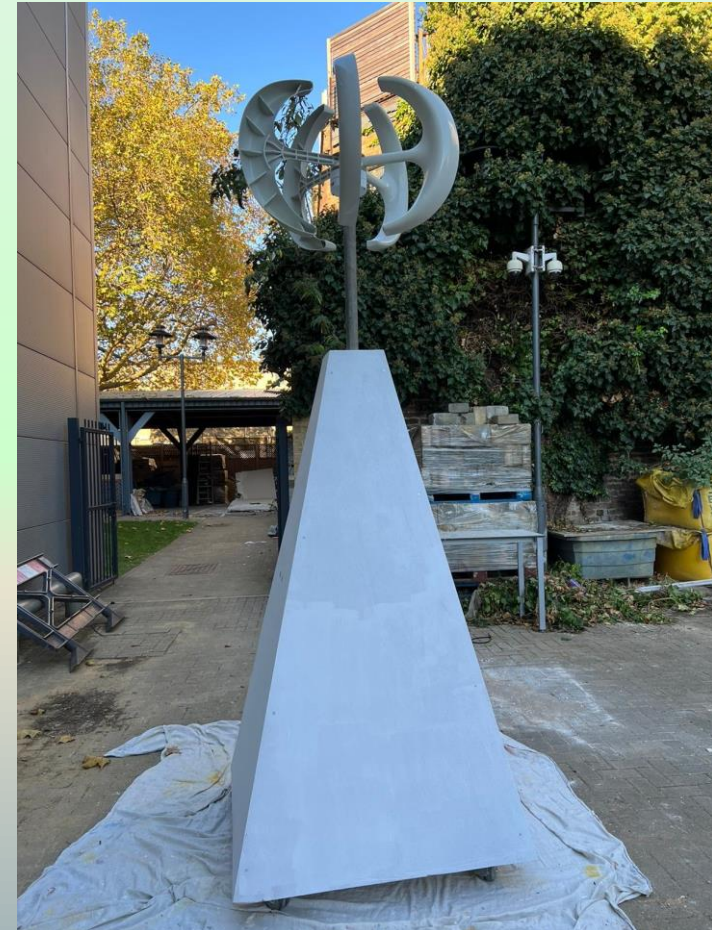
Doughnut Economics





CARBON NEUTRAL ESTATES POLICY

- Planning application at Poplar
- Wellness centre at Epping
- Sustainable industries centre Rainham
- Possible alternative energies plant – Hackney?
- Travel incentives
- Retro fitting
- Heat pumps: LBTH



CAREERS; NOT JOBS

Skills supply considerations

Green sectors tend to draw staff from other sectors, rather than straight from education

- Around 1% of the workforce enter straight from full-time education each year, compared with 3% across all sectors
- Entrants from other sectors to green sectors make up 6% of the current workforce each year
- Manufacturing sectors are a key source of labour and skills

Provision in the FE sector

- Just over 20,000 learners in relevant courses in FE; stable over recent years, but large increases in numbers in building and construction courses
- Similarly, around 20,000 apprenticeship starts in relevant sector subject areas - mostly in business apprenticeships rather than craft apprenticeships
- Around 7,000 apprenticeship achievements
- Learners in FE/apprenticeships are just under 20% of the size of the workforce

There is a substantial pool of relevant skills in other sectors

- The number of workers in key occupations related to green sectors but working in non-green sectors is around twice as large as the current green workforce
- This additional 'pool' is largest for consultancy/finance, and smallest for homes, buildings and landscape

Provision in the HE sector

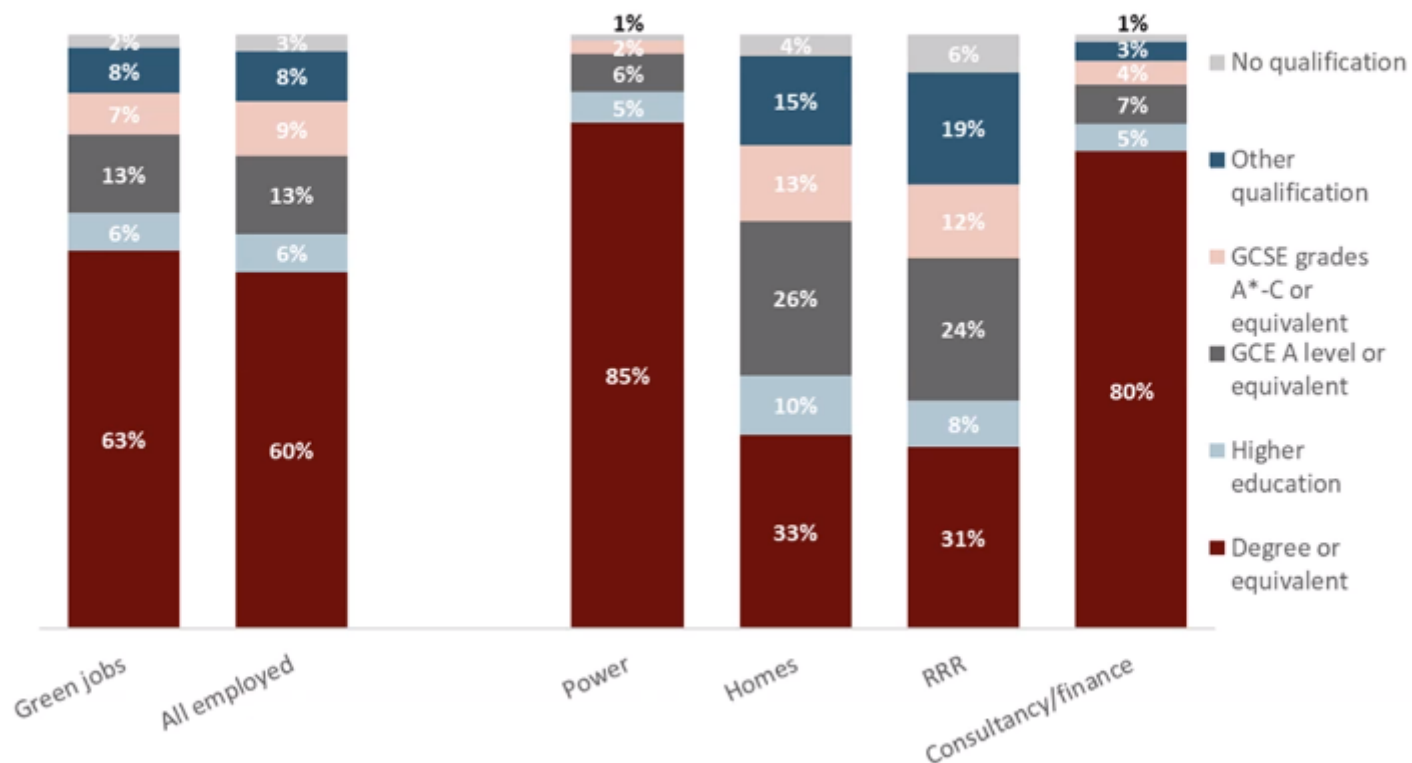
- There is a large HE student population in London, c. 250,000 first degree students
- The number of business/finance graduates each year is almost half the size of the workforce with these degrees
- However, new engineering graduates represent a quarter of the number of employed in green sectors
- And new graduates in physical/environmental sciences represent 15% of the graduate workforce

Estimated green jobs in Central London Forward sub-region, 2020

Sector	Central London Forward sub-region		
	Numbers of jobs	% of green jobs in CLF sub-region	% of total employment in CLF sub-region
Green finance	50,100	34%	1.6%
Power	42,700	29%	1.4%
Homes and Buildings	30,700	21%	1.0%
Low Carbon Transport	8,700	6%	0.3%
Reduce, reuse, recycle	6,400	4%	0.2%
Climate adaptation	2,400	2%	0.1%
Climate change strategy, policy, monitoring and planning	2,300	2%	0.1%
Climate change Research and Development	1,800	1%	0.1%
Green and blue infrastructure	700	0%	0.0%
Reducing localised pollution	700	0%	0.0%
Industrial decarbonisation, hydrogen and carbon capture	400	0%	0.0%
Total	146,900	100%	4.8%
Whole of London	234,300	-	4.4%

Source: WPI Economics calculations based on data supplied by kMatrix on their Low Carbon Environmental Goods and Services methodology and The Data City, and ONS Business Register and Employment Survey for total employment by sub-region

Green workers by highest qual – pan-London



Vocational qualifications and demographics

- Among green workers with vocational qualifications ...
 - Building and civil engineering accounts for 22%, compared with 5% of all workers with vocational qualifications
 - Electricity and energy accounts for 14% (2% of all workers)
 - Finance, banking and insurance accounts for 7% (4% of all workers)
- The green workforce is male dominated, and less ethnically diverse than the workforce overall
 - Two thirds of green workers are male, compared with 54% of all workers in London
 - 70% of green workers are white, compared with 64% of the overall London workforce

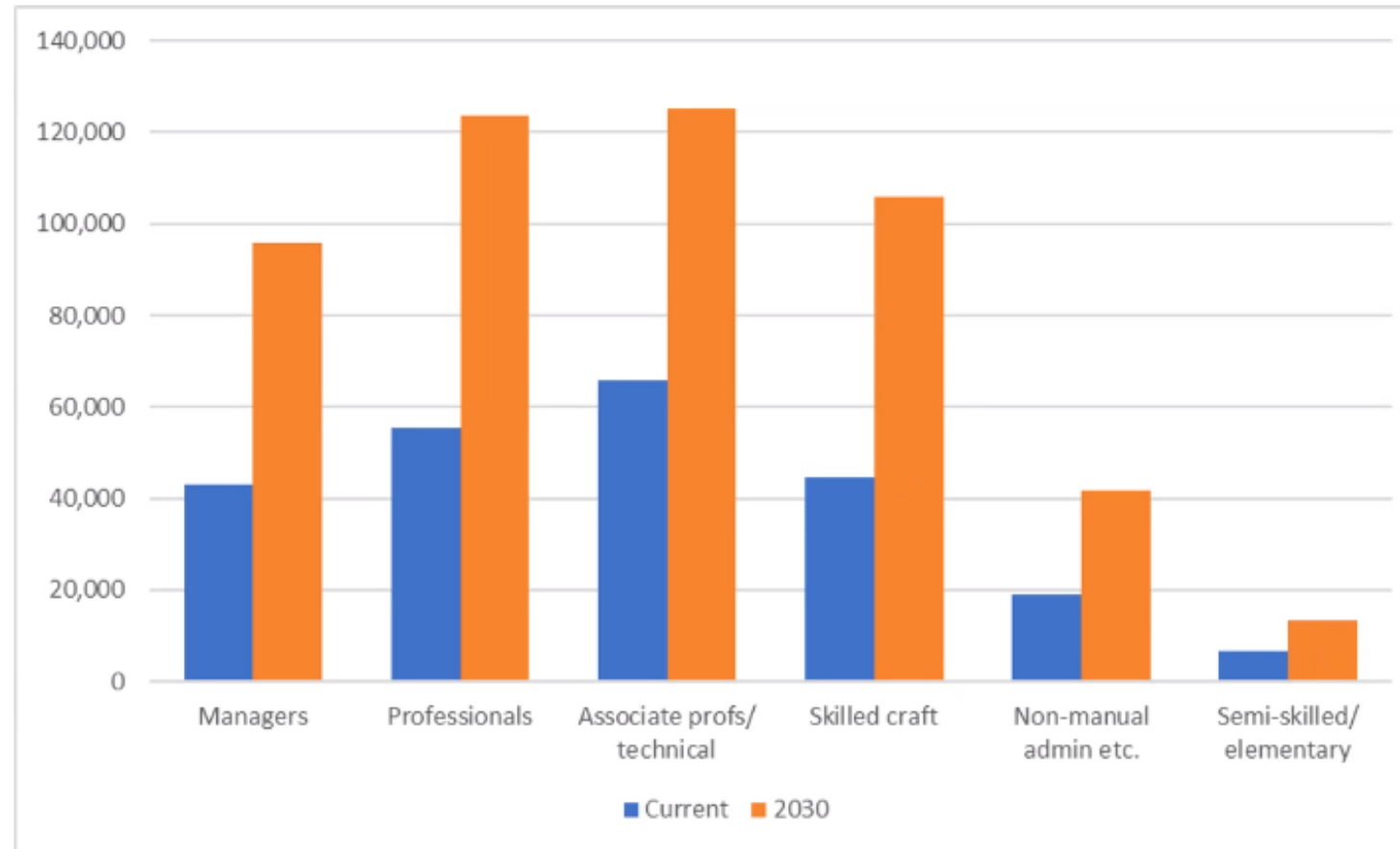
WHY SHOULD EMPLOYERS PARTNER WITH US?

- Customers will be looking at their supply chain to make sure they are working with responsible partners - otherwise it effects their own efforts to reach net zero.
- Not showing commitment can affect their ability to borrow from banks.
- Staff and clients want to work with a responsible company.
- Reducing Carbon emission should be part of their CSR and ESG policy.
- European competitors are in all likelihood already on the FNZ path
- You can no longer bid for government contracts over £5m without a demonstrable carbon reduction roadmap - getting started with carbon reporting will help.

AMBITION

From '*here and now*' to '*next and how?*'

Occupational changes to 2030 - Central forecast



Detailed occupational changes, and skills supply implications

Largest increases to 2030 among skilled craft workers under central scenario

- 17,500 more electricians – 140% increase
- 12,600 more gardeners and landscape gardeners – 161% increase
- 9,900 more plumbers and heating & ventilation engineers – 161% increase

Largest increases to 2030 among man/prof/technical workers under central scenario

- 24,900 more business associate professionals (business systems analysts, data analysts etc.) – 61% increase
- 15,200 more management consultants – 167% increase
- 9,800 more production managers in construction – 161% increase

- Nationally, there are skills shortages currently for many of these occupations – electricians, plumbers, and production managers in construction
- Green sectors currently draw substantially more staff from other sectors, than straight from education – but if all new jobs were filled by entrants from education, the sector would need to attract half of all FE/HE leavers with relevant skills
- To ensure a sufficient supply for these new jobs, there is an urgent need to:
 - Increase education provision in subjects and courses that are relevant for green jobs
 - Increase the proportion of those taking relevant courses who progress to employment within green sectors; and
 - Increase the flows from other, non-green, sectors into green sectors, including through re-skilling training

AIMS & ACTIONS 21/22

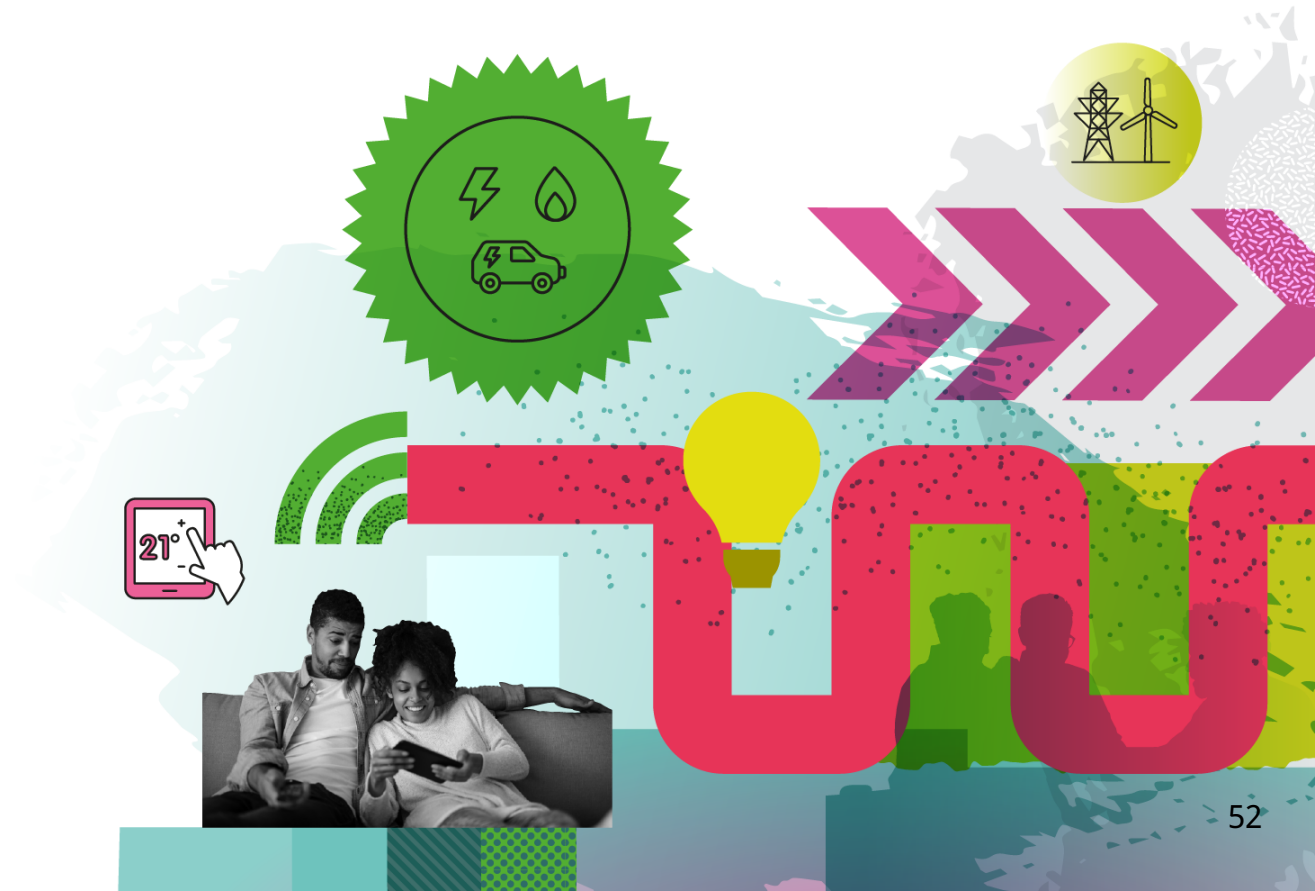
- Professionalise perceptions of some SSAs (e.g. Construction)- specific target audience of parents as well as young people.
- Honestly address gender and racial disparity in applications, opportunities and ambition
- Engender ownership and consequences (reduced access to copying, provide clear budget choices for students and staff.)
- Explore FE opportunities and internal HE progression into expanding sectors. (Careers College & Bath Spa Partnership)
- Hold partners and employers to account as we already do about LLW or DDA
- Work in collaboration with councils and others to provide a more cohesive approach.

North East LEP – ESC skills research findings

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4 November 2021

 @EnergySysCat  **LinkedIn**



Introduction

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ESC skills work overview



Complete

- Gatsby Charitable Foundation
 - Skills foresighting work – research report completed
 - Three pieces of research: literature review; learning from ESC innovation programmes; industry expert interviewees

On-going

- Consortium of LEPs and Energy Hubs
 - Development of nationwide project to create national and regional ecosystem for training

In development

- Gatsby Foundation Phase 2
 - Proposal being drafted
 - Scenarios to be worked through with key stakeholders representing:
 - education (colleges, independent training providers, IfATE etc)
 - consumers (Citizens' Advice, NEA etc)
 - technologists (esp. data and digital)
- Curriculum development with FE colleges
 - Proposals being drafted
 - Key priority skills and competencies to be identified and learning modules created and trialled

Gatsby Charitable Foundation – skills foresighting research

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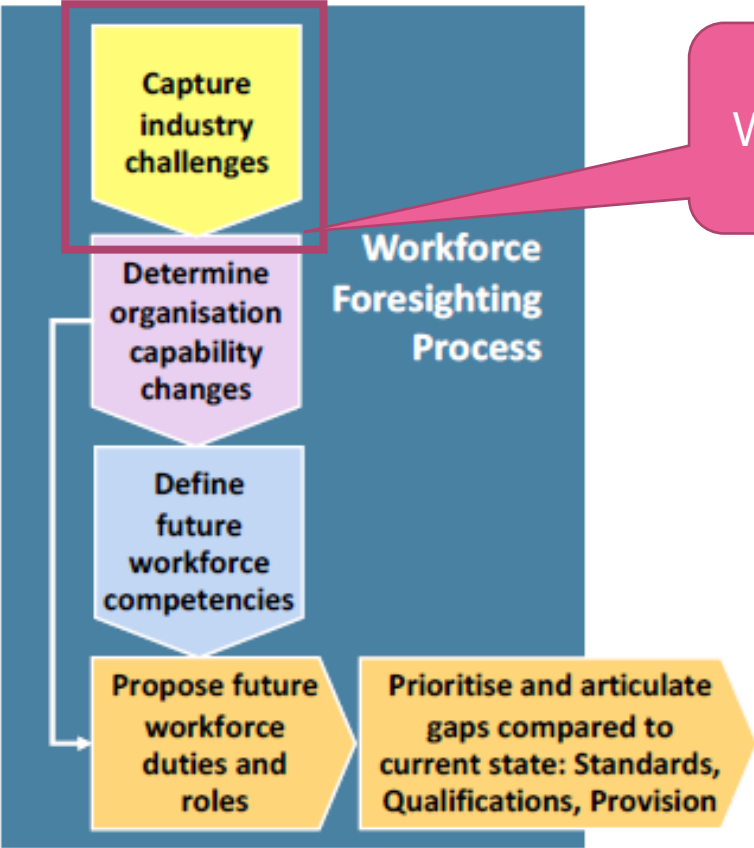
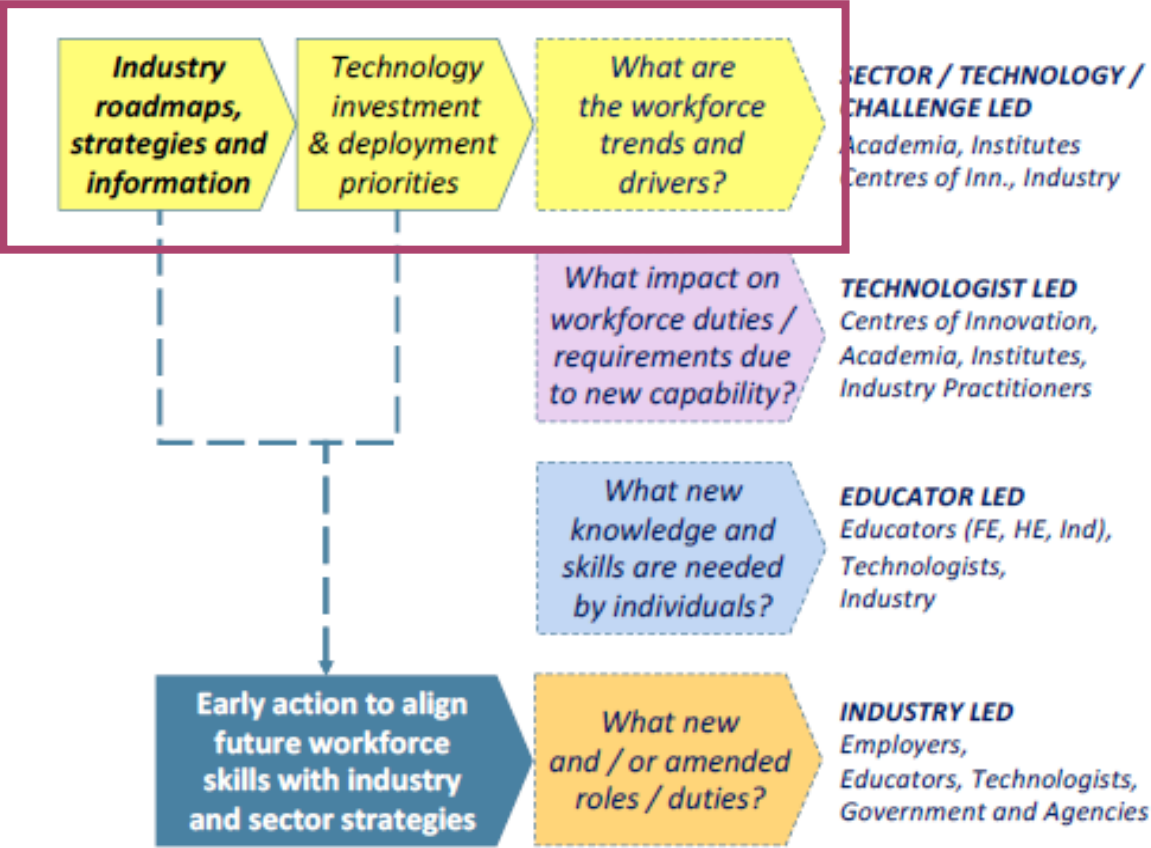
Introduction

- Making the necessary upgrades to get the UK's housing stock to Net Zero will be far from simple – every home and household is subtly different, and upgrades will include a number of technologies that will need to be integrated to work properly.
- The domestic retrofit sector is fragmented, with a history of poor quality installations for customers. There are several gaps in the supply chain, which consists predominantly of SMEs focusing on a narrow range of technologies (e.g. boiler installers)
- Based on the HVMC industry foresighting approach, ESC have:
 - built on knowledge from existing literature, external experts and internal ESC innovation projects to identify the key challenges and skills gaps in the domestic retrofit sector
 - started to explore the solutions that could help to solve these challenges

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HVMC Fore-sighting Framework

Foresighting – connecting technology strategies to workforce action



We are here

Research areas

Three independent pieces of research

Literature review

- **Open source reports** from key organisations including:
 - BEIS
 - CCC
 - CITB
 - Construction Leadership Council
 - Each Home Counts Review (MHCLG)
 - MCS Charitable Foundation
- **Academic literature** – key authors include:
 - Aaron Gillich
 - Gavin Killip
 - Catrin Maby

Learning from ESC innovation programmes

- Focus on Smart Systems and Heat Phases 1 and 2
- Insight generated from other ESC trials and innovation projects
- Experience of working with consumers in their own homes
- Learnings from coordinating work, in collaboration with a range of staff on public sector buildings across multiple sites

Expert interviews

- Installers/practitioners, e.g.:
 - Heat pump and renewable energy installers
 - Insulation installers
 - Architects
 - Retrofit coordinators and home visitors
- Educators, e.g.:
 - Independent training providers
 - Lecturers and FE course providers
 - Certification body
- Technologists, e.g.:
 - Product manufacturers
 - Innovators/start ups

Research findings - barriers

Consumer confidence and trust

- Lack of access to good quality, trustworthy information
- Supply chain doesn't do enough to listen to and understand customer needs
- Customer care skills lacking
- Lack of good quality data to inform better quality assessment and design
- Few organisations able to undertake the kind of detailed assessment needed
- Hard to differentiate quality of organisations
- Overall lack of trust creates low demand

Quality and governance

- Poor quality work undermines trust
- Certification schemes – too much focus on paperwork rather than outcome – poor work is not identified and sanctioned, which undermines quality and workforce development
- Training courses – focused on qualification rather than competency
- Insufficient opportunities for ongoing learning
- Key knowledge and competency gaps include low carbon heat
- Low demand means limited opportunities to improve

Systems integration

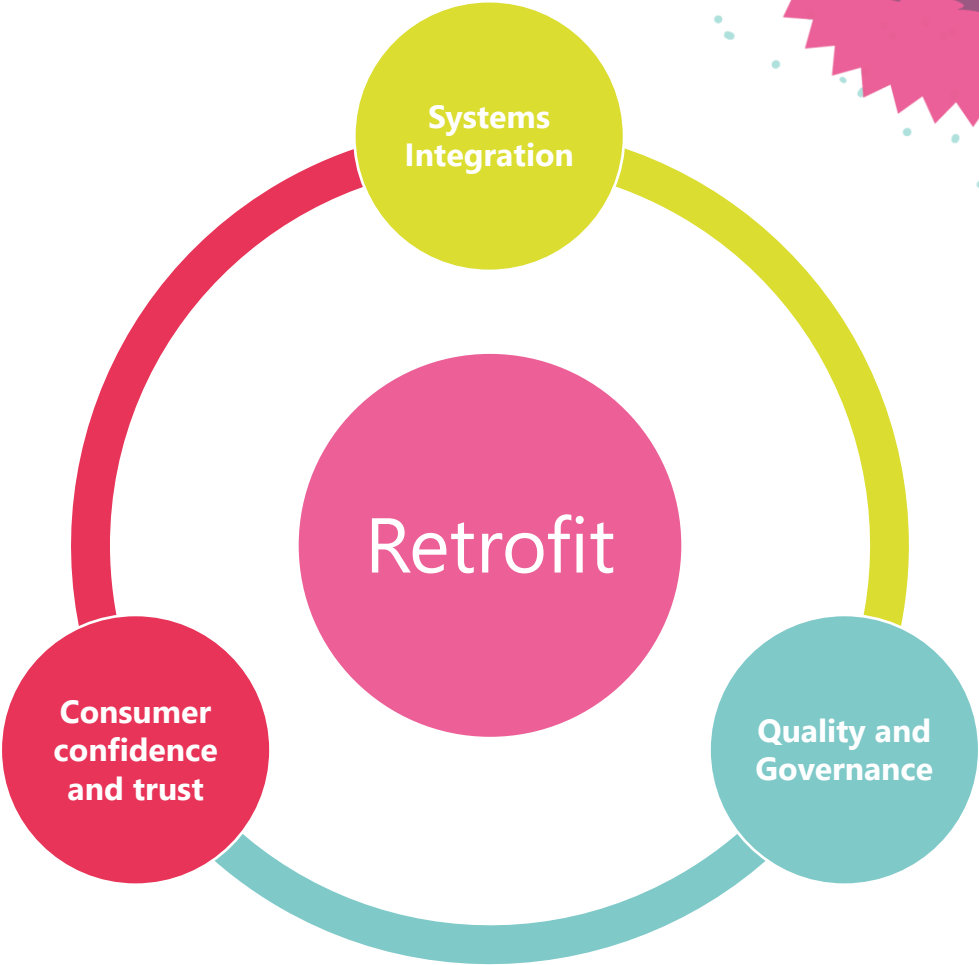
- Findings from innovation programmes show how an integrated end to end approach and standardised processes add value – but this very rarely happens
- A whole house understanding and approach is needed, but not common to all roles across the sector
- Assessment, evaluation, quality assurance and coordination of work need to be integrated into a smooth process – however, additional costs and roles are seen as an obstacle
- Insufficient opportunities for knowledge sharing across the sector (e.g. identification of common good practice and pitfalls)

Key gaps

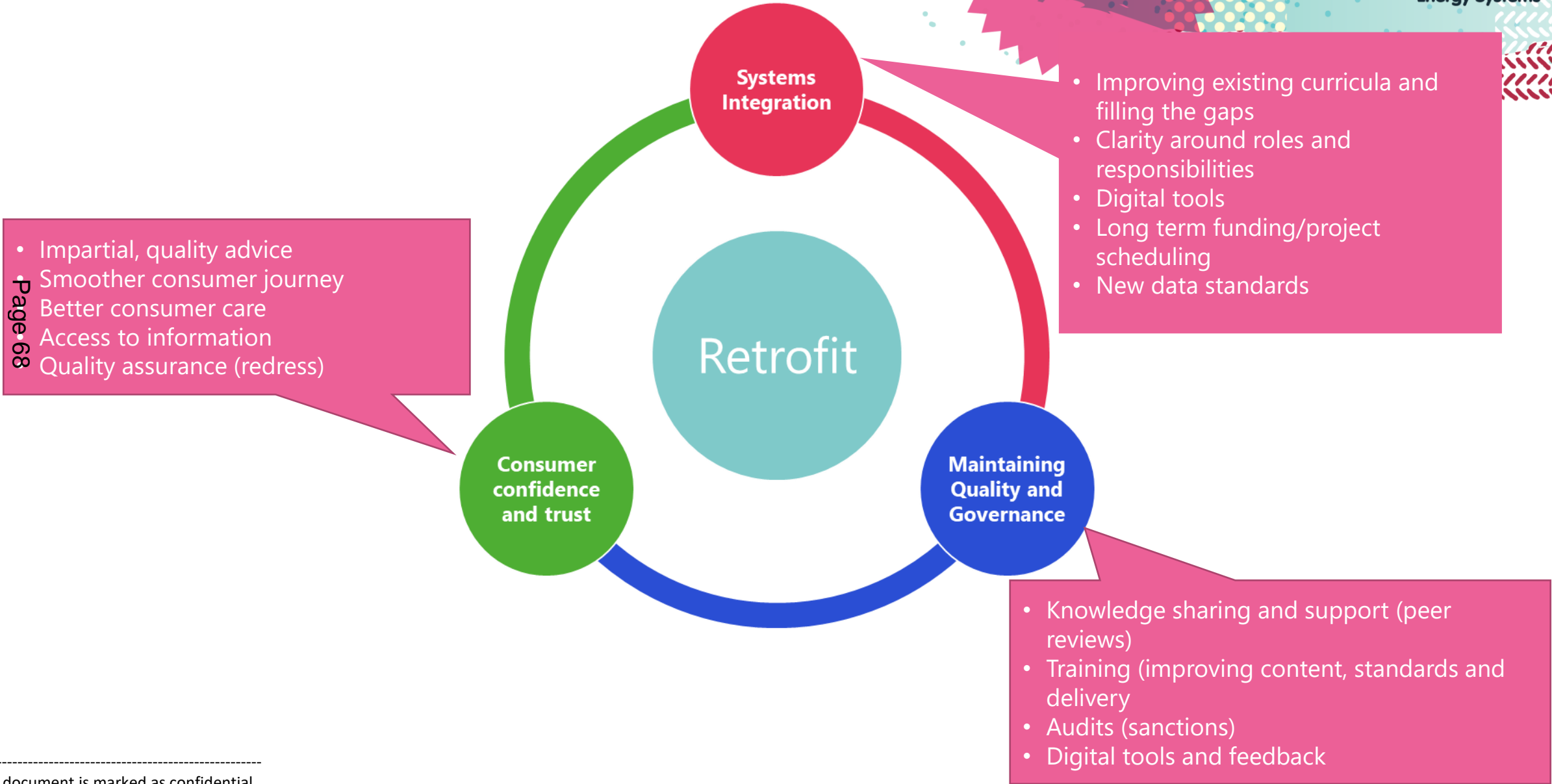
Overall, the research depicts a sector that is not sufficiently incentivised to improve. SMEs lack resources & appetite to undertake training due to low demand; costs of course development are high, and not perceived as a risk worth taking; quality assurance does not highlight poor practice or stimulate improvement; it is too easy to get away with poor quality work.

- **Reform to quality assurance processes** – in-use evaluation through monitoring or on-site audits to hold poor work to account and drive improvements
- **Customer support provision** – end-to-end customer care and advice needed to improve satisfaction, build trust and empower customers to make decisions
- **Data** – more detailed data for better assessment and evaluation, helping improve consistency and provide better value
- **SME support** – to help integrate different trades, facilitate information sharing and improvement, support development of coordinated offers

Three Key Challenges

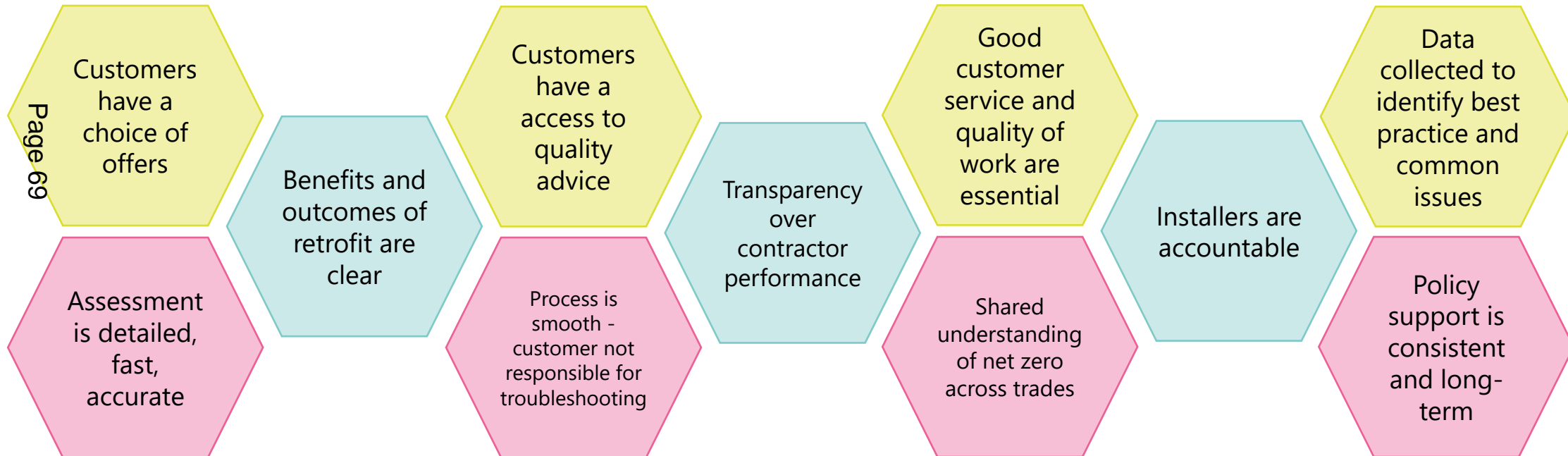


Retrofit Solutions proposed by interviewees



Future market needs

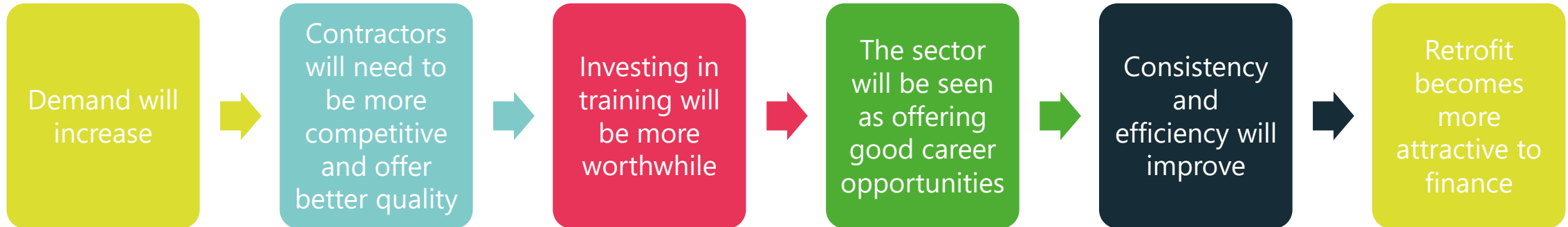
Our conclusions are that the following needs to be “true” to create growth of a sustainable market – healthy demand serviced by a trusted, quality supply chain.



Future market needs

If the above is true then...

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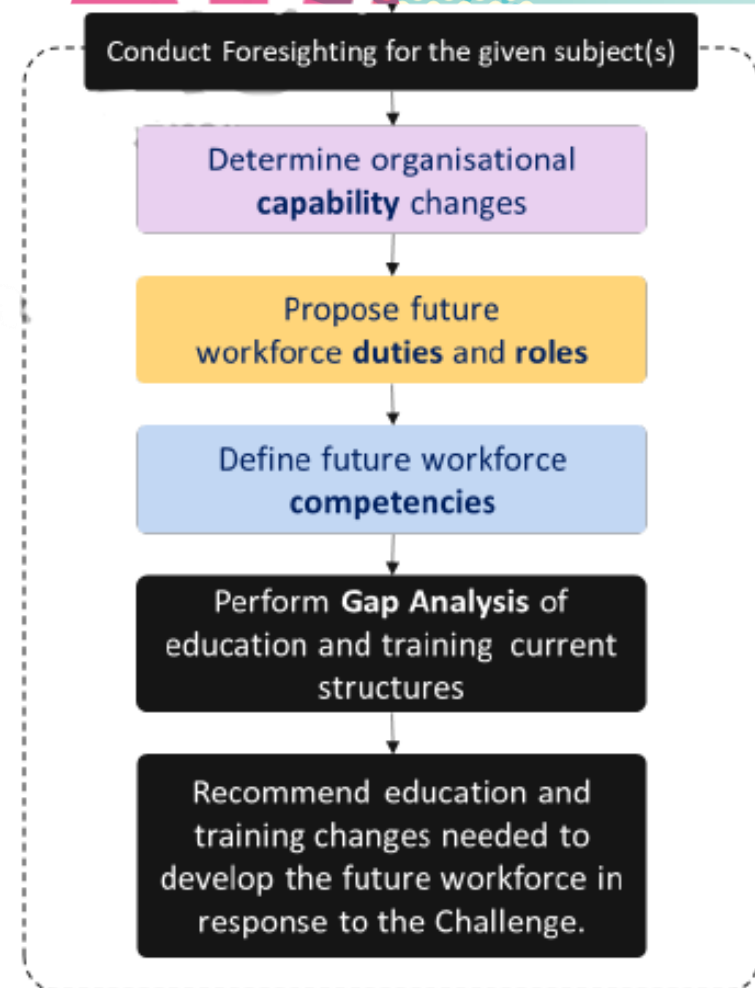
Conclusions and benefits

The research has

- Validated previous assumptions about the importance of customer care and advice
- Reinforced need for a whole market approach looking at processes, tools and supply chain structure as well as specific roles and skills gaps
- Emphasised the importance of evaluation of install quality and outcomes to drive supply chain improvements (as well as increase customer satisfaction)
- Broadened our Retrofit Skills knowledge across a larger team of staff
- Brought together several disparate threads of work that were taking place across the Energy Systems Catapult
- Valuable learning from the HVMC process
- Cross-working with other Catapults
- Garnered interest in the fore-sighting activity from IfATE

Next Steps

- Adapt and use HVMC process:
 - Technology -> solutions including processes and business models
- Identify solutions that can be developed and deployed to respond to these challenges
- Identify specific and suitable foresighting subjects, including stakeholders representing:
 - education (colleges, independent training providers, IfATE etc)
 - consumers (Citizens' Advice, NEA etc)
 - technologists (esp. data and digital)
- Create and use working scenarios for stakeholders to use to identify future Capabilities





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North East Domestic Energy Retrofit Skills Assessment

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Workshop 2

The Future Demand for Retrofit

4th November 2021

 @northeastlep • #moreandbetterjobs



What have we done?

► Step 1. Identify the activities that need to take place within the domestic low-carbon retrofit sector

- ❑ This includes 4 level 1 sub-sectors: the technologies to get heat and electricity into the building, the energy efficient measures to keep it there, making good after works and the knowledge and services needed to do it and drive the market
- ❑ There are: 21 Level 2 sub-sectors, 64 Level 3 sub-sectors, split into activity codes resulting in 302 discrete activities
- ❑ The activity taxonomy is flexible, with activities switched on or off depending on client requirements. For this study we decided 5 activities related to building internal/external walls were out of scope and will not be reported, leaving 297 individual activities measured
- ❑ For most instances, Level 2 data is reported, dropping to Level 3 for more detailed analysis where relevant. The whole dataset provides data in evidence for the needs of the region.

What have we done?

► Step 2. Identify all the possible skills needed to perform all the activities within the activity taxonomy

- ❑ Skills are highly varied within the sector, mainly because the sector itself is so diverse in terms of activity and range from desk-based jobs such as designing infographics through to hanging off the side of a high-rise building fitting windows
- ❑ One person can perform more than one skill, for example hard flooring installers may also fit carpets, but the hours worked per skill are counted per activity, to eliminate double counting
- ❑ There are 57 skills identified within domestic energy retrofit

► Step 3. Group the skills into Retrofit Roles

- ❑ The 57 skills have then been grouped into 10 Retrofit Roles
- ❑ Some people within a role will not have or need all the skills within the role e.g. installers include plaster boarders and gas engineers who are unlikely to be the same person
- ❑ People can move between skills e.g. a specialist engineer trained to install heat pumps becomes a multi-engineer if they upskill to also fit photovoltaics

What have we done?

- ▶ **Step 4. Measured the workforce in 2019/20 and Forecast the workforce needed**
 - ❑ Measured the workforce in 2019/20 as a 'Heads Equivalent' pre-pandemic baseline and forecast the Heads Equivalent workforce needed, by skill and activity to service the domestic retrofit sector to reach net zero 2030 and 2050 under the following circumstances:
 - ❑ No Additional Policy
 - ❑ Hydrogen Dominant Policy
 - ❑ Heat Pump Dominant Policy
 - ❑ Photovoltaic Dominant Policy
 - ❑ Heat and Buildings Strategy – the new strategy released last month and the ***focus of this presentation going forward***
 - ❑ Forecasting the other potential policies allow for future adjustments to forecasts as policies may change over the coming years

What have we done?

- ▶ **Step 5. Measured the Educators training the skills in 2019/20 and forecast the educators needed as a heads equivalent for the same scenarios as the skills forecasting. Educators are split by:**
 - ❑ Further Education
 - ❑ Independent Training Providers
 - ❑ Manufacturer-led Training Providers

Notes:

► Geography

- ❑ The demand data has been produced for the geographies of:
 - ❑ The North East LEP (Report at this geographic level)
 - ❑ The Yorkshire and Humber Region
 - ❑ The North East Yorkshire & Humber Energy Hub area

► Heads Equivalent (aka full time equivalent)

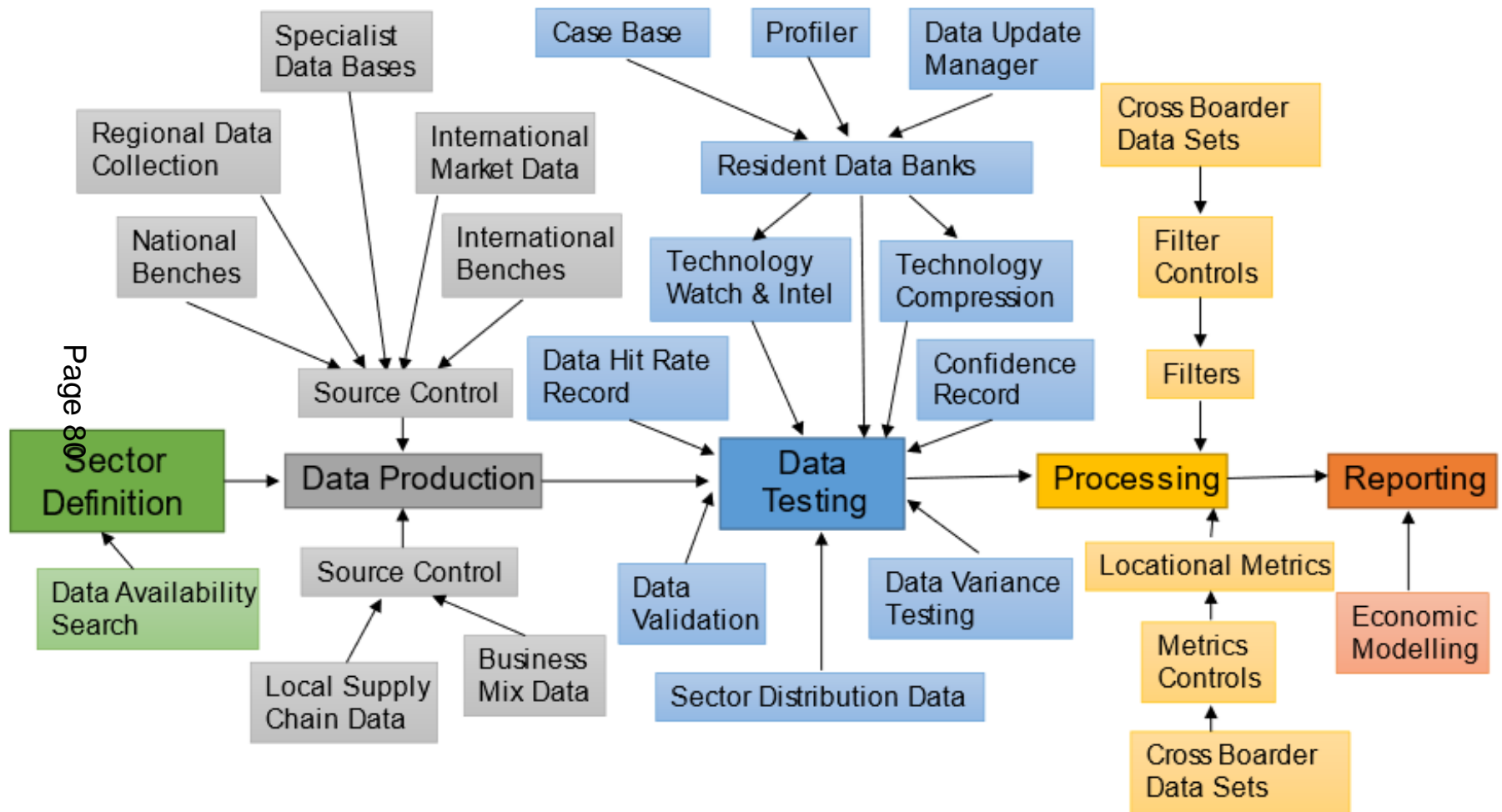
- ❑ The 2019/20 figures are for domestic retrofit only. For example, if we look at an installer working in commercial and domestic settings for both retrofit and new-build projects, the methodology only counts the hours spent installing domestic retrofit applications
- ❑ Heads equivalent forecasts allow for changing working practices e.g. in 2019/20 only approx. 10% of small heat pump installations were for retrofit and this includes commercial retrofit. The 90:10 split between newbuild and retrofit is likely to change, if we counted the total number of installers regardless of type of installation, activity would be missed or double-counted

► Classification of Engineers

- ❑ Multi Engineers are qualified in multiple engineering applications
- ❑ Specialist Engineers specialize in one engineering activity *not elsewhere classified*
- ❑ There are other named specialist engineers who are not counted in the specialist engineer's classification such as:
 - ❑ Gas Engineers
 - ❑ Underfloor Heating Engineers etc

kMatrix Methodology

- Brief Model of Forecasting



Heat and Buildings Strategy

- Main points relevant to this study

► The policy approach – 5 core principles within the Heat and Buildings Strategy:

- ❑ Whole- building and whole system approach to minimize costs
- ❑ Innovation is essential
- ❑ Accelerate no- and low-regrets action – fabric-first approach to improve thermal efficiency of buildings, futureproof new builds, air-handling for climate change resilience, push installation of heat pumps to be 600,00 per year by 2028 and associated infrastructure
- ❑ Flexibility in solutions, i.e. adoption of solutions on a building-by-building basis, not one size fits all
- ❑ Policies to support the fuel poor etc

► Retrofitting and Insulation Policies through the 2020's:

- ❑ Local Authority Delivery (2020 to 2021) – low carbon heating upgrades to low-income homes
- ❑ Home Upgrade Grant (2022 to 2025) – energy efficiency upgrades and low-carbon heating to low-income, off-gas-grid homes
- ❑ EC04 (2022 to 2028) – supports upgrading fuel poor homes and homes of those unable to pay
- ❑ Review Decent Home Standard – a review of the current criteria and how it could support decarbonisation and improved energy efficiency of social homes
- ❑ Social Housing Decarbonisation Fund (launched 2020) – upgrade social housing stock below EPC C
- ❑ Private-rented sector minimum standards – Consultation stage to set standards for rented homes
- ❑ Mortgage lender requirements – proposal for mortgage lenders to publish stock details
- ❑ Owner-occupied policy – potential policy, consultation period planned
- ❑ Net Zero backstop for homes – potential policy to ensure all homes are net zero by 2050

Heat and Buildings Strategy

- Main points relevant to this study

► Heat Pump Specific policies:

- ❑ Boiler upgrade Scheme (2022 to 2025) – upfront capital grants to households for air and ground source heat pumps
- ❑ Market-based mechanism for low-carbon heat – proposal to create an incentive framework to drive market growth, subject to consultation
- ❑ Local Authority Delivery (2020 to 2021) – as previous slide
- ❑ Social Housing Decarbonisation Fund (launched 2020) – as previous slide
- ❑ Home Upgrade Grant (2022 to 2025) – as previous slide
- ❑ £14.6 million Electrification of Heat Demonstration project (live) – project testing the practical and technical feasibility of large-scale roll-out of heat pumps by installation in up to 750 homes
- ❑ £60 investment designated to a Net Zero Innovation Portfolio ‘Heat Pump Ready’ Program to support the development of innovative solutions across the heat pump sector
- ❑ Reinforcement of electricity networks

► Heat Network points of interest:

- ❑ Low-carbon heat cluster in the North East of England and Tees Valley, specifically inward investment in heat networks capturing mine heat
- ❑ Green Heat Network Fund (2022 to 2025) – over £270 million allotted to develop low-carbon heat networks
- ❑ Others

Note: Heat and Buildings Strategy referred to as H&B for the rest of the presentation

Heat and Buildings Strategy

- how it might alter the skills landscape

► 2019/20 employment was:

- ❑ 221 people in the North East LEP
- ❑ 640 people within the Yorkshire and Humber Region
- ❑ 934 people within the North East Yorkshire & Humber Energy Hub area

► Net zero by 2030, if there were no additional policy, is expected require:

- ❑ 12,371 people in the North East LEP
- ❑ 35,950 people for the Yorkshire and Humber Region
- ❑ 52,325 people within the North East Yorkshire & Humber Energy Hub area

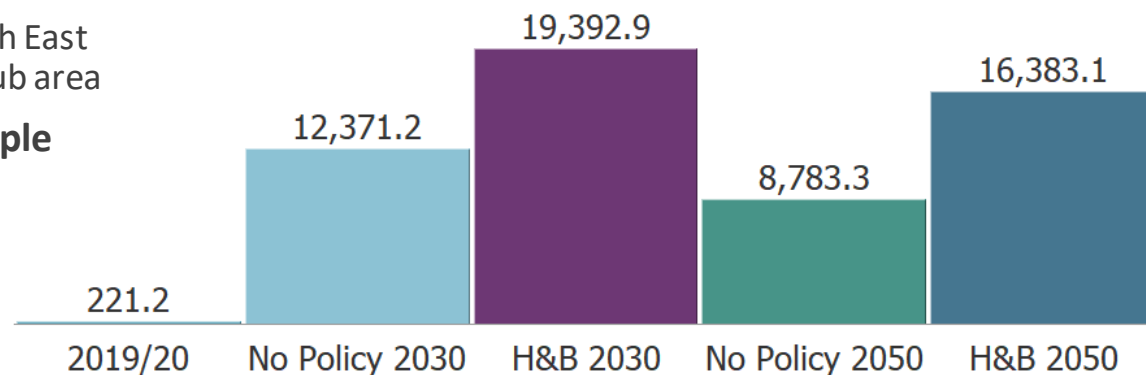
► Net zero by 2030, with the H&B, is expected to require:

- ❑ 19,394 people in the North East LEP
- ❑ 55,863 people within the Yorkshire and Humber Region
- ❑ 81,609 people within the North East Yorkshire & Humber Energy Hub area

► Net zero 2050 takes fewer people

- ❑ Longer timeframe

North East LEP # Heads Equivalent Jobs

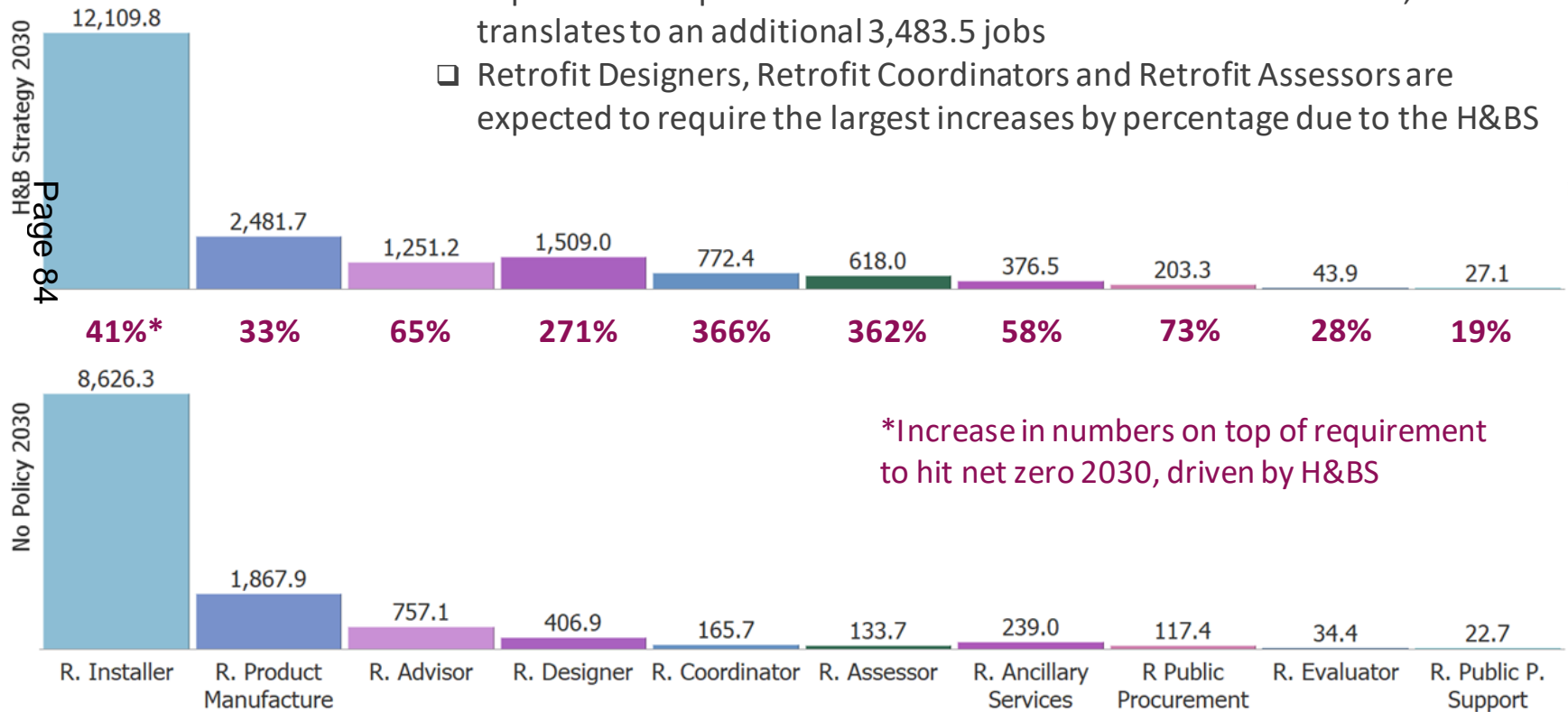


Sector-Level Skills Forecast

- by Role, North East LEP

► The effect of the Heat & Buildings Strategy *on top of* the existing target of net zero by 2030 is expected to vary between Roles

- Expected to require 41% more Retrofit Installers to deliver H&B, this translates to an additional 3,483.5 jobs
- Retrofit Designers, Retrofit Coordinators and Retrofit Assessors are expected to require the largest increases by percentage due to the H&BS

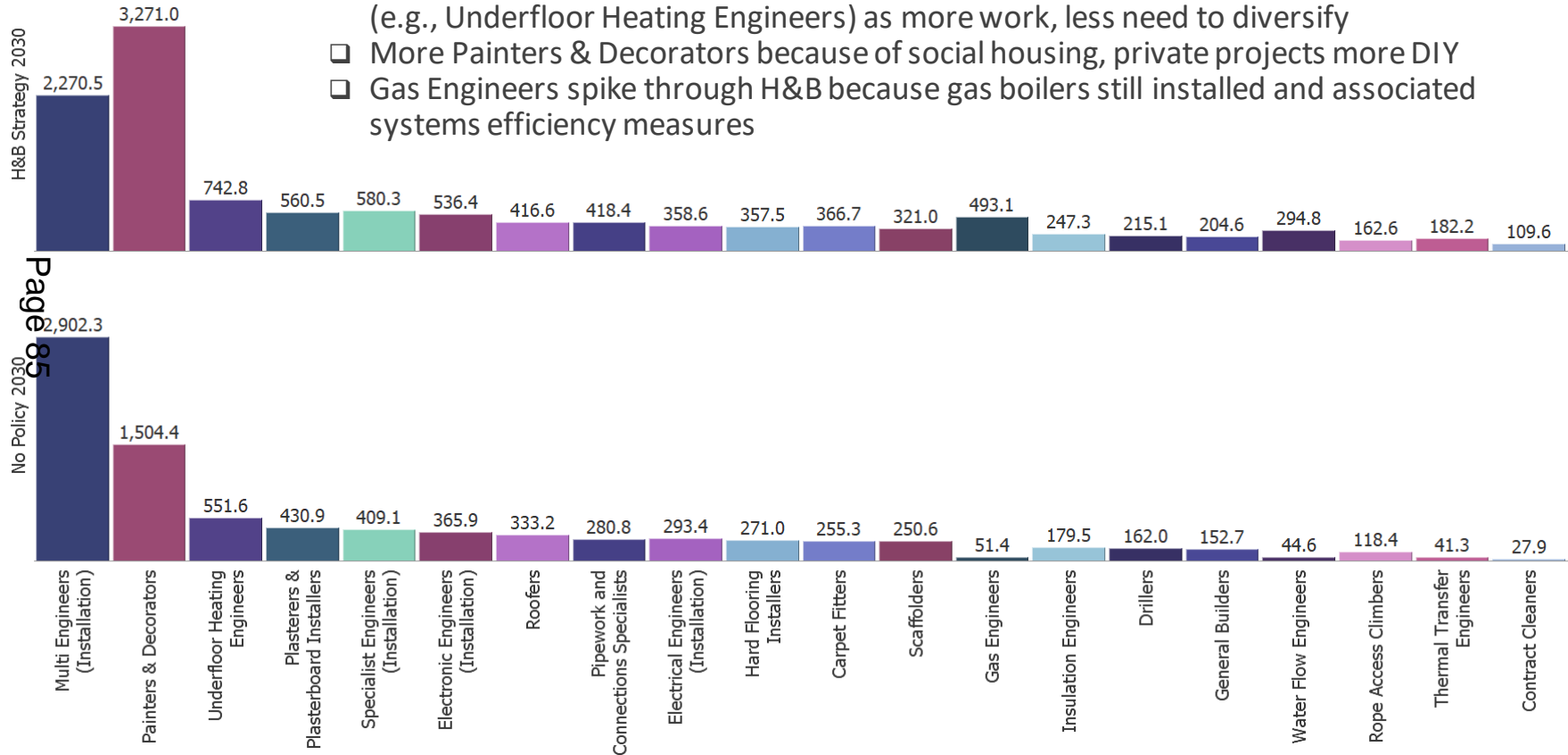


Sector-Level Skills Forecasts

- R. Installers by skill, North East LEP with no policy and H&B

- Largest role is R. Installer, employees required for the North East, to reach net zero by 2030. H&B provides some certainty in the pipeline through social housing policies, results in differences:

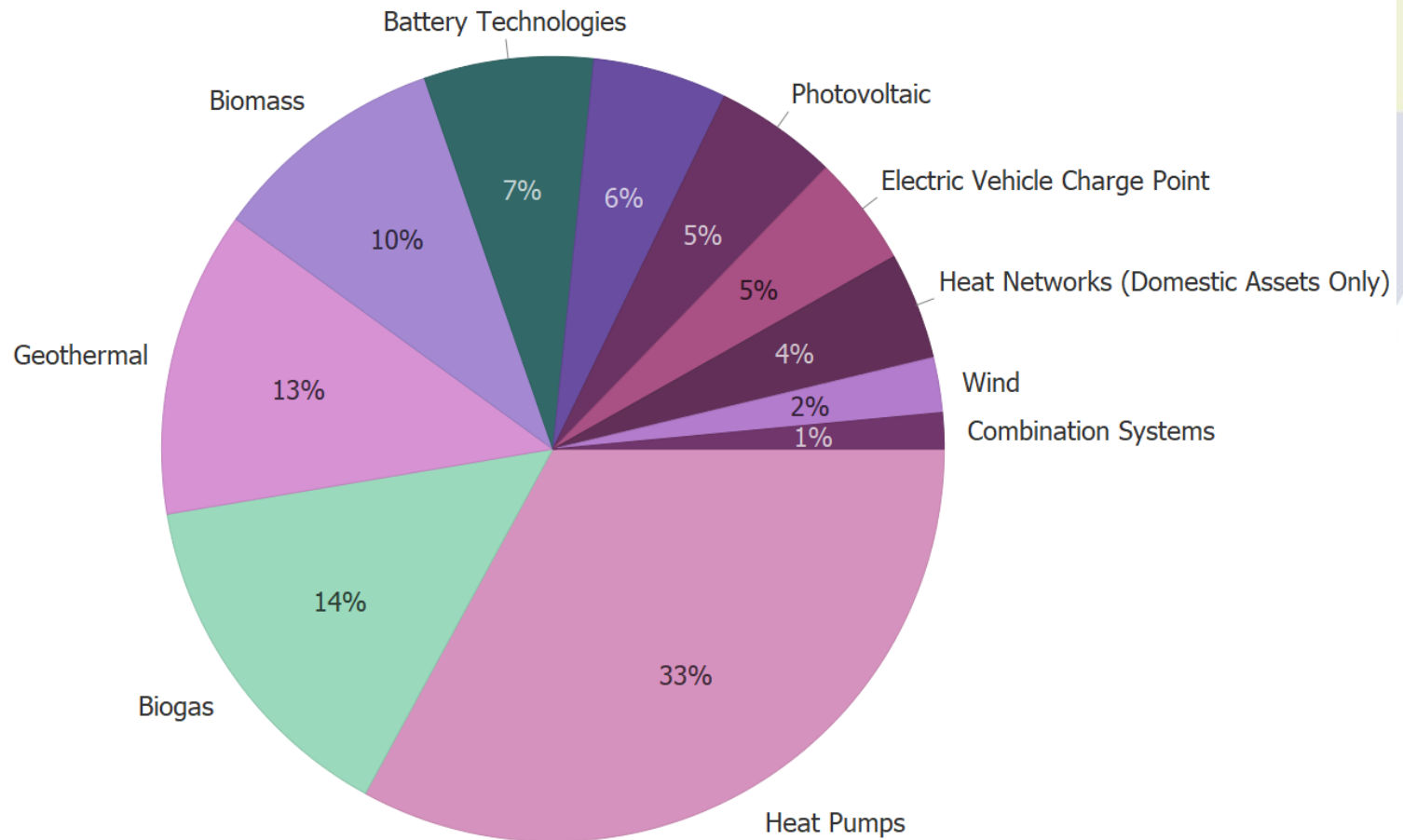
- ❑ Multi engineer numbers drop, but specialist engineers and 'named' engineers increase (e.g., Underfloor Heating Engineers) as more work, less need to diversify
- ❑ More Painters & Decorators because of social housing, private projects more DIY
- ❑ Gas Engineers spike through H&B because gas boilers still installed and associated systems efficiency measures



Any Reflections or Questions?

Sector-Level Skills Forecasts

- Jobs split by technology for electricity & heat generation H&B
net zero 2030, North East LEP



What constitutes a 'Top Job'?

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- ▶ The data is designed to measure and forecast the *number* of jobs
 - ❑ Painters and Decorators are the largest of the skills, needing 3,721 people by 2030 with the H&B, because they are involved in most activities and policies with a high ratio of social housing retrofit require more of them – many private projects would offset the cost via DIY
- ▶ Some jobs are more 'important'
 - ❑ The Retrofit Coordinator Role is arguably the most 'important', it only includes the Project Management for Coordination skill and only requires 772 people by 2030 with the H&B, yet it is one of the most 'important' with regards to both in terms of being a highly qualified 'good' job and in terms of potential remuneration
- ▶ All skills and roles are required
 - ❑ The range of skills and the numbers required allows a high degree of flexibility in terms of range of potential jobs to choose from when new entrants to the sector are considering possibilities
there is literally something for everyone in the sector

Sector Educators

- provision of training in 2019/20

► North East 2019/20 Educators split by training provider:

- ❑ 62% manufacturer-led education
- ❑ 22% further education
- ❑ 16% Independent

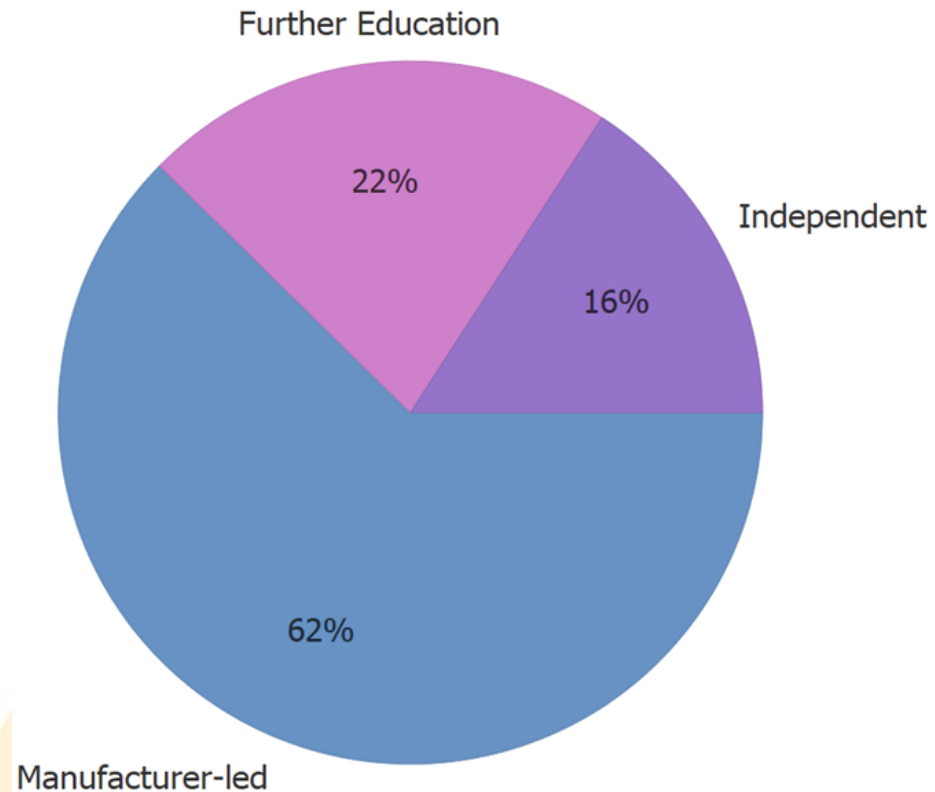
► Wider area:

- ❑ Yorkshire and Humber Region split is 63%, 22% and 15%
- ❑ North East Yorkshire & Humber Energy Hub split is 63%, 22% and 15%

► Forecast data:

- ❑ # educators require for each skill/role
- ❑ # educators required for each forecast policy
- ❑ # educators for the sector, not split by activity
- ❑ # educators in total, not split by training provider

North East LEP # Educators split by provider



Heat and Buildings Strategy

- how it might alter the Educators landscape

► 2019/20:

- ❑ 8 educators in the North East LEP
- ❑ 22 educators within the Yorkshire and Humber Region
- ❑ 32 educators within the North East Yorkshire & Humber Energy Hub area

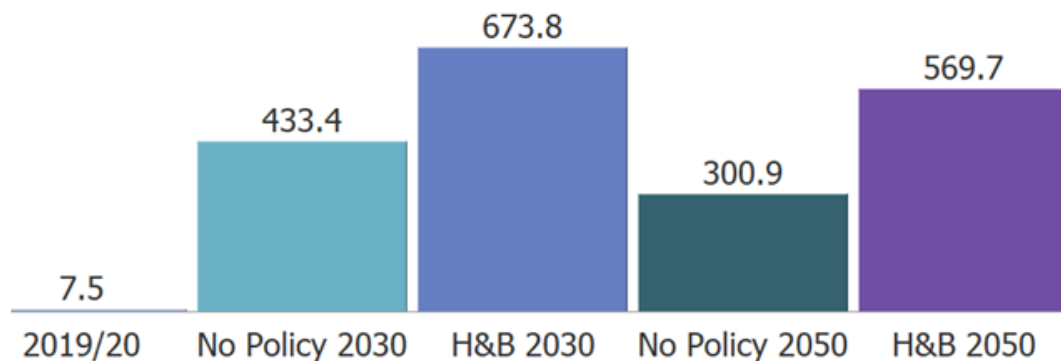
► Net zero by 2030, if there were no additional policy, is expected require:

- ❑ 433 educators in the North East LEP
- ❑ 1,223 educators for the Yorkshire and Humber Region
- ❑ 1,794 educators within the North East Yorkshire & Humber Energy Hub area

► Net zero by 2030, with the H&B, is expected to require:

- ❑ 674 educators in the North East LEP
- ❑ 1,919 educators within the Yorkshire and Humber Region
- ❑ 2,809 educators within the North East Yorkshire & Humber Energy Hub area

North East LEP # Heads Equivalent Educators



► Net zero 2050 takes fewer people

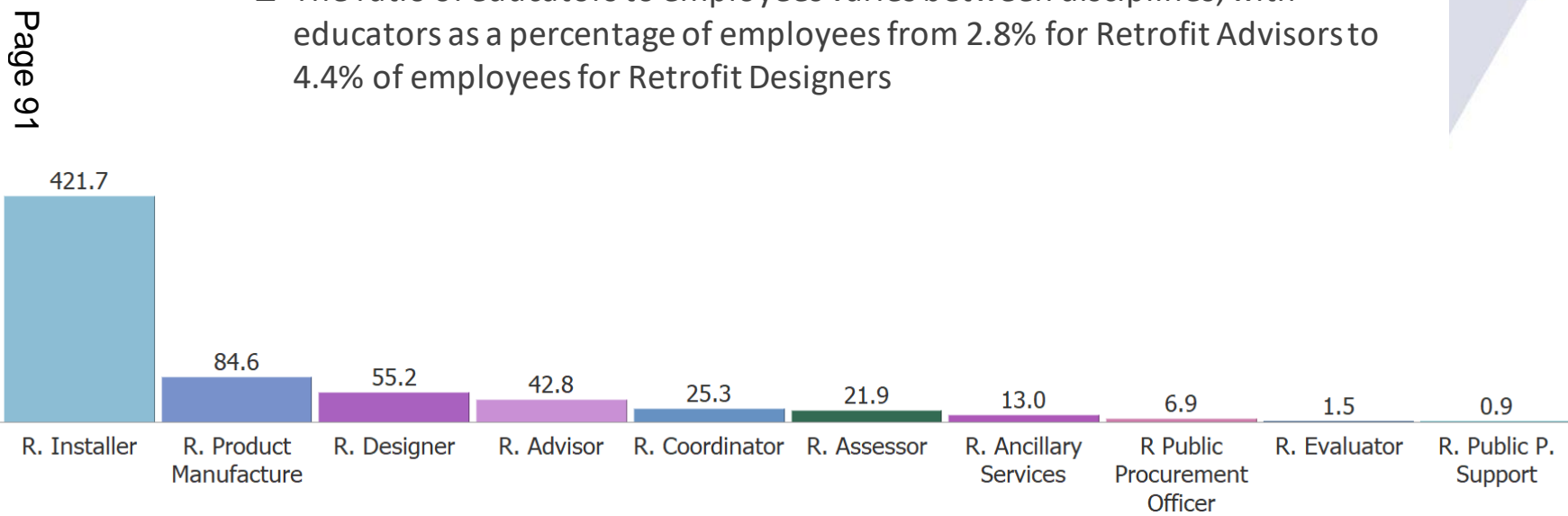
- ❑ Longer timeframe

Sector-Level Educators Forecast

- split by Role, North East LEP

- This graph represents the number of educators required in the North East LEP, per Role, to reach net zero by 2030 with the H&B:

- ❑ 422 Educators of Retrofit Installers
- ❑ The ratio of educators to employees varies between disciplines, with educators as a percentage of employees from 2.8% for Retrofit Advisors to 4.4% of employees for Retrofit Designers

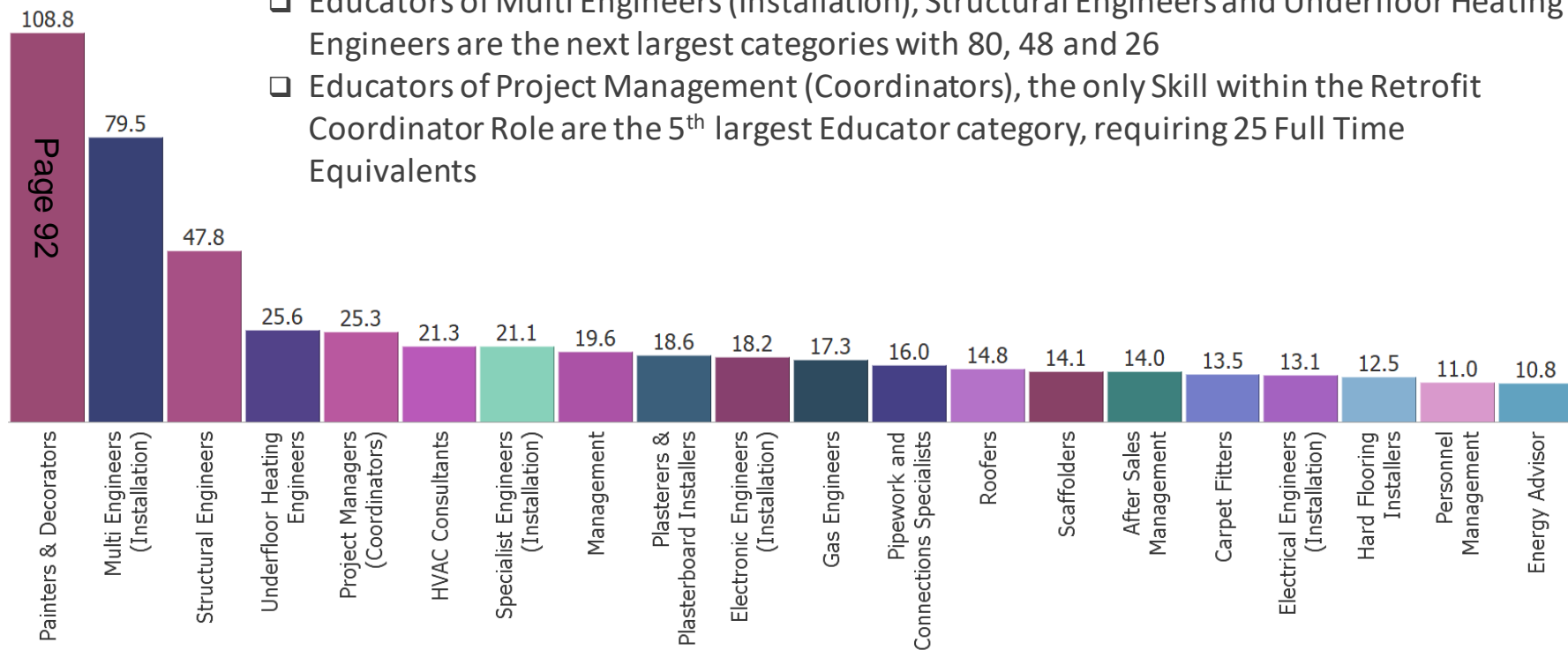


Sector-Level Educators Forecast

- Top 20 Educators split by Skill, North East LEP

- ▶ The top 20 Educators, in terms of numbers, per Skill required in the North East LEP, to reach net zero by 2030 with the H&B:

- ❑ Painters and Decorators require the highest numbers of Educators with 109
- ❑ Educators of Multi Engineers (Installation), Structural Engineers and Underfloor Heating Engineers are the next largest categories with 80, 48 and 26
- ❑ Educators of Project Management (Coordinators), the only Skill within the Retrofit Coordinator Role are the 5th largest Educator category, requiring 25 Full Time Equivalents



Skills Scalability Index

- relative ease of skills to scale, by Level 2 activity across the North East Yorkshire and Humber Energy Hub region

► **Skills Scalability refers to the combination of:**

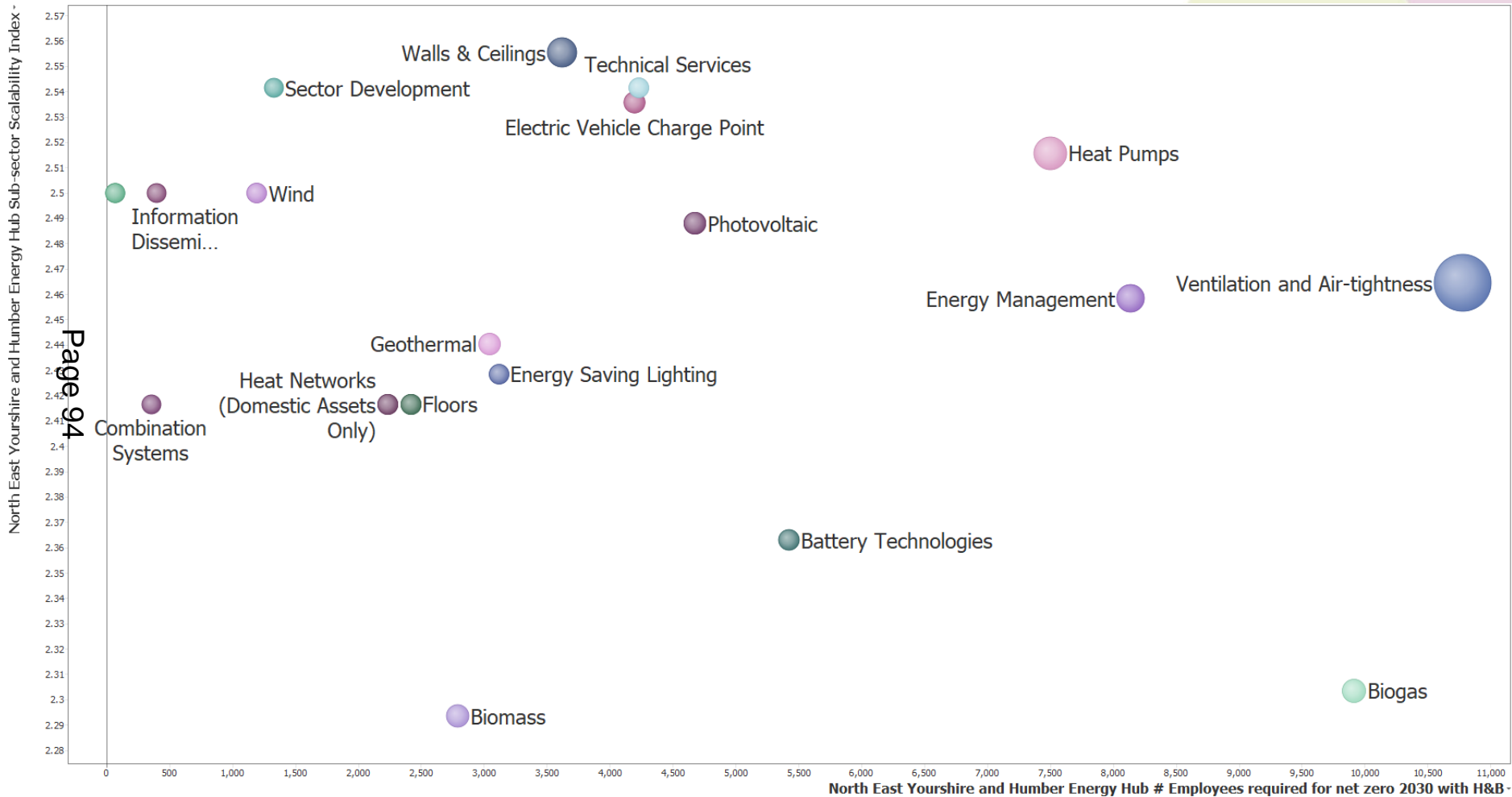
- ☐ How long it takes to train the skill
- ☐ How long it takes to train the trainer
- ☐ How long it takes to put a training course together
- ☐ Rate of maturity of the technology, e.g. heat pumps are still in development, rapid rate of advancement may require additional or varied training
- ☐ Associated costs of training

► **Hydrogen is not included in the Skills Scalability graph in the next slide because:**

- ☐ Hydrogen is not a mature market and although it is expected to play a role, there is a lack of clarity in the breadth and depth of the potential contribution it will make
- ☐ Decisions regarding hydrogen for heat are postponed until 2026, so no need for immediate training provision

Skills Scalability Index

- North East Yorkshire and Humber Energy Hub Regional Scalability of Level 2 Sub-sectors



We need them all!!

Feeder Channels:

1. Initial push
2. Longer term

► People needed to fulfil the initial push or 'Burst of Activity' to hit net zero 2030, could come from:

- ❑ Retirees from sectors with relatively early retirement who often go on to a secondary career e.g.
 - ❑ Armed forces
 - ❑ Fire service
 - ❑ Police
- ❑ Workers from any sector who are later in their working life and who find themselves unemployed
- ❑ Retired people who want to work full or part time after 'official' retirement, using complimentary skills

► People for the longer term post-2030:

- ❑ Industries in the North East which are maybe in decline with compatible skills, e.g., castings industry
- ❑ Retail, financial advisors offering retrofit advisory services as a value added etc.
- ❑ School leavers – early engagement vital to ensure the variety in jobs are understood

► More to come in the next workshop.....



Skilling up for Retrofit Series: Workshop 1

Domestic Energy Skills Assessment

Overview

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About Domestic Energy Skills Assessment

- Funding secured from North East Yorkshire and Humber Energy Hub
- Part of a wider collaboration with Energy Systems Catapult and 5 other pilot LEP areas
- Understanding both skills supply and demand
- Project Team appointed in June
- Work to be completed in December/ January
- Stakeholder engagement is a key aspect

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Skills Assessment Project Objectives

Assess the breadth and depth of current skills provision for domestic retrofit

Understand the qualification levels required to deliver domestic retrofit initiatives

Review curriculum content and training content

Assessment of market demand for skills related to domestic retrofit

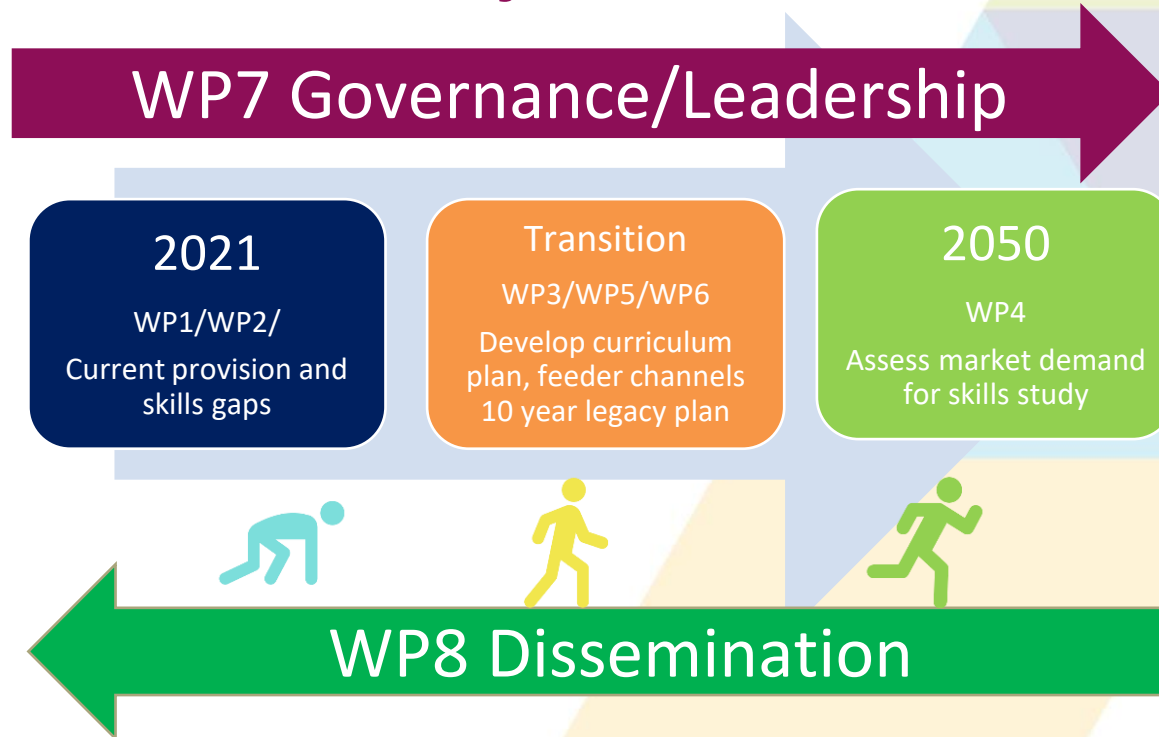
Build a 10 year plan for futureproofing and strategy development

The Project team

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North East Domestic Energy Skills Assessment Project Framework



Domestic Energy Skills Assessment

Assessing Current and Future Supply of Skills

Literature Review

Training providers

Learning Aims Database

ESFA Data Cube

Assessing Current and Future Demand for Skills

Quantitative Analysis of demand using different future scenarios and a policy overlay



Identify gaps and develop a skills plan

Identify Feeder Channels

Identify initiatives, approaches and tools to apply regionally

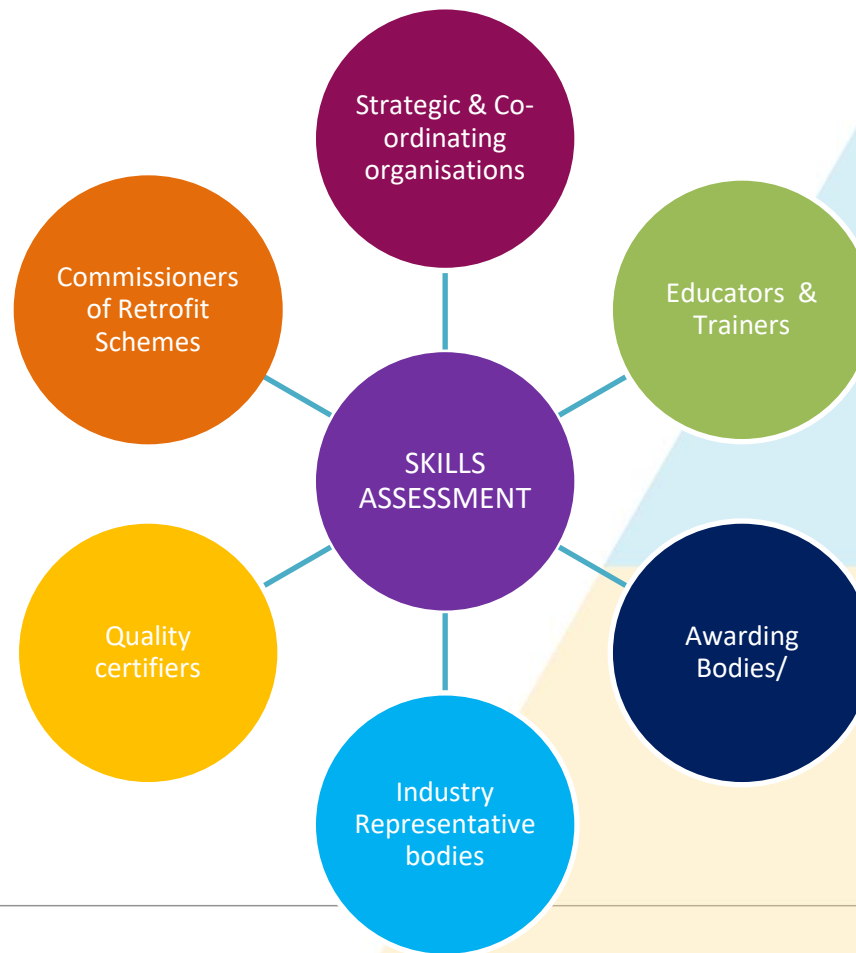
HIGH LEVEL WORK PLAN NORTH EAST DOMESTIC ENERGY SKILLS ASSESSMENT

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	2021					
Work Packages	Jul	Aug	Sep	Oct	Nov	Dec
WP1: Stakeholder Engagement						
WP2: Identify gaps in skills and training provision						
WP3: Develop a skills plan						
WP4: Assess Market Demand						
WP5: Identify 'Energy Feeder Channels'						
WP6: Build Regional Delivery Model						
WP8: Dissemination and Knowledge Transfer						
WP7: Governance and Leadership						

WP1: Stakeholder Engagement Groups

Develop a
Stakeholder
engagement plan



WP1: Engagement Themes include

- Gathering data on existing research and pilots
- Explore current provision, gaps, challenges, barriers, future provision and support required.
- Explore curriculum content and skills gaps
- Explore current and future projects and initiatives that will help to accelerate the pace of change.
- What assets do we have in the region to utilise
- What is current demand for retrofit skills?
- Where are the examples of best practice?
- What specific support is required
- Industry's main concerns and challenges

WP1: Engagement Methods

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Steering Group x 2

1-2-1 discussions

Existing
meetings/networks

Workshop Events x
3

On-line survey of
FE Colleges/ITPs

? Open to other
suggestions

WP2: Using existing and new evidence base to identify skills gaps

Literature Review

Review of Energy Systems Catapult data

Review of Learning Aims Database

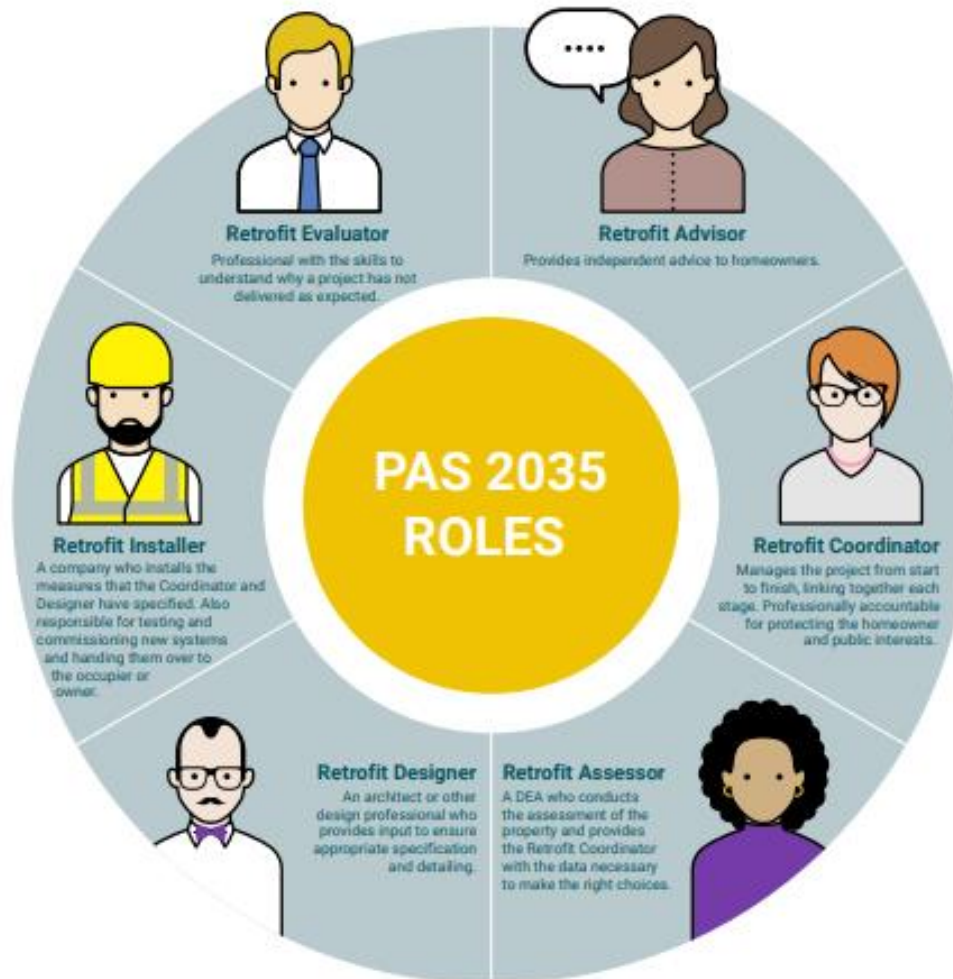
Review of North East LEP ESFA Data Cube

On-line Survey of FE colleges/Independent Training Providers

PAS Retrofit Roles

PAS 2035 also introduces a series of defined roles to ensure it is clear who is responsible for what at each stage of the project. It further defines what qualifications and accreditations they must hold, but we can leave that for another time.

The roles are:



Concluding Remarks

- Great deal of activity in the area, nationally and regionally
- Seems to be good will to collaborate and share
- Dynamic process, opportunities already emerging
- Some large scale training activity planned
- Important to think about how the region's plug into these

**Interested and would like to discuss
any aspect further**

Please get in touch - I would really welcome your input!

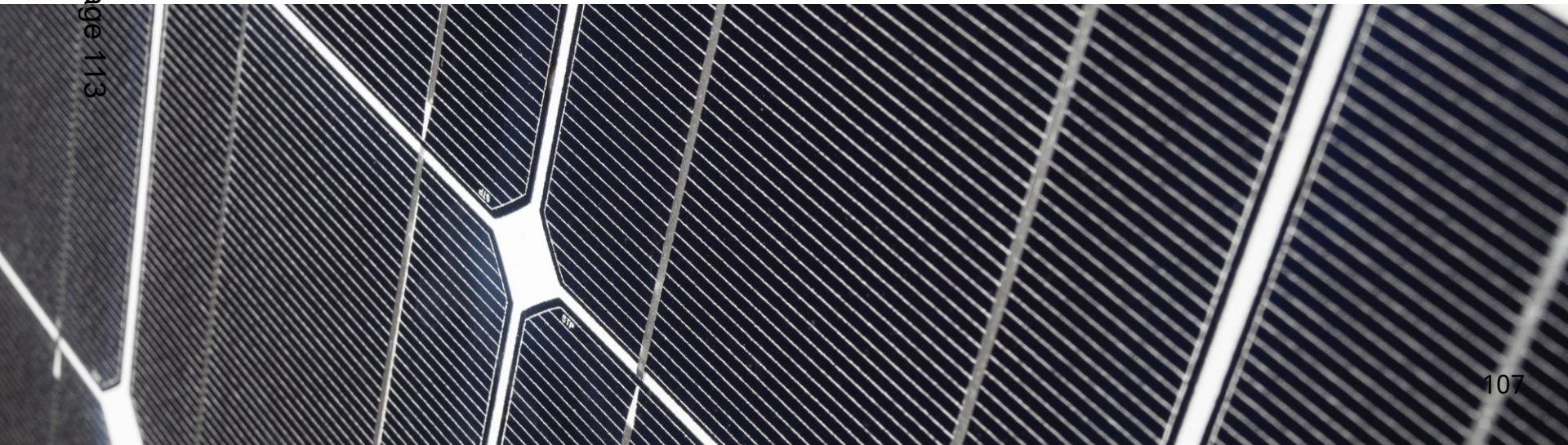
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Retrofit Skills Analysis

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Net Zero is a huge opportunity for growth and industry transformation

The recently published CLC Skills Plan is a result of close collaboration between industry and Government, it recognises the potential opportunity that Net Zero presents to the sector and also the skills challenges that need to be overcome to deliver this.



According to Alex Vaughan, Costain CEO, cutting carbon is a "huge opportunity for the sector".

Around half of all UK emissions can be influenced by construction. We have the opportunity to:

- ✓ Transform the way the built environment works with the environment
- ✓ Drive waste management elimination
- ✓ Reduce impact on the environment
- ✓ Reform safety and competence to create a safe environment.

Background

Our [Building Skills for Net Zero](#) research published earlier this year identified the huge challenge and opportunity presented to the industry of retrofitting existing buildings in order to reach **Net Zero by 2050**.

Estimated **27 million domestic** and **2 million non-domestic** properties requiring energy efficiency retrofit.

Construction Leadership Councils (CLC) RMI group identified a need for further analysis of the skills requirements to deliver the National Retrofit Strategy.

Achieving net zero scale of the challenge

Existing demand

Output growth average of 4.4% across 2021-2025

= **need to recruit extra 217,000 workers**, [43,000 / year]

[CITB Construction Skills Network, June 2021]

The net zero RMI target requires investment to retrain and create **new roles for 350,000 people by 2028** (a 13% increase in output capacity) **in addition to the above**

[CITB Building Skills for Net Zero, March 2021]

Green jobs

- Retrofit assessors, designers, coordinators, evaluators
- Installers – building envelope & heat pump
- Heat networks – design & management
- Modern Methods – designers, surveyors, installers project managers.

Key Skills Findings

1. There is a need for a large increase in the numbers of **heat pump installers** that will be required in order to deliver the volume of installations required and to meet the governments targets.
2. **Insulation installers** are also a key occupation and one where some are already reporting skills shortages and gaps in the knowledge of current installers.
3. There is also recognition that there will be an increasing need for effective **project managers** with an understanding of the retrofit process.
4. There is an increasing need for tradespeople to have an understanding of how a **building works as a system** and how the different elements of retrofit measures interact
5. The majority of training courses focus on new build and not retrofit which has led to a lack of knowledge within the existing workforce.
6. **Retrofit Co-ordinator** role is seen as being essential in ensuring that quality is maintained as different systems are installed alongside each other.
7. Tradespeople will need to develop further '**soft skills**' such as communication and teamwork

Key Findings

1. Need for a longterm programme of work
2. Importance of a 'fabric first' approach
3. Advocation of a whole house retrofit approach
4. Need for increased engagement and collaboration

Barriers

- Lack of demand from home-owners, measures are expensive (beyond the means of most households) and disruptive
- Lack of knowledge and understanding from homeowners
- Government schemes have been too short in duration and have created 'a boom and bust' cycle
- Government schemes have also been too complicated for both householders and SMEs
- SMEs are cautious
- Quality assurance concerns

Challenges

- Legacy of short duration government initiatives
- Continuous professional development needs to be adopted
- SME builders are already busy

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Interviews with SMEs in the industry have expressed the following concerns:

- Government schemes have previously attracted some 'cowboy firms'
- Reputation risks/concerns
- The need for quality assurance and some form of regulation
- Skepticism and caution around engaging with government schemes
- Complexity of government schemes and their accreditation processes
- Perceived higher risk
- Skills concerns

Solutions

Solutions:

- A coordinated retrofit strategy and supporting skills plan
- Governments to commit to path to Net Zero to stimulate demand in the domestic housing market
- Local authorities and social housing programmes lead supply chain development
- Minimum standards for retrofit to ensure quality installations
- Place based approach facilitates economies of scale
- Building Passports for all buildings

CITB Activity

Standards & Qualifications

- Developed retrofit pathways in the NOS for Construction Site Management and Construction Site Supervision
- Built in to the NOS review process energy efficiency, retrofit and net zero
- Plan to develop a Net Zero Competency Framework
- NOS for Insulation and Building Treatments review is in progress – looking for employers to join the working group
- Working with government on the Apprenticeships standards review and on new traineeships and T-Level development

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CITB Research

- Research in progress looking at Insulation skills requirements in more detail
- Development of employment model for use at sub-regional level – pilot in progress
- Planned research into embodied carbon and the impact of the Future Homes Standard

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Thank you

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RE:GEN

GROUP

A view from Industry - Developing future skills

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Lee Francis



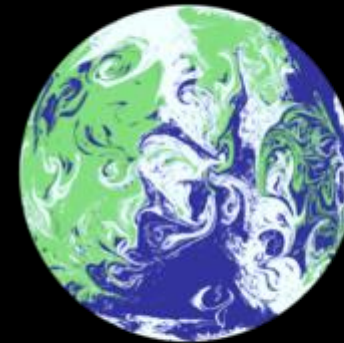


Context – The Green Agenda

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- 39% of carbon (Incl embodied) is produced by the Built Environment
- 28% operational carbon and 11% embodied carbon
- 20% of UK stock built pre 1919
- 29m properties requiring retrofit action (20%)
- 8m are hard to treat properties
- 270,000 homes per year to achieve 2030 target
- 62% of North East properties have EPC Band D or worse
- 600,000 heat pumps to be installed per year by 2028
- 300,000 new homes per year

Northern Housing Consortia 2021



UN CLIMATE
CHANGE
CONFERENCE
UK 2021

IN PARTNERSHIP WITH ITALY

RE:GEN
GROUP

Whinfell, Sunderland

- Fabrick Enhancements to 20nr
- Loft top ups to 249nr
- Windows replacement to 309nr
- Loft top up and Window Replacement to 25nr
- c£3m project value

- SHDF notice approx. June 21
- Funding opened mid September 21
- Submission mid Oct 21
- Notification Dec 21
- Start on site Jan 22
- Completion Jan 23

Funding Submission;

- 'Strategic fit'
- Delivery Assurance
- Project Outputs
- VFM





Required;

- Site visit complete
- Risk Path Analysis
- Retrofit assessment
- Measured Survey
- SAP modelling
- Design
- Retrofit design sign off
- Design review with installers to make sure conform to PAS 2030 (2019) and are to PAS 2035 requirement
- Engagement with supply chain for PAS2035 installation details
- Compliance statements
- Construction programme review based on non-compliant designs
- Risk Register
- Price

+ Quality submission

Partners





- Stock data
- Evolving
 - Compliance
 - Technology
- Budget – Anticipated ave spend c£25k per property to retrofit to EPC rating 'C'
- Competing Factors;
 - Fire compliance
 - High Rise (Cladding etc)
 - Development
- Approvals (Planning / conservation / building control)
- Resident involvement / engagement
- R&M

Client Challenges



Customer Challenges

- Age and wide demographics
- General mixed needs across sector
- Fuel poverty
- Digital poverty
- Energy prices (Gas / electric)
- Behavioural change
- Education new technologies



SCAN ME

RE:GEN
GROUP



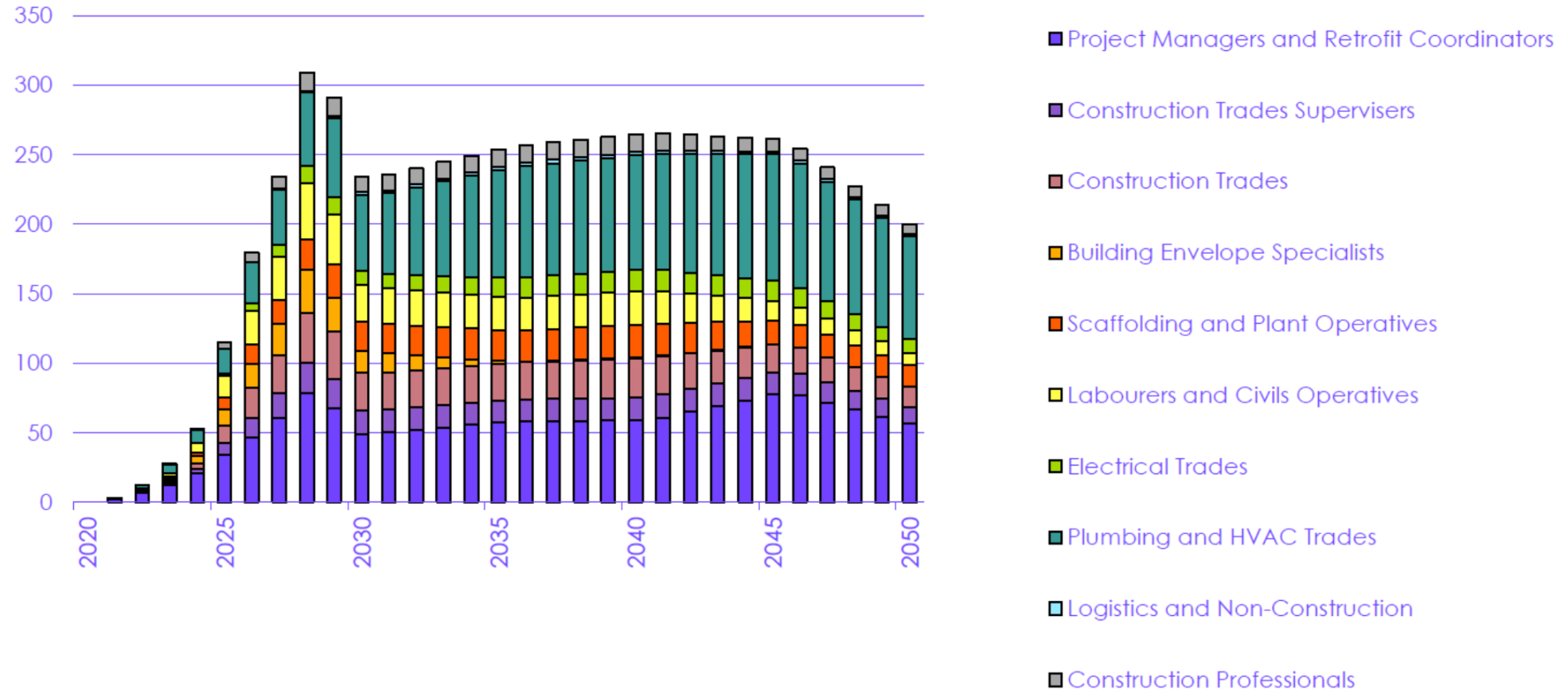
- Diverse resource requirements
- Risk!
- Evolving compliance / technologies and funding
- PAS2035 Compliance & Understanding
- Post completion Maintenance and aftercare
- Limited supply chain
- Competing Factors;
 - Full order books
 - Cost driven model
 - Material availability and cost certainty
 - Skill shortage
 - Existing trades
 - New emerging roles

Delivery Challenges



Over 200,000 jobs created

FTE above 2019 (thousands)



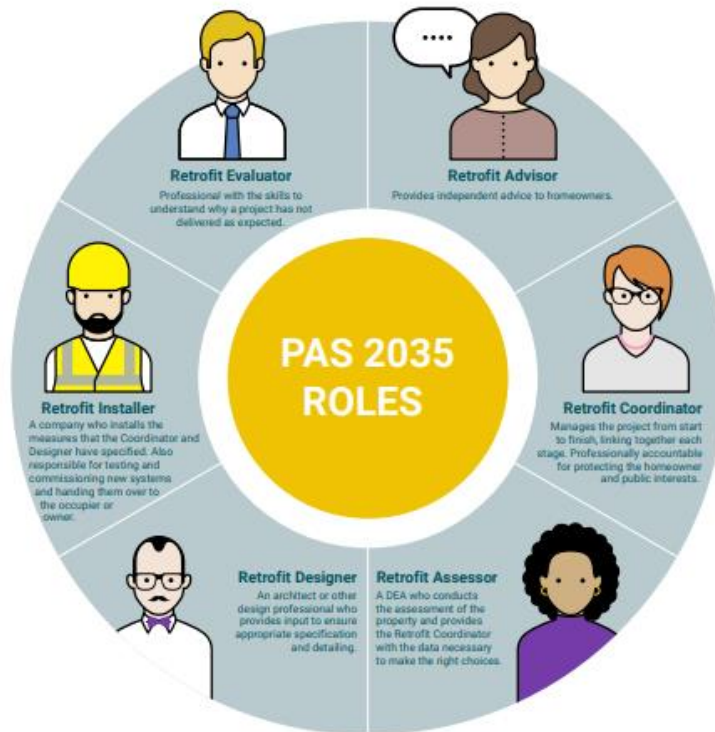


Skills

PAS Retrofit Roles

PAS 2035 also introduces a series of defined roles to ensure it is clear who is responsible for what at each stage of the project. It further defines what qualifications and accreditations they must hold, but we can leave that for another time.

The roles are:



- Basic understanding of;
 - Decarbonisation agenda
 - Retrofit
 - Compliance
- Roles;
 - Project Management
 - Quantity Surveyors
 - Heating Engineers
 - Energy consultants
 - Aftercare 'experts'
 - Resident Liaison



A more radical approach...?

My Ask...

1. Collaborative approach to ensure FE matches employer needs
2. Set standards / benchmarks
3. Seamless route into FE
4. Work ready individuals

Areas for exploration

1. Shared resource / expertise
2. Employer / FE integration workshops / Job shadowing
3. Joined up approach



Thank you!

UNLOCKING THE JOB POTENTIAL OF ZERO CARBON

Report on the case studies United Kingdom,
Hungary and the Republic of Ireland

Anne Chapman, Jonathan Essex and Peter Sims

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December 2018

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Peter Sims is an Electronic Engineer who specialises in systems engineering. He particularly focuses on the overlap and interfaces between human and non-human systems. For example, the relationship between energy or transport systems and human behaviour in the context of climate change. This work has included a multi-disciplinary design project to propose a two-degree climate compatible energy system for Europe. He has carried out the modelling of job creation from the transition to a zero-carbon economy described in this report.

Acknowledgements

Whilst many peoples' work has informed this study, and precursor reports on Sheffield and the Isle of Wight (UK) we would like to particularly thank Ray Cunningham (Green House), Tommy Simpson and Hayley Farrell (Green Foundation Ireland) and Josef Gal (Ökopolis Alaptivány).

The **Green European Foundation (GEF)** is a European-level political foundation whose mission is to contribute to a lively European sphere of debate and to foster greater involvement by citizens in European politics. GEF strives to mainstream discussions on European policies and politics both within and beyond the Green political family. The foundation acts as a laboratory for new ideas, offers cross-border political education and a platform for cooperation and exchange at the European level.

Green House is a think tank, founded in 2011. It aims to lead the development of green thinking in the UK.



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ABBREVIATIONS

EV	electric vehicle
FTE	full time equivalent
GW	gigawatt (one thousand million watts)
ICE	internal combustion engine
kW	kilowatt (one thousand watts)
MW	megawatts (one million watts)
NUTS	Nomenclature of Territorial Units for Statistics
ONS	Office for National Statistics https://www.ons.gov.uk/
PV	photovoltaic
W	Watt, a unit of power
Wh	Watt hour, one watt for one hour, a unit of energy



SUMMARY

Meeting the challenge of climate change requires structural changes to the economy so that it is no longer dependent on fossil fuels: we need to reduce overall energy use and ensure that all the energy that we do use is from renewable sources. This will require the creation of a large number of new jobs.

The Green European Foundation, with the support of Green House Think Tank, has developed a model to estimate the number of jobs that would be created in key sectors of the economy, and to not only demonstrate that a transition is achievable but to also show where those jobs will be. To this end, we have applied the model to the United Kingdom as well as to Ireland (with the support of Green Foundation Ireland) and Hungary (with the support of Ökopolisz Alaptivány).

In too many countries the economy is out of balance. Large cities, linked into a global economy, are thriving, whereas many smaller places and rural areas are in decline. Existing patterns of infrastructure spending, which promote long distance transport links between thriving cities, will only make things worse. But a different path is possible: our research shows that increasing ambition on climate targets and transitioning the economy towards zero-carbon would result in a net increase in jobs all over the three countries looked at, helping to rebalance the economy.

Our model includes: the installation and maintenance of renewable energy systems; sustainable transport; buildings (energy efficiency and installation of renewables); reuse and recycling of waste; and sustainable agriculture. We considered jobs created during a transition phase (to 2030) and in the longer term, by geographic area. The model combines published data about an area with available information on hours of work and hence numbers of jobs involved in, for example, installing wind turbines, driving buses, insulating homes or separating waste for recycling. Where information is available, we have then subtracted the jobs that will be lost in current fossil fuel-dependent activities, such as coal power stations and car maintenance. Many people will need training or support of some kind to take up the new jobs, so we have included an estimate for such 'support jobs'.

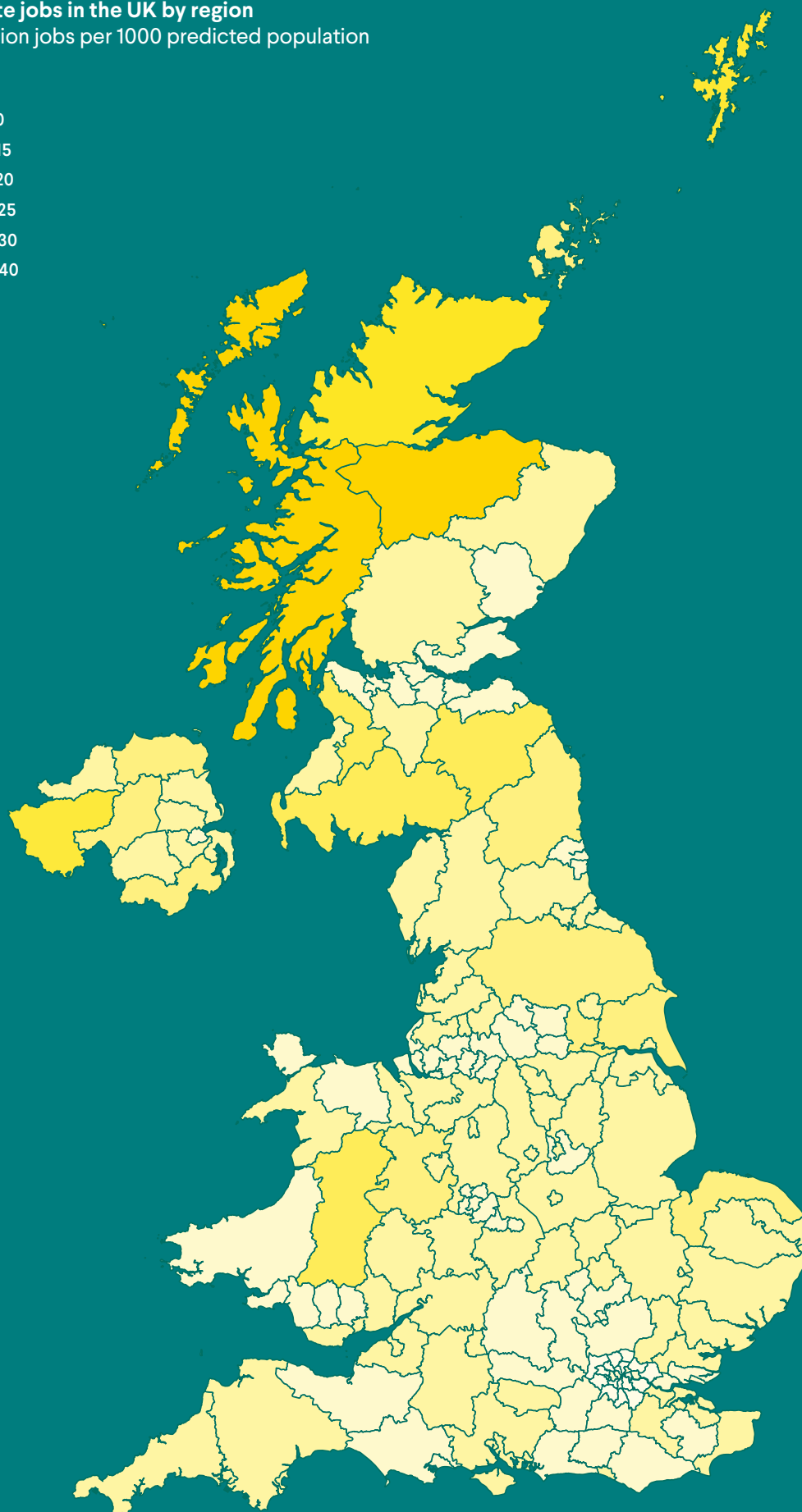
We first developed the model in 2016 in a study of the potential for creating climate jobs on the Isle of Wight, in the UK. This was followed by estimates for the Sheffield City Region in 2017. In 2018, we developed a model for the whole of the UK and estimated the jobs that could be created in Ireland and Hungary (excluding the agricultural sector).

Some of the new jobs are proportional to the population whilst others depend on land availability: producing food and generating renewable energy both require land, which is mostly found in rural areas.

Our job estimates are conservative. Firstly, data on numbers of jobs was not available for some aspects of the transition, so these aspects were not included in the estimates. Secondly, we have not estimated the jobs created in the wider economy by the spending of those in the new jobs. Finally, we have not included jobs in the supply chain, such as making wind turbine blades and generators. These are likely to replace existing manufacturing jobs. This research shows that jobs-intensive investment at the local level can help achieve more ambitious climate targets and shift job creation away from the major cities, reducing regional inequality.



Climate jobs in the UK by region
Transition jobs per 1000 predicted population



CLIMATE JOBS IN THE UNITED KINGDOM

► 980,000 transition jobs ► 710,000 long term jobs

	Transition	Long-term	
Energy	347,600	103,900	Scale up renewables, especially wind and solar: installing and maintaining 274 GW of new capacity.
Transport	181,800	363,500	Rapidly shift to a sustainable mix of public and active transport.
Buildings	306,900	64,100	Massive street-by-street energy efficiency and renewables retrofit to 20 million homes.
Reuse and recycling	41,800	83,600	Double reuse and recycling from 45% to 90%.
Agriculture	19,800	39,500	Shift to locally sustainable, organic agriculture.
Training and support	80,800	58,900	Upskill, retrain and support people to take up new jobs.

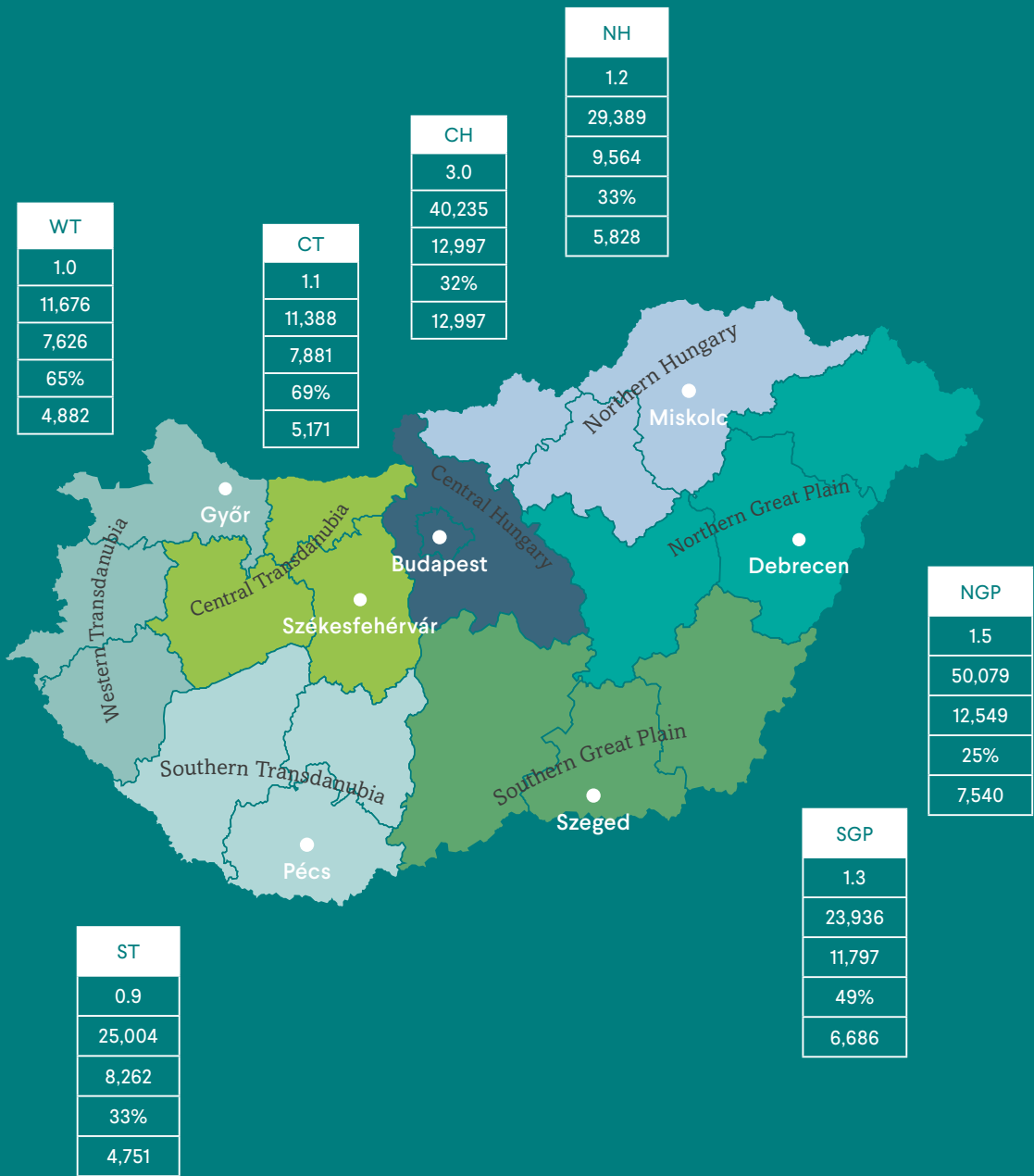
Current Situation: The UK economy is dominated by London. Some large cities and university towns in other parts of the country attract jobs and investment while in many coastal communities and post-industrial towns and villages there are few job opportunities. Growth of aviation and road transport have slowed reductions in carbon emissions.

Climate Opportunity: A transition economy would divert investment from long-distance transport, fracking for shale gas and speculative housing developments into local rail, bus and active transport to localise the economy, alongside massive planned renewables and energy efficient investment, and a new vision for farming and land-use to revitalise rural areas.



Regions of Hungary

Population (millions)
Unemployed (in 2017)
Transition jobs
As % of unemployed
Long term jobs



From <https://upload.wikimedia.org/wikipedia/commons/1/16/RegionsHungary.png>

CLIMATE JOBS IN HUNGARY

- 70,000 transition jobs ► 47,000 long term jobs

	Transition	Long-term	
Energy	20,300	5,000	Restart wind (15 GW) and scale up solar photovoltaic (10 GW) and other renewables.
Transport	11,900	23,800	Rapid transition to sustainable transport for all.
Buildings	28,200	5,900	Retrofit of energy efficiency and/or renewable energy systems to around 2 million homes.
Reuse and recycling	4,400	8,900	Nearly triple reuse and recycling levels to 90%.
Training and support	6,000	4,000	Upskill, retrain and support people to take up new jobs.

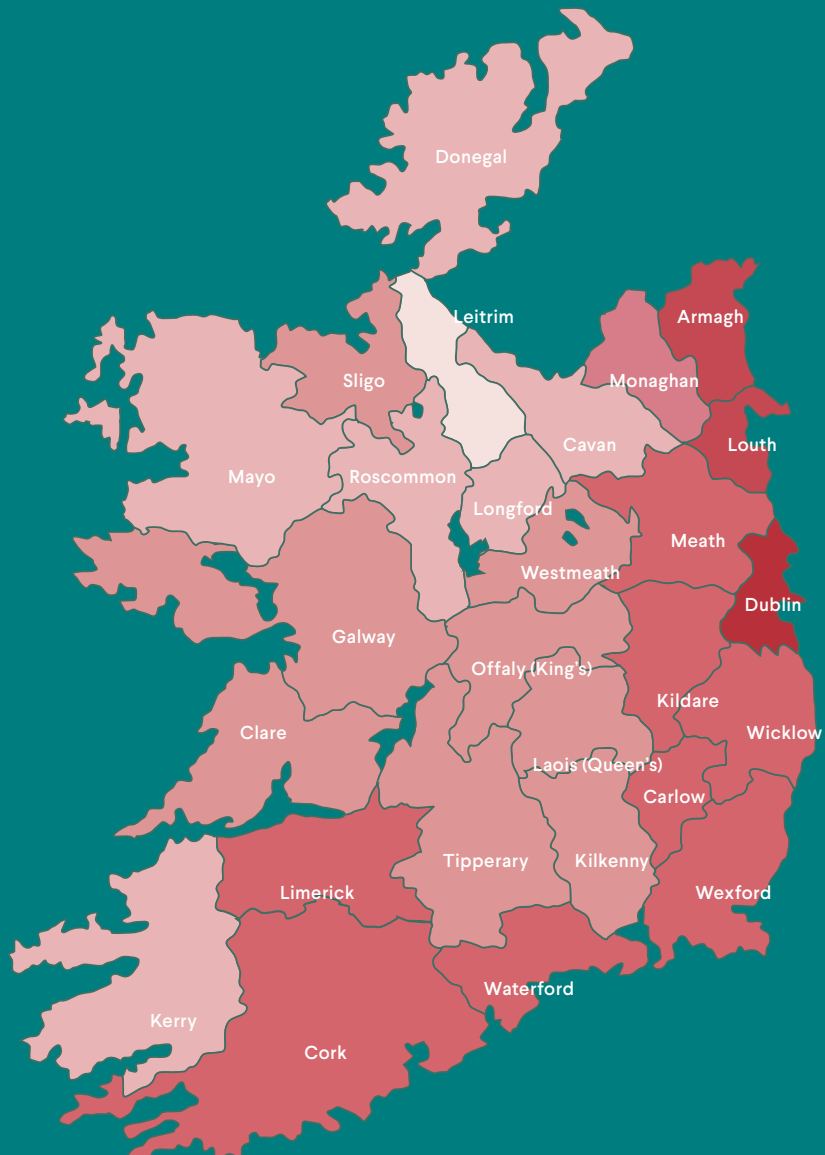
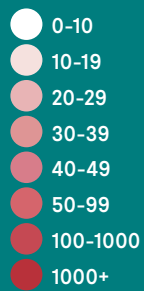
Current Situation: Hungary has a low population density with half the land used for arable agriculture (typically large-scale and industrialised) and a quarter forested. 30% of the population of just under 10 million live in the Central Hungary Region. The economy is increasingly centralised, dominated by the capital, Budapest. No wind turbines have been installed since 2010.

Climate Opportunity: The shift to a sustainable energy economy requires massive investment in renewables and rethinking of transport. The jobs created by a transition to a zero-carbon economy would help rebalance the economy across Hungary and could provide employment for between a quarter and two thirds of those currently unemployed, depending on the region.



Population density of Ireland map Based upon Republic of Ireland - 2002 Census results

People per km²



From https://en.wikipedia.org/wiki/File:Population_density_of_Ireland_map.png

CLIMATE JOBS IN IRELAND

- 53,000 transition jobs
- 38,000 long term jobs

	Transition	Long-term	
Energy	17,700	7,200	Strategic investment to install and sustain 18 GW of wind, solar and other renewables.
Transport	8,750	17,500	Shift to electric-powered, sustainable transport.
Buildings	22,100	4,600	Retrofit of energy efficiency and/or renewable energy systems to around 1.2 million homes.
Reuse and recycling	2,900	5,700	More than double reuse and recycling to 90%.
Training and support	1,500	3,100	Upskilling and support so all can access these jobs.

Current Situation: Ireland has a population of just over 4.8 million, of which 1.8 million live in the Dublin area. 120,000 people were unemployed in June 2018. A particular challenge to the transition in Ireland is the extraction and burning of peat in the Midlands to produce electricity, carried out by the semi-state company, Bord na Móna. Since its creation in 1946, this company has provided good jobs and relative prosperity to a previously impoverished region.

Climate Opportunity: The transition could create far more employment than that lost as peat extraction for power generation is phased out. This provides an opportunity for wider rethinking of what sustainable communities might look like across the country, including a chance to rethink the way Ireland uses its fertile countryside to produce cattle, beef and dairy products for export.



INTRODUCTION

Since 2016, the Green European Foundation with the support of Green House has been carrying out work on estimating the number of jobs that would be created by a transition to a zero-carbon economy; an economy where we take climate change seriously and reduce emissions of greenhouse gases in line with the aspiration to limit global warming to 1.5 degrees¹. We first focused on the Isle of Wight, an island off the South coast of England, for which we developed a model to estimate the number of jobs that would be created by the transition of key sectors of the economy. The model made use of published data about the number of jobs associated with activities such as insulating homes, or installing renewable energy systems, and data on the Isle of Wight. The report, *A Green Transition for the Isle of Wight*, by Jonathan Essex and Peter Sims, was published March 2017. This was followed by a similar study for a very different area of the UK, the Sheffield City Region. The results were published in May 2018, in the report, *Job Creation from a Sustainable Transition for Sheffield City Region: How delivering a climate change compatible sub-regional economy will create new enterprises and employment*². The research for the Isle of Wight and Sheffield reports was part of the Green European Foundation project on [Ecological Production in a Post-Growth Society](#).

In 2018, Green House has led a project for the Green European Foundation entitled [Strengthening Climate Targets, Creating Local Climate Jobs](#), working with Green Foundation Ireland and Ecopolis in Hungary.

This project has estimated the number of jobs that could be created by more ambitious emissions reduction targets and a local jobs-rich green investment strategy, in local authority areas in the UK, in each region of Hungary and in Ireland. This report describes the methodology used in that work and presents its results

METHODOLOGY

2.1 Overview

Our model combines:

- ▶ A zero carbon vision for the economy and how this would impact on each sector in practical terms;
- ▶ Published data about the geographic area of interest, such as land area, population, waste generation, etc.; and
- ▶ 'Job metrics' – hours of work and hence numbers of jobs per activity, derived from published sources.

These are combined in a spreadsheet to give an estimate for the number of jobs in each sector during a transition period (to 2030) and in the longer term. We have taken 2030 as the date when emissions need to be reduced to net zero because the UK Committee on Climate Change, in its consideration of what would be required to limit global warming to 1.5°C³, concluded that emissions of carbon dioxide and other long-lived greenhouse gases need to be reduced to net zero in the 2030s, or a decade later if technologies to remove CO₂ from the atmosphere become viable at scale. A precautionary approach is therefore to achieve net zero by 2030.

For some sectors the transition and long-term jobs are estimated separately as they are for essentially different activities (e.g. installing and then maintaining renewable energy systems). In calculating the number of transition jobs we have assumed that the activities required to bring about the transition, such as creating new infrastruc-

1 The 2030 target is consistent with the target to dramatically change our carbon emissions in the next 12 years set out by the IPCC. See IPCC (2018) Special Report: Global Warming of 1.5°C. <https://www.ipcc.ch/sr15/>

2 Both reports are available to download from <https://www.greenhousethinktank.org/climate-jobs.html>.

3 <https://www.theccc.org.uk/wp-content/uploads/2016/10/UK-climate-action-following-the-Paris-Agreement-Committee-on-Climate-Change-October-2016.pdf>



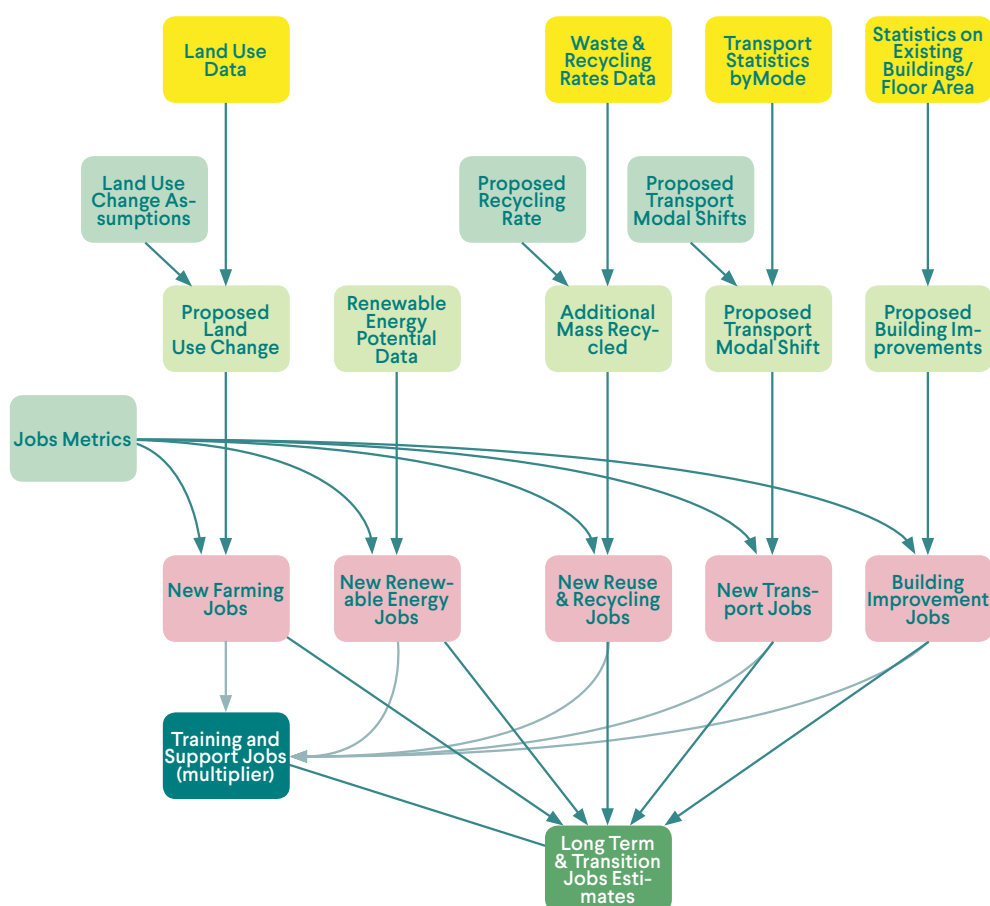
ture, are spread equally throughout the transition period. The transition jobs also include 50% of the long-term jobs, on the assumption that half of the transition will have happened half way through the transition period.

The sectors we have looked at are:

- ▶ Energy;
- ▶ Transport;
- ▶ Buildings (retrofit of renewable energy and energy efficiency measures);
- ▶ Reuse and recycling of waste; and
- ▶ Sustainable agriculture and forestry (in the UK only).

Once we have calculated the total number of new, full-time equivalent (FTE) jobs in a sector we have then, where information is available, subtracted the jobs that will be lost in current fossil fuel-dependent activities, such as in running coal fired power stations and in the maintenance of internal combustion engine vehicles. Many people will need training or support of some kind to take up the new jobs so we have included an estimate for such 'support jobs', calculated from the total number of jobs. An overview of our method is given in Figure 1.

Figure 2 Overview of methodology



For the UK we looked at each NUTS (Nomenclature of Territorial Units for Statistics) level 3 area, used by Eurostat⁴ and the UK Office of National Statistics (ONS).⁵ These are similar to the UK areas of local government: they are generally smaller than UK Counties but larger than districts or single Unitary Authorities. For Hungary we modelled jobs in each of the seven NUTS 2 regions and for Ireland the job estimates were modelled for the Republic of Ireland as a whole. This methodology section sets out how we estimated the climate jobs in the UK. Sections 4 and 5 discuss how that method differed for the estimates made for Hungary and Ireland respectively.

⁴ ec.europa.eu/eurostat

⁵ ons.gov.uk



2.2 Energy

Vision:

An energy system powered by renewable energy, where electricity is used for transport and heating as well as its current uses.

Onshore wind and river run hydro

The amount to be installed has been taken from national estimates,⁶ then scaled to the NUTS3 areas depending on the available land area in each which is not urban, forestry or urban green space.

Offshore wind and tidal

Estimates have only been made at the national level and not allocated to NUTS3 areas.

Solar Photovoltaics (PV)

The jobs estimated under this sector include those associated with ground-mounted solar farms and solar photovoltaic systems installed on the roofs of commercial and public buildings. Those involved in installing and subsequent maintenance of solar PV on domestic properties are included under Buildings. The amount of solar PV installed in each NUTS3 area is based on the available area of former landfill and mining sites, and of the relevant roof areas using the following assumptions:

% of landfill & mining area used for ground-mounted solar PV	40%
% of urban land area assumed to be public/community roof space	2%
% of industrial/commercial land area which can be used for solar PV	10%
Assumed MW PV per Ha ground-mounted solar PV7	0.52 MW
Assumed MW PV per Ha roof-mounted solar PV8	0.83 MW

Finally, the existing jobs in fossil-fuel power stations were subtracted from the total new jobs. Jobs associated with fossil fuels used in the industrial sector have not been included.

A flow chart showing how we have modelled jobs in the Energy sector is shown in Figure 2. The jobs metrics used, and their sources are shown in Table 1.

6 Estimates of renewable potential are primarily based on figure 5.1 of <http://fes.nationalgrid.com/media/1363/fes-interactive-version-final.pdf> and Allen et al, 2013.

7 Average for Isle of Wight Solar Farms – from Essex and Sims, 2017

8 From Solar PV – Buyers Guide produced by the Energy Managers Association. <http://www.theema.org.uk/wp-content/uploads/2015/12/Solar-PV-EMA-Buyers-guide.pdf>

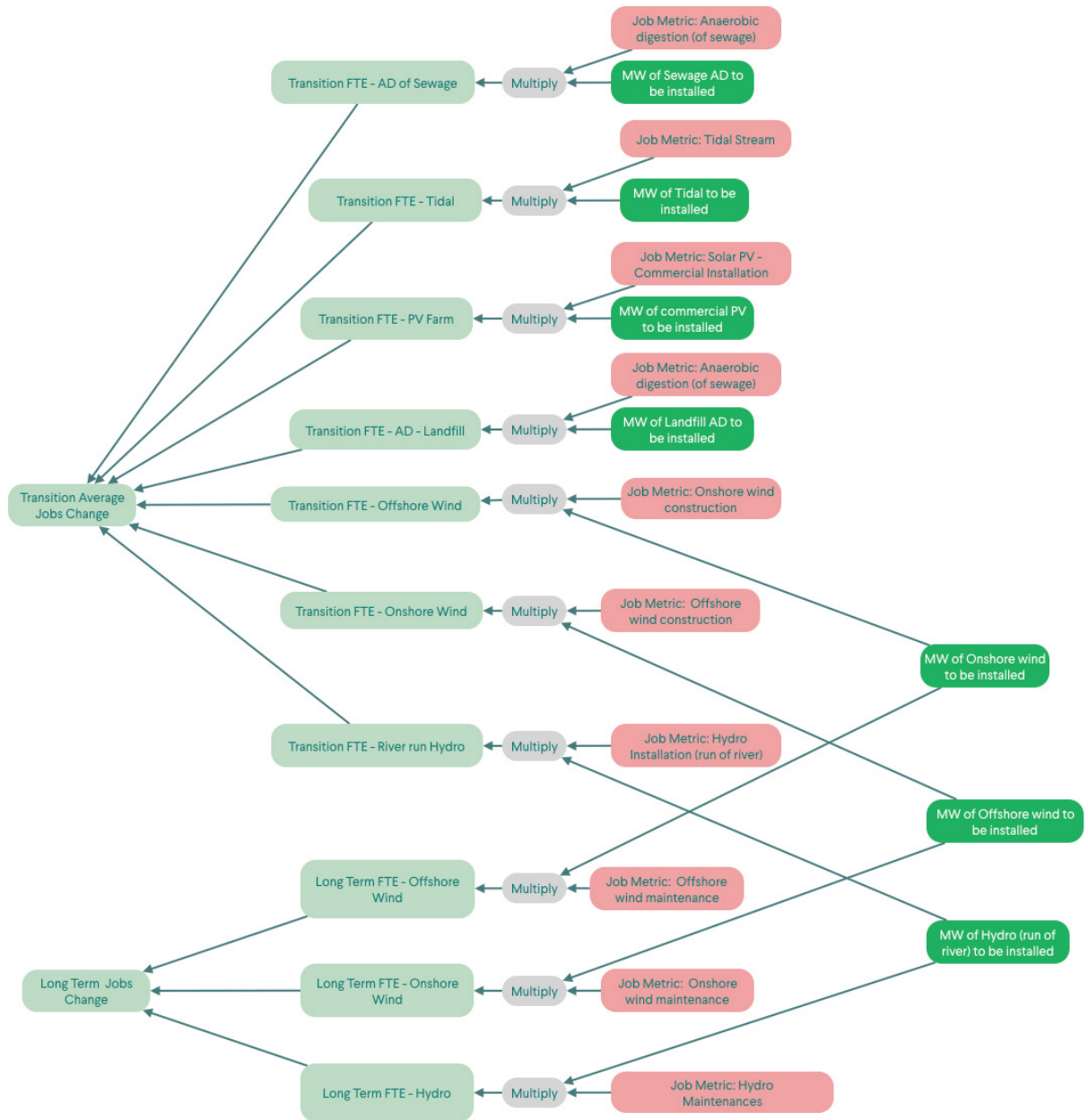


Table 1 Job Metrics for the energy sector

Job Type	Scaling metric	Notes	Source
Onshore wind construction	9 job years per MW installed		https://www.campaigncc.org/sites/data/files/Docs/online_companion_nov_2014.pdf
Onshore wind maintenance	0.3 jobs per MW		https://www.campaigncc.org/sites/data/files/Docs/online_companion_nov_2014.pdf
Offshore wind construction	18 job years per MW installed	Assumed to be twice as labour-intensive as on-shore wind	https://www.campaigncc.org/sites/data/files/Docs/online_companion_nov_2014.pdf
Offshore wind maintenance	0.7 jobs per MW	Assumed to be twice as labour-intensive as on-shore wind	https://www.campaigncc.org/sites/data/files/Docs/online_companion_nov_2014.pdf
Tidal Stream	2.1 jobs per MW	From the figures for Dorset in The Resilience Centre, 2015. 64 jobs from 30 MW installed capacity	http://mollymep.org.uk/wp-content/uploads/The-power-to-transform-the-South-West_FINAL1.pdf
Solar PV – Commercial Installation	2 Job years per MW installed	From the figures for Dorset in The Resilience Centre, 2015. 1287 jobs from 650 MW installed	http://mollymep.org.uk/wp-content/uploads/The-power-to-transform-the-South-West_FINAL1.pdf
Hydro Installation (low head: run of river schemes)	48.5 job years per MW installed	From data for <100KW projects in Forrest and Wallace, 2009.	https://www.nls.uk/scotgov/2010/9780755992270.pdf
Hydro Maintenance (low head: run of river schemes)	1.3 jobs per MW	From data for <100KW projects in Forrest and Wallace, 2009.	https://www.nls.uk/scotgov/2010/9780755992270.pdf



Figure 2 Energy jobs modelling flow chart



2.3 Transport

Vision:

Many existing private car journeys will be replaced by walking, cycling or public transport. Internal combustion engine (ICE) vehicles will be replaced by electric vehicles (EVs) or, where this is not feasible, with vehicles that use hydrogen or biodiesel. The railways are almost completely electrified.

We have assumed a modal shift as set out in *Zero Carbon Britain, Rethinking the Future*, by the Centre for Alternative Technology.⁹ Our assumptions about modal shift and changes in vehicle occupancy are shown in Table 2.

Table 2 Assumed changes in modes of transport and vehicle occupancy

	Occupancy		Change in distance travelled	Total change in distance travelled by people	Total change in distance travelled by vehicles
	Current	Proposed	km/person	million km/year	million km/year
Car- EV			55%	350,539	201,538
Car – ICE			-94%	-603,706	-347,093
person km/vehicle km	1.6	1.74			
person km/vehicle	12,480	18,595			
Bus			150%	62,850	6,983
London	19.8	19.8			
urban (outside London)	10.4	14			
rural	9	10			
Train			57%	37,813	291
passenger km/vehicle km	127	130			

In addition to the modal shift (which is the focus of our job creation calculation) the *transition* to this new transport system will require a massive programme of installation of electric vehicle charging points, substantial completion of the electrification of the current railway system and, potentially, the construction of new tram systems and railway lines. However, insufficient data was available to predict the number of jobs in these areas, so our modelling is of the *long-term jobs only* - in driving and maintaining buses, operating and maintaining the railways and maintaining private electric vehicles. From these new jobs we have subtracted the jobs that will be lost in the maintenance of private internal combustion engine vehicles.

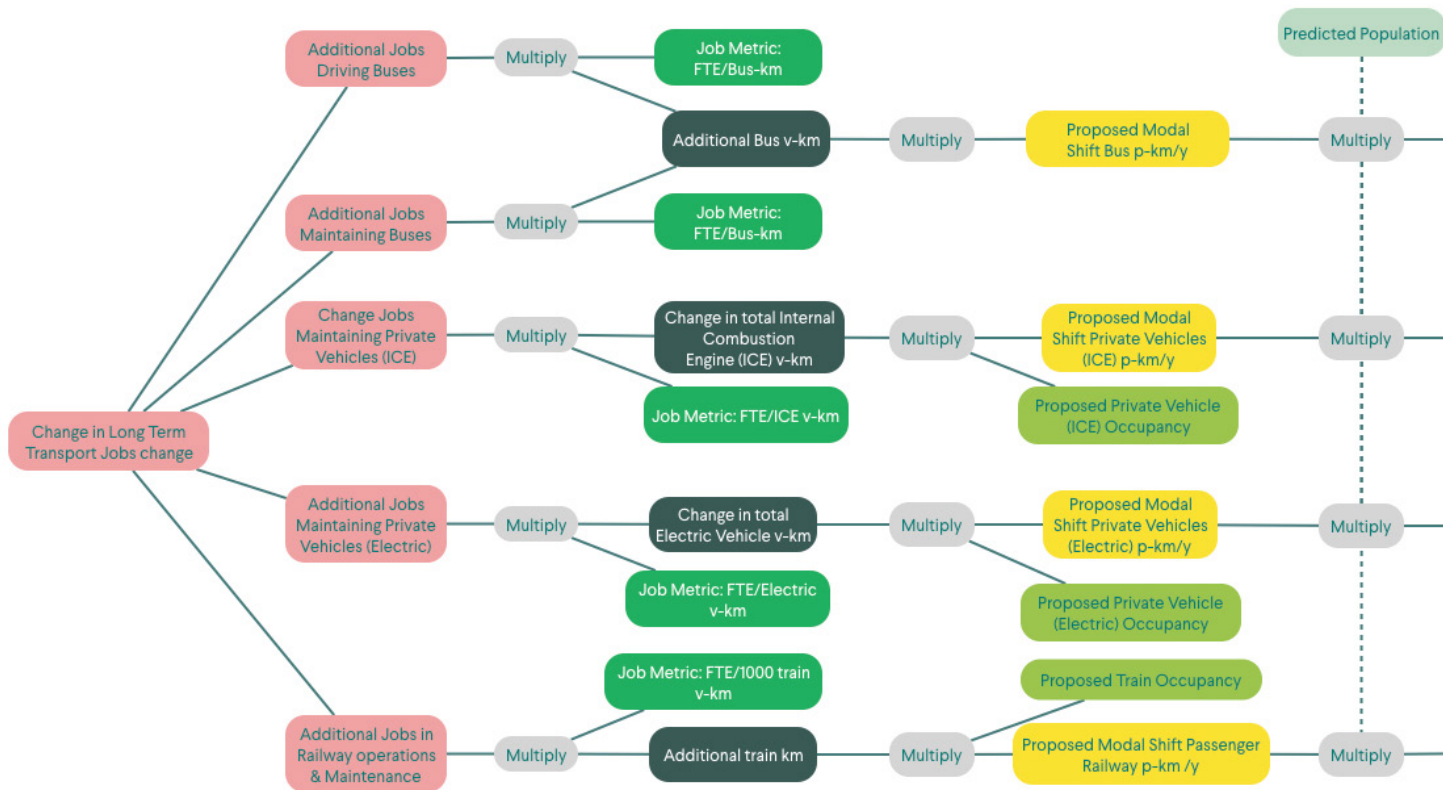
The required modal shift in freight, and the challenge to bring international transport (aviation and shipping) within global climate limits will also result in a significant transformation. This process will be supported by the re-localisation of the economy reflected in the changes across all of the other sectors modelled.

A flow chart showing how we have modelled jobs in the transport sector is shown in Figure 3. The jobs metrics used, and their sources are shown in Table 3. Job estimates have been done for NUTS2 areas then scaled to NUTS3 areas according to population.

⁹ See p.51 of Allen *et al*, 2013.



Figure 3 Transport jobs modelling flow chart



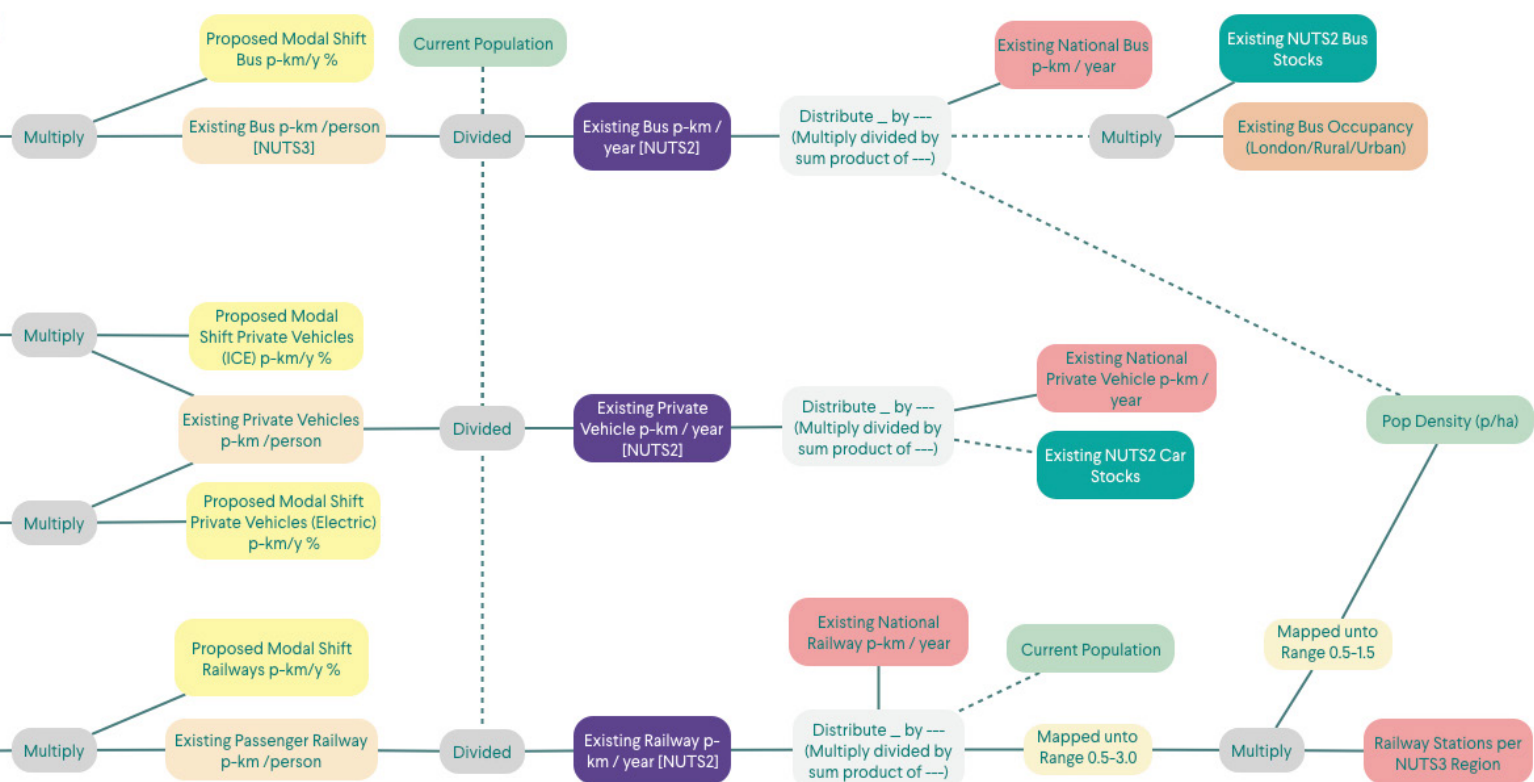


Table 3 Job metrics used in estimation of Transport Sector jobs

Job Type	Scaling Metric	Notes	Sources
Driving buses	0.4 FTE jobs per 10,000 bus miles/year	Bus drivers employed in the UK per bus miles in the UK.	ONS data: <i>Annual Bus Statistics 2011/12</i> and Table EMP04 All in Employment by Occupation, Apr-June 2016.
Maintaining buses	0.1 FTE jobs per 10,000 bus miles/year	Employment in bus maintenance in the UK per bus miles in the UK. Existing maintenance intensity assumed to apply to Trolley/EV/hydrogen buses.	ONS data: <i>Annual Bus statistics 2011/12</i> BUS 0208 and Table EMP04 All in Employment by Occupation, Apr-June 2016
Railways - Operation and maintenance	4.1 FTE jobs per 10,000 train miles/year	Total UK rail industry staff divided by total train-km (Includes supply chain),	Rail Delivery Group <i>Annual Report 2016</i> and Office for Rail and Road, 2016 /17 statistics.
Maintaining private internal combustion engine vehicles (ICE)	0.5 FTE jobs per 1,000,000 private vehicle miles/year	Based on 233,000 FTE jobs supporting 316.7 billion vehicle miles.	ONS, Table TRA8901 and Table EMP04, <i>All in Employment by Occupation</i> , Apr-June 2016.
Maintaining private electric vehicles (EVs)	0.3 FTE jobs per 1,000,000 private vehicle miles/year	Based on EVs requiring approximately 2/3 of the maintenance of ICE vehicles.	Van den Bulk, 2009.

2.4 Buildings

Vision:

Energy efficient buildings that require little heating or cooling and generate much of the energy they use.

Whilst there is clearly a need to make all buildings energy efficient and to retrofit them with renewable energy technologies, we have not been able to find data on the number, size and location of commercial, public and community buildings. Our job estimates are therefore just based on retrofit of domestic dwellings. To estimate the numbers of jobs created we have assumed that 75% of dwellings require improvements to their energy efficiency, 75% will be fitted with solar thermal, 20% with solar PV and 13% with ground source heat pumps. The numbers of buildings containing dwellings in each NUTS area have been obtained from Eurostat (2011 census data). In some cases the number of dwellings was not available at the NUTS3 area level, in which case we have scaled down from the NUTS2 level by population.

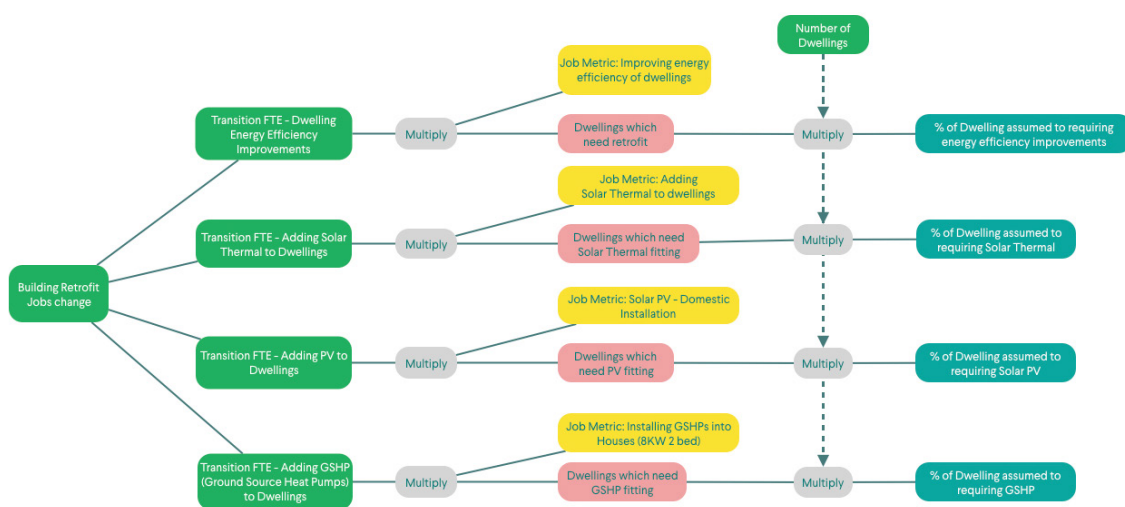
A flow chart showing how we have modelled jobs in the buildings sector is shown in Figure 4. The jobs metrics used, and their sources are shown in Table 4.



Table 4 Job metrics used in estimation of Buildings Sector jobs

Job Type	Scaling Metric	Notes	Source
Improving energy efficiency of dwellings	81.5 jobs for 1000 dwellings per year	Direct labour only. 134 hrs on site per house + 3hrs survey (see source)	Birmingham City Council, 2009
Adding Solar Thermal to dwellings	34.5 jobs for 1000 dwellings per year	Source has 1 FTE (direct and indirect) per 100m2 installed. Assume out of 2900 FTE jobs 400 are direct. Also assumed 4m2 per house as most installations are 2x2m2 panels.	Batisti, et al, 2007
Solar PV - Domestic Installation	26.6 jobs for 1000 dwellings per year	Assume it takes 30.75hrs to install 1 kW of PV, and 2 kWp installed per dwelling.	Birmingham City Council, 2009
Installing Ground Source Heat Pumps in houses	208 jobs for 1000 dwellings per year	Assume 8 kW heat pumps in 2 bed houses. From capital costs in source, assuming 40% of cost is labour and a wage of £26,000 per year.	www.gshp.org.uk and https://www.kensaheat-pumps.com/wp-content/uploads/2015/06/Retrofit-blueprint-document-120916.pdf
Dwelling Maintenance	3.1 jobs per 1000 dwellings	Additional maintenance as a result of retrofit & to maintain energy efficiency standards.	Birmingham City Council, 2009

Figure 4 Buildings Sector jobs modelling flow chart



2.5 Reuse and recycling of waste

Vision:

A society where products are repaired and reused much more than they are today, reducing the amount of waste we produce. Most of what does end up as waste is recycled.

The estimate of job creation is based on the shift to higher value recycling. This will facilitate a dramatic shift to increasing amounts of repair, remanufacturing and reuse. The job estimates in this area reflect the amount of extra employment in sorting, storing and making these materials and products available for reuse, repair and recycling. As limited breakdown of the waste sector is available in either the construction and demolition, or commercial and industrial sectors we have used data on the jobs involved in recycling of municipal solid waste alone. We have assumed that recycling rates will increase to 90% from their current levels.



We have looked at three types of waste:

- ▶ Municipal solid waste (MSW);
- ▶ Commercial and industrial waste (C&I); and
- ▶ Construction and demolition waste (C&D)

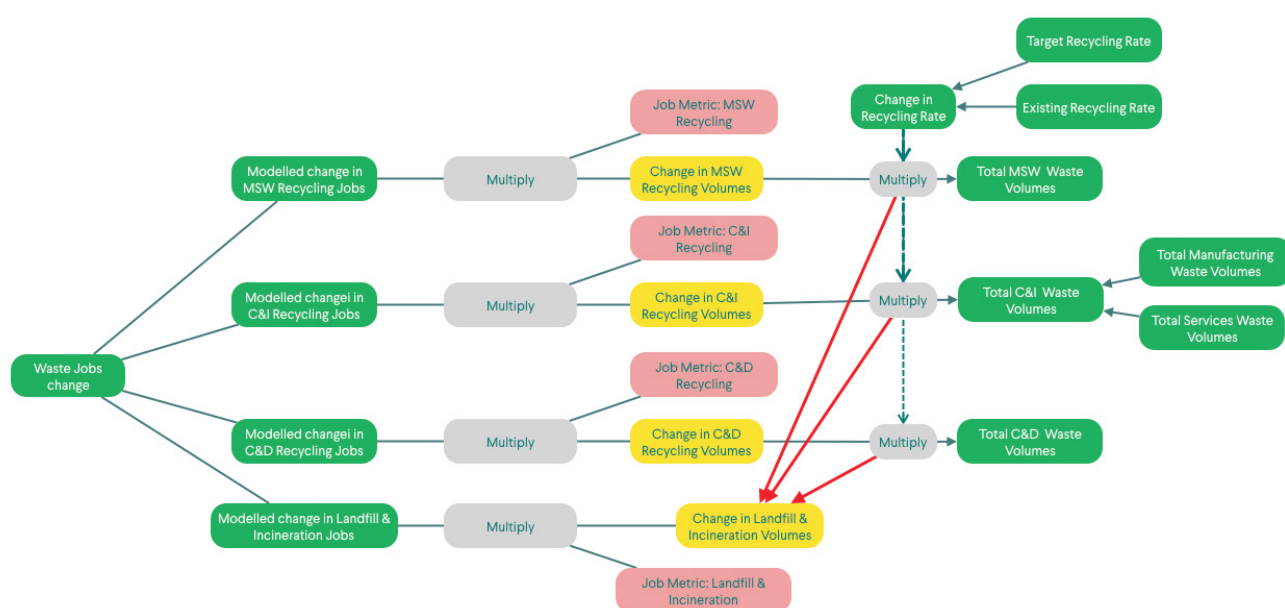
The tonnes of MSW by local authority area are available from ONS and we used this information to work out the amount in each NUTS3 area. The tonnes of C&I and C&D waste in each NUTS3 area was then scaled from national totals (obtained from Eurostat) on the basis of the percentage of the total MSW in each area. Existing recycling rates for MSW were obtained from Eurostat and the rate for recycling of C&I and C&D waste assumed to be the same as for MSW. In practice the current recycling rates may be higher in the latter, but this tends to be low value *downcycling* of materials rather higher value (and higher employment intensity) upcycling of products. A flow chart showing how we have modelled jobs in the waste sector is shown in Figure 5 and the job metrics used in Table 5.

Table 5 Job metrics used in estimation of Waste Sector jobs

Job Type	Scaling Metric	Notes	Source
Recycling of municipal solid waste (MSW)	2.9 jobs per 1000 tonnes of waste recycled	Excluding indirect & induced jobs.	Friends of the Earth, 2010
Recycling of commercial and industrial waste (C&I)	1.5 jobs per 1000 tonnes of waste recycled	Assuming 50% less jobs intensive than MSW recycling due to larger volumes.	
Recycling of construction and demolition waste (C&D)	1 job per 1000 tonnes of waste recycled	Assuming 66% less jobs intensive than MSW recycling due to larger volumes & inclusion of soils in waste volumes.	
Waste disposal	0.3 jobs per 1000 tonnes of waste	Source states that waste disposal (landfill & incineration) employs roughly a 10th of reuse and recycling.	Waste Watch, 1999, p.6

A flow chart showing how we have modelled jobs in the waste sector is shown in Figure 5.

Figure 5 Waste sector jobs modelling flow chart



2.6 Sustainable agriculture and forestry (in the UK only)

Vision:

A UK agriculture that provides sufficient food to feed the UK population, as well as providing fibre, leather and fuel, through a sustainable approach to farming and land management that combines a permaculture design approach with predominantly organic farming methods, which together also increase biodiversity.

Our modelling of jobs in agriculture started from estimating the amount of food UK agriculture needs to produce to feed the UK population and the amount of land needed to produce that food, as well as land needed for energy crops (for on-farm use) and for fibre crops (hemp and flax). For this we based our modelling on work carried out by Simon Fairlie (see Table 6).

When modelling land-use we have aimed to maximise sufficiency in each area. To achieve this we have prioritised horticulture (fruit and vegetable growing) on arable land before other agriculture land-use (up to the level required to provide sufficient fruit and vegetables for the local population), as the significantly higher labour intensity of horticulture and perishability of the product means it is more important to locate horticulture near centres of population. We have also allocated permanent pasture to dairy cows to maximise local food production before cattle for beef for the same reason. We have assumed that 40% of existing permanent pasture could in theory be used for arable crop rotation so have included this in available arable land. This leads to more mixed farming, rather than large-scale industrial agriculture that locates arable and livestock farming in different parts of the country. The amount of existing arable and permanent pasture land in each NUTS area was obtained from ONS. We also envisage increased management of 50% of existing woodland and better management of hedgerows (we have assumed 10% of field boundaries are laid hedges and that there are 0.01km of field boundary per hectare of arable and pasture land). Finally, we have used data on the numbers of jobs per hectare for different land uses, or per head of livestock, to calculate the number of long-term jobs.

Table 6 Diet and land requirements

					Land Required per person			Livestock	
Consumption		Calories in diet	Production needed per person	Yield (feed required)	Arable	Permanent pasture	Other land	Yield per head	live-stock
	g/ person/ day	kcal/ person / day	tonnes /year	tons/ha (tons/ton)	ha/ person	ha/ person	ha/ person	tonnes / head	head / ha
Cereals for human food	448	1526	0.164	4.30	0.038				
Potatoes	453	300	0.165	25.00	0.007				
Sugar	32	100	0.012	7.50	0.002				
Vegetables and fruit	500	150	0.183		0.002				
Green Manure					0.011				
Milk (incl butter, cheese)	568	330	0.207	3.7 (3.26 net)	0.047	0.029	0.226	4.800	0.727
Beef (grass reared)	33	86	0.012	0.40		0.030		0.227	0.753
Cereals for pigs (Bacon)	36	180	0.013	3.00	0.003			0.070	
Cereals for poultry eggs/chicken	30	50	0.011	3.40	0.009			0.014	
Sheep	9	24	0.003	0.08			0.039	0.018	0.214
Fish	11	11	0.004						
Energy crops (biofuels)					0.008				
Fibre crops (hemp and flax)	14		0.005	3.00	0.002				
		2757			0.126	0.06	0.27		

Adapted from Table F: Livestock Permaculture, p.98 of Fairlie, 2010
Other land includes moorland, 50% of which is allocated for rough-grazing of sheep.



The metrics used to calculate the numbers of jobs required to produce this food assume organic farming methods and are shown in Table 7. We have subtracted the number of existing jobs in agriculture, assuming that 88% of the farming jobs in Eurostat data are associated with the activities we have modelled (based on modelling of the number of agricultural jobs using job metrics for conventional farming), to calculate the net number of jobs. Transition jobs are assumed to be 50% of the long-term jobs. The transition could also involve jobs in planting new woodland, but we have not been able to find data on the number of jobs involved in this. We have not included jobs in non-farm horticulture in urban areas or jobs from the production of fibre crops as no metrics were available. The flow chart showing how we calculated jobs in the agriculture sector can be found in Appendix 1.

Table 7 Job metrics used in estimation of Agriculture and Forestry Sector jobs

Job Type	Scaling Metric	Notes	Source
Cereal Crops (Organic)	1.3 jobs per 100 ha		Hamer, 2012
Potatoes (Organic)	8.3 jobs per 100 ha		Hamer, 2012
Sugar (Organic)	2.4 jobs per 100 ha		Hamer, 2012
Fruit & veg (Organic)	7.7 jobs per 100 ha		Hamer, 2012
Dairy (Organic)	29.4 jobs per 1000 cows	excluding labour to grow grain for feed	Soil Association, 2006
Beef (Organic)	9.1 jobs per 1000 head of cattle	excluding labour to grow grain for feed	Soil Association, 2006
Pigs (Organic)	2.4 jobs per 1000 pigs	excluding labour to grow grain for feed	Soil Association, 2006
Sheep (Organic)	2.7 jobs per 1000 head of sheep	Not shepherded	Soil Association, 2006
Poultry - eggs (Organic)	2.9 jobs per 10,000 chickens (eggs)	excluding labour to grow grain for feed	Soil Association, 2006
Woodland management	0.3 jobs per 100 ha	Scaled from proposals for Britain in source	Independent Panel on Forestry, 2012
Timber processing (indirect)	0.1 jobs per 100 ha		Public and Corporate Economic Consultants, 2000
Biodiversity improvements	1.7 jobs per 10 km of hedge	Hedge Laying	Table 5 of Hird, 2015

RESULTS OF UK MODELLING

3.1 Overview

Our results indicate that at least 980,000 jobs would be created during the transition phase to 2030 and 710,000 in the longer term through the changes that we have suggested.

These estimates are conservative.

- ▶ Firstly, data on hours of work involved was not available for many aspects of the transition, so these aspects were not included in the estimates.
- ▶ Secondly, we have not estimated the jobs created in the wider economy by the spending of those in the new jobs.



- Finally, we have not included jobs in the supply chain, such as those involved in making wind turbine blades and generators. These are likely to replace existing manufacturing jobs.

A summary of the results for the UK, showing the transition and long-term jobs in each sector is shown in Table 8. The transition and long-term jobs in each NUTS area, as well as the population in 2018 and 2030, land area and population density of each area, are shown in Table A2.1 in Appendix 2.

Table 8 Summary of transition and long-term climate jobs in the UK

	Transition	Long-term
Energy	347,599	103,916
Transport	181,732	363,463
Buildings	306,918	64,075
Reuse and recycling	41,777	83,554
Agriculture	19,765	39,530
Training and support	80,800	58,909
Total	978,592	713,448

3.2 Energy sector results

The additional renewable energy capacity to be installed in the UK, along with total transition and long-term jobs this would create is shown in Table 9.

Table 9 Energy Sector: Renewable energy to be installed and transition and long-term jobs in the UK

Technology	Capacity to be installed	load factor	Annual generation	Transition Jobs	Long-term jobs
	GW	%	GWh	Average	
Offshore Wind	140	43%	530	277,788	92,400
Wave	9	29%	23	Not estimated	
Tidal	21	24%	44	6,965	
Onshore wind	39	29%	99	48,776	12,929
River run hydro	1.2	30%	3	6,503	1,611
PV on domestic roofs	6.3	9%	5	Estimated in Buildings sector	
PV ground-mounted and commercial roofs	55.4	9%	43	9,078	
Anaerobic digestion of landfill and sewage gas	1.4			Not estimated	
Existing jobs lost				-1,512	-3,024
Total	274		746	349,111	103,916

The jobs in each NUTs area are shown in Table A2.2 in Appendix 2. Note that jobs in offshore wind and tidal energy have not been allocated to a particular area.



There are other types of renewable energy, such as wave power and anaerobic digestion for which we have not included job estimates.¹⁰ Also, an all-renewable electricity system will require significant battery storage, upgrading the distribution network and improved demand management (including enabling and encouraging households and industry to switch their use of electricity to times when it is available from renewable sources). There will be jobs involved in all these activities but they have not been included in our estimate because of insufficient data.

3.3 Transport sector results

The total estimated number of long-term jobs in transport is shown in Table 10. Transition jobs have been assumed to be 50% of the long-term jobs. In addition there will be jobs during the transition in building the new infrastructure required: installing electric-vehicle charging points, electrification of railway lines and possibly constructing new tram systems and light railways. However, we have not been able to find the data required to estimate these jobs. Critically, this transition requires a shift in freight travel in the UK and internationally. This has not been included in this modelling work.

Table 10 Transport Sector jobs in the UK

	Total long-term jobs
Maintenance of private electric vehicles	67,392
Maintenance of private internal combustion engine vehicles	-158,664
Bus drivers	264,694
Bus maintenance	69,428
Railways operation and maintenance	120,614
Total	363,463

The jobs in each NUTS region are shown in Table A2.3 in Appendix 2.

3.4 Buildings sector results

The estimated transition and long-term jobs in the building sector in the UK, from retrofitting residential buildings with energy efficiency measures and renewable energy technologies are set out in Table 11.

Table 11 Buildings Sector jobs in the UK

	Number of residential buildings retrofitted	Jobs years	Transition jobs	Long-term jobs
			FTE	FTE
Installation of:				
- Energy Efficiency Improvements	20,387,610	1,662,561	138,547	
- Solar Thermal	20,387,610	703,021	58,585	
- Solar PV	5,436,696	199,022	16,585	
- Ground Source Heat Pumps	3,533,852	733,954	61,163	
Additional maintenance			32,038	64,075
Total	-	3,298,558	306,918	64,075

The jobs in each NUTS area are shown in Table A2.4 of Appendix 2.

¹⁰ The generation of wave energy is anticipated to become commercially viable from 2030, which is beyond the time period considered in this study.



In addition there will be jobs retrofitting commercial, community and public buildings but we have not been able to quantify the scale of this challenge in terms of the location, number and size of these buildings, which is a pre-requisite to enable us to estimate these jobs.

3.5 Waste sector results

Table 12 shows the change in mass of waste recycled or sent to landfill or incineration,¹¹ assuming an increase from the existing recycling rate (which is 45% for the UK as a whole), to 90%. This table also shows the numbers of jobs gained and lost as a result of this change.

Table 12 Change in waste recycled and jobs created in the UK

	Change in mass recycled/ disposed of	Change in Jobs
Type of Waste	Tonnes/year	FTE
Municipal solid waste (MSW)	12,596,299	37,156
Commercial and industrial waste (C&I)	10,553,926	15,566
Construction and demolition waste (C&D)	54,718,966	53,802
Landfill & Incineration	-77,869,191	-22,969
Total Jobs		83,554

The average number of jobs over the transition period is assumed to be 50% of the jobs shown in Table 12, which are long-term jobs. The existing recycling rate in each NUTS area, the assumed change in the amount of waste recycled and the resulting jobs in each NUTS area is shown in Table A2.5 in Appendix 2.

Our vision is for the amount of waste produced to be greatly reduced through reuse and repair, which is reflected in the higher overall figure for the recycling modelled here. In the longer-term these jobs could transition from waste sector jobs to jobs maintaining products to avoid them becoming waste in the first place.¹²

3.6 Agriculture and forestry sector results

For the UK as a whole we have estimated that there will be a net increase of 33,300 jobs in agriculture and 6,230 jobs in woodland management, hedge laying and timber processing. The numbers of jobs in each NUTS area are shown in Table A2.6 in Appendix 2.

We believe that the statistics for the existing jobs include supply chain jobs and other activities that we have not modelled, which in turn means that our job estimates for agriculture could be significant underestimates (despite only using 88% of the existing jobs figure). This is why for many rural areas the modelled net number of jobs, after subtracting the existing farming jobs, is negative.

¹¹ This is also called energy-from-waste in many reports. The energy and carbon saved in reuse and recycling is far greater than that recovered from burning waste.

¹² Such a notion of a circular economy is now widely discussed.



Table 13 Assumed use of land and livestock numbers

Land used for	Ha	No. of animals
Arable		
Cereal Crops (Including animal feed)	3,462,384	
Potatoes	459,877	
Sugar	108,286	
Fruit & Vegetables	131,732	
Hemp & flax	115,888	
Energy Crops	532,106	
Green Manure	985,155	
Pasture on Rotation for beef	3,940,979	
Pasture on Rotation for dairy cows	2,393,010	
Permanent Pasture		
Dairy Cows	3,191,113	4,056,967
Beef Cattle	753,501	1,733,815
Grazed orchards	3,293	
Pigs		12,706,069
Chickens		50,214,923
Rough Grazing / number of sheep	753,501	410,189

HUNGARY JOBS MODELLING AND RESULTS

4.1 Overview

For Hungary we estimated the numbers of jobs for NUTS2 areas (Hungarian Regions) in essentially the same way as for the UK, using Eurostat data on population, area, numbers of dwellings, amount of waste, existing recycling rates, etc. We used similar assumptions and job metrics as for the UK modelling. Key differences in our methods and assumptions are outlined below.

Statistics for the NUTS2 regions of Hungary, with the estimated transition and long-term jobs are shown in Table 14. These jobs include 'support jobs', which are calculated from the total number of jobs in each sector.



Table 14 Hungary regions and jobs estimates

NUTS	Area name	Population		Area (ha)	Pop Density	Total Additional Jobs	
Code		2018	2030	ha	p/ha	Transition	Long-term
HU	Hungary	9,797,561	9,665,170	9,301,300	1.05	64,846	43,473
HU10	<i>Central Hungary</i> Közép-Magyarország	3,000,076	2,959,537	691,600	4.34	11,925	11,491
HU21	<i>Central Transdanubia</i> Közép-Dunántúl	1,056,097	1,041,826	1,108,600	0.95	7,230	4,744
HU22	<i>Western Transdanubia</i> Nyugat-Dunántúl	983,251	969,965	1,132,900	0.87	6,997	4,480
HU23	<i>Southern Transdanubia</i> Dél-Dunántúl	894,223	882,140	1,419,700	0.63	7,580	4,358
HU31	<i>Northern Hungary</i> Észak-Magyarország	1,143,902	1,128,445	1,342,600	0.85	8,774	5,346
HU32	<i>Northern Great Plains</i> Észak-Alföld	1,468,088	1,448,250	1,772,300	0.83	11,512	6,918
HU33	<i>Southern Great Plains</i> Dél-Alföld	1,251,924	1,235,007	1,833,600	0.68	10,824	6,134

4.2 Energy Sector

Hungary currently has around 8 GW of installed capacity for electricity generation, most of which is oil, gas, coal and nuclear generation, with around 300 MW of wind, 57 MW of hydro and 29 MW of solar, in 2015.¹³ In addition, biomass is used, predominantly for industry and space heating.

There is evidence that there is significant renewable potential in Hungary. For example, in 2010 the Hungarian Energy Office received 68 bids to construct 1.1 GW of wind power capacity, nearly three times the 410 MW for which they were going to grant licences.¹⁴ However, the government scrapped this wind tender¹⁵ and instead decided to invest in two new nuclear power stations, with support from Russia.¹⁶ This tender alone suggests that 400 MW/year of new wind capacity could be delivered. Solar power has grown rapidly in recent years and by 2016, according to one source, there was 225 MW of installed capacity.¹⁷

To generate the electricity currently produced by existing nuclear, coal and oil power stations, and to provide power for an electrified transport system, we estimate that around 15 GW of wind generation and 10 GW of solar PV capacity will be needed¹⁸ plus 1 GW of anaerobic digestion, biomass and geothermal (although we do not have jobs metrics for all of these technologies). We have assumed that wind and solar generation will be distributed across the country by land area. With 23% forest cover in Hungary, there is also potential to expand the use of biomass, such as for space heating.

We have calculated the new jobs associated with installation of wind and solar power (assumed to happen over the transition period) and the long-term maintenance of wind turbines using the metrics we used for the UK estimates. We have not subtracted the jobs in fossil fuel power stations that will be lost, but given that in the UK there were about 100 jobs per 1 GW of fossil fuel generation with just under 6 GW of such generation capacity in Hungary¹⁹ it is likely that around 600 jobs will be lost. We have assumed that jobs in the nuclear industry will be switched to decommissioning of the existing power stations.

¹³ From Table 12.1, p. 93 of Mavir, 2017.

¹⁴ <https://www.windpowermonthly.com/article/989494/hungarian-government-overwhelmed-bids-wind-energy-licenses>.

¹⁵ <https://www.windpowermonthly.com/article/1017835/hungary-scraps-wind-tender>

¹⁶ https://www.reuters.com/article/us-russia-hungary-putin-orban-nuclear/russia-to-start-building-two-nuclear-reactors-in-hungary-soon-putin-idUSKCNILY204?feedType=RSS&feedName=worldNews&utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3AReuters%2Fworld-News%28Reuters+World+News%29

¹⁷ https://en.wikipedia.org/wiki/Solar_power_in_Hungary#cite_note-2

¹⁸ Assuming a 40:60 split between new solar and new wind generation capacity, as modelled in Zero Carbon Britain 2 for the UK (Allen, 2013).

¹⁹ See Table 12.1, p.93 of Mavir, 2017



The amount of wind and solar to be installed, the jobs involved in this and the long-term jobs from maintenance of wind turbines are shown in Table 15.

Table 15 Hungary, Energy Sector jobs

	Capacity to be installed		Transition jobs			Long-term jobs
	Wind	Solar PV	Wind	Solar PV	Total*	Wind
	MW	MW	Job years	Job years	Average over 12 year period	FTE
Hungary	15,000	10,000	16,200	1,638	20,319	4,950
<i>Central Hungary Közép-Magyarország</i>	1,115	744	1,205	122	1,510	368
<i>Central Transdanubia Közép-Dunántúl</i>	1,788	1,192	1,931	195	2,421	590
<i>Western Transdanubia Nyugat-Dunántúl</i>	1,827	1,218	1,973	200	2,474	603
<i>Southern Transdanubia Dél-Dunántúl</i>	2,290	1,526	2,473	250	3,101	756
<i>Northern Hungary Észak-Magyarország</i>	2,165	1,443	2,338	237	2,932	715
<i>Northern Great Plains Észak-Alföld</i>	2,858	1,905	3,087	312	3,871	943
<i>Southern Great Plains Dél-Alföld</i>	2,957	1,971	3,194	323	4,004	976

* The total for transition jobs includes 50% of the long-term jobs, as well as the jobs in installation.

4.3 Transport Sector

We have modelled a modal shift from private internal combustion engine (ICE) cars to buses and private electric vehicles (EVs), and estimated the jobs associated with bus driving, bus maintenance and maintenance of private EVs then subtracted the current jobs in maintenance of ICE cars, using the same job metrics used for the UK. We have not estimated a modal shift or associated jobs for train travel. The change in vehicle-miles travelled and the associated long-term jobs are shown in Table 16. The average number of additional jobs during the transition period is assumed to be 50% of the long-term jobs.



Table 16 Hungary, Transport Sector jobs

	Proposed Modal Shift (additional v-km)			Jobs change from Proposed Modal Shift			
Name	Buses	Private EVs	Private ICE Vehicles	Bus Drivers	Bus Maintenance	Maintenance of private EVs	Maintenance of private ICE vehicles
	v-km	v-km	v-km	FTE	FTE	FTE	FTE
Hungary	750 M	22,742 M	-43,151 M	28,425	7,456	7,604	-19,725
<i>Central Hungary Közép-Magyarország</i>	230 M	6,964 M	-13,213 M	8,704	2,283	2,329	-6,040
<i>Central Transdanubia Közép-Dunántúl</i>	81 M	2,451 M	-4,651 M	3,064	804	820	-2,126
<i>Western Transdanubia Nyugat-Dunántúl</i>	75 M	2,282 M	-4,330 M	2,853	748	763	-1,980
<i>Southern Transdanubia Dél-Dunántúl</i>	68 M	2,076 M	-3,938 M	2,594	680	694	-1,800
<i>Northern Hungary Észak-Magyarország</i>	88 M	2,655 M	-5,038 M	3,319	870	888	-2,303
<i>Northern Great Plains Észak-Alföld</i>	112 M	3,408 M	-6,466 M	4,259	1,117	1,139	-2,956
<i>Southern Great Plains Dél-Alföld</i>	96 M	2,906 M	-5,514 M	3,632	953	972	-2,520

4.4 Buildings Sector

For the number of buildings to be retrofitted with energy efficiency measures and/or renewable energy systems, we have used the number of residential buildings with one dwelling from Eurostat data. This gives 2.5 million dwellings in Hungary and, as for the UK we have assumed that 75% will require improvements to their energy efficiency, 75% will be fitted with solar thermal, 20% with solar PV and 13% with ground source heat pumps. We have then calculated the jobs that this will create using the same job metrics we have used for the UK. Long-term jobs are those involved in maintenance of the installed measures. Our jobs estimates by region are shown in Table 17.



Table 17 Hungary, Buildings Sector jobs

	Number of residential buildings with one dwelling	Additional Jobs	
		Transition	Long-term
		FTE	FTE
Hungary	2,498,706	28,212	5,890
<i>Central Hungary</i> Közép-Magyarország	479,896	5,418	1,131
<i>Central Transdanubia</i> Közép-Dunántúl	270,117	3,050	637
<i>Western Transdanubia</i> Nyugat-Dunántúl	255,543	2,885	602
<i>Southern Transdanubia</i> Dél-Dunántúl	264,840	2,990	624
<i>Northern Hungary</i> Észak-Magyarország	348,718	3,937	822
<i>Northern Great Plains</i> Észak-Alföld	460,272	5,197	1,085
<i>Southern Great Plains</i> Dél-Alföld	419,320	4,734	988

4.5 Waste Sector

To estimate the number of jobs that could be created in the waste sector we have assumed that recycling rates will increase from 31% to 90%. Data on the amount of waste in each region has been obtained from Eurostat. We have subtracted the jobs lost in landfill and incineration from the new jobs in recycling. We have assumed that on average throughout the transition period, the number of jobs will be 50% of these long-term jobs. The increased amount of waste recycled and the decrease in that sent to landfill or incineration, along with our estimates of the net number of jobs created, are shown in Table 18.

Table 18 Hungary, Waste Sector jobs

	Net long-term jobs	Change in mass recycled/disposed of			
		Municipal solid waste (MSW)	Commercial and industrial waste (C&I)	Demolition and construction (D&C)	Landfill & Incineration
	FTE	Tonnes/y	Tonnes/y	Tonnes/y	Tonnes/y
Hungary	8,871	1,734,934	2,435,725	2,022,181	-6,192,840
<i>Central Hungary</i> Közép-Magyarország	2,717	531,248	745,835	619,205	-1,896,287
<i>Central Transdanubia</i> Közép-Dunántúl	956	187,012	262,551	217,975	-667,538
<i>Western Transdanubia</i> Nyugat-Dunántúl	890	174,112	244,441	202,939	-621,493
<i>Southern Transdanubia</i> Dél-Dunántúl	810	158,347	222,309	184,564	-565,220
<i>Northern Hungary</i> Észak-Magyarország	1,036	202,560	284,380	236,097	-723,037
<i>Northern Great Plains</i> Észak-Alföld	1,329	259,966	364,974	303,008	-927,949
<i>Southern Great Plains</i> Dél-Alföld	1,134	221,688	311,235	258,393	-791,316



IRELAND JOBS MODELLING AND RESULTS

5.1 Overview

For the Republic of Ireland we used data from Eurostat and the job metrics we used for the UK estimates, to produce job estimates for the country as a whole. The total transition and long-term jobs are shown in Table 19.

Table 19 Transition and long-term jobs in Ireland

Sector	Transition	Long-term
Energy	17,650	7,200
Transport	8,750	17,500
Buildings	22,100	4,600
Waste reuse and recycling	2,856	5,712
Training and support	1,541	3,147
Total	52,897	38,159

5.2 Energy Sector

Our estimates of jobs in the energy sector assume that electricity supply needs to about double from the existing 26,740 kWh/year, so as to provide energy for transport and heating (with heat pumps). In August 2017 there was 2.9 GW of renewable generation capacity installed in Ireland. Our assumptions about the renewable energy that needs to be installed, the electricity generated and the jobs created (using the job metrics set out in Table 1) are shown in Table 20. We have subtracted from our estimates the numbers of jobs that will be lost in coal and peat. Peat is currently extracted and burnt to produce electricity in the Midlands of Ireland, by the semi-state company, Bord na Móna. Since its creation in 1946, this company has provided good jobs and relative prosperity to a previously impoverished region and a challenge to the transition will be to replace those jobs with ones of similar quality.

Table 20 Ireland renewable energy needed and job estimates

Technology	Installed capacity	Assumed load factor	Generation	Transition jobs	Long-term jobs
	GW	%	GWh/year		
Offshore wind, wave and tidal	6.0	36%	23652	8300	4200
Onshore wind	10.0	25%	21900	10800	3000
Solar PV	2.5	10%	2190	400	
Anaerobic digestion/biomass ²⁰	0.5	90%	4383	550	
Peat jobs lost				-2000	
Coal jobs lost				-400	
			52125	17650	7200

²⁰ Assumes 1.5 jobs per 1000 MWhr, from Table 4.5 of The Resilience Centre 2015.



5.3 Transport Sector

Our modelling of the transport sector in Ireland assumed a modal shift from private internal combustion (ICE) engine cars to buses and private electric vehicles (EVs). We estimated the jobs associated with bus driving, bus maintenance and maintenance of private EVs and subtracted the current jobs in maintenance of ICE cars, using the same job metrics used for the UK. We have not estimated a modal shift or associated jobs for train travel. The average number of additional jobs during the transition period is assumed to be 50% of the long-term jobs.

5.4 Buildings Sector

We have used the number of residential buildings with one dwelling, obtained from Eurostat, to give a figure for the number of dwellings in Ireland of 1.2 million dwellings. As for the UK, we have assumed that 75% will require improvements to their energy efficiency, 75% will be fitted with solar thermal, 20% with solar PV and 13% with ground source heat pumps. We have then calculated the jobs that this will create using the same job metrics we have used for the UK. Long-term jobs are those involved in maintenance of the installed measures. Our jobs estimates by NUTS area are shown in Table 23.

5.5 Waste Sector

We have assumed that the recycling rate of the approximately 9 million tonnes of waste produced a year in Ireland will be increased from 42 to 90%. This should create 5,712 jobs in the long-term. We have assumed that in the transition period there will, on average, be 50% of these jobs, giving 2,856 jobs.

CONCLUSIONS

Measures to protect the environment, reduce pollution and tackle climate change are too often seen as threatening jobs and economic prosperity. Hence President Trump's roll back of environmental legislation in the USA trying to preserve jobs in coal, or in June 2018, Len McCluskey of the Unite Union, the second largest union in the UK, calling for Labour MPs to vote for construction of a third runway at Heathrow because it would create hundreds of thousands of new unionised jobs.²¹

However, the research described in this report makes it clear that a transition to a zero-carbon economy is possible and it is going to involve a lot of work, which will create millions of jobs across Europe. Many in the union movement do recognise this and acknowledge that there are no jobs on a dead planet.²² Instead they are calling for a 'just transition' that ensures the new jobs are of similar or better quality in terms of wages and conditions as those that are lost, and that workers in fossil-fuel dependent activities who lose their jobs are able to take up the new ones.²³

The need for a just transition is one reason why we have included jobs in training and support: those who are currently unemployed, underemployed or working in jobs that are likely to disappear need to be enabled to take up the new jobs.

Another aspect of the transition that we propose is the shift in the location of new jobs. In the power sector, for example, the old model of a few large-scale power stations supplying the country means many jobs being created in a small number of places. Renewable energy, in contrast, is available whether the sun shines, the wind blows, or rivers run. It is easier to do at smaller scale, providing a more dispersed pattern of jobs in installation

21 www.theguardian.com/environment/2018/jun/24/union-boss-urges-labour-mps-to-back-heathrow-expansion

22 See http://oecdobserver.org/news/fullstory.php/aid/5294/There_are_no_jobs_on_a_dead_planet.html

23 See <https://www.tuc.org.uk/research-analysis/reports/tuc-climate-change-and-%E2%80%9Cjust-transition%E2%80%9D>



and maintenance of these systems. There are choices that need to be made here: the current UK government seems to have turned its back on small scale renewables and is focusing its support on offshore wind.²⁴ This will not provide the jobs across the country envisaged here. UK policy on renewables has been inconsistent and characterised by booms and busts, making it difficult for companies to provide quality, long-term secure jobs. Similarly, policies of the former Spanish government towards support for renewable energy created uncertainty with regard to future revenues, discouraging investment in the sector and resulting in the loss of 75,000 jobs between 2008 and 2017. What is needed is a clear and stable framework to support the transition and realise the potential for jobs.

Transport is another sector which generates the inequalities we see today, in particular those between thriving large cities linked into an increasingly globalised economy and declining small towns and rural areas²⁵. All three countries considered in this report are dominated by their capital cities. Spending on transport infrastructure over the last few decades has mainly gone to promoting long distance links between cities. We need to re-orientate this spending to providing local transport: good quality bus services (which will provide jobs all over the country) and safe walking and cycling routes. We also need to decarbonise transport through electrification and use of alternative fuels such as hydrogen or sustainable biodiesel.

Electrification of the railways and private cars clearly requires planned, co-ordinated action, but will provide jobs all over the country. A co-ordinated approach is particularly needed to ensure, for example, that rural areas are not left behind when it comes to the installation of electric vehicle charging points, as they often have been in the provision of broadband across the EU.²⁶ Another area where a planned co-ordinated approach is going to be needed is in the retrofit of buildings. Experience in the UK has shown that this is best done through local authority-led street-by-street programmes, supported by public money.²⁷ In the UK, these have in the past focussed on cavity wall and loft insulation, whereas we now need to do whole-house retrofits that install multiple measures at once. Only such a programme is likely to realise the reductions in carbon emissions that are needed and provide good quality jobs in every community.

Limitations of modelling and further work

The modelling carried out has been limited by the lack of data in many areas. Below we summarise how further research would enable additional job estimates to be included and make the current estimates more accurate.

1. Job metrics that if available would enable additional activities/sectors to be modelled:

- ▶ Labour intensity of demolition and deconstruction per tonne of construction and demolition waste produced.
- ▶ Labour intensities of fitting heat pumps, solar thermal and direct electric heating to dwellings (e.g. person-hour per typical dwelling) and to commercial, industrial and public buildings (e.g. person-hours per 1000m² of building).
- ▶ Labour intensities of installing solar PV panels, for commercial and domestic scale installations.
- ▶ Additional jobs through more labour based approaches to road maintenance, such as early filling of pot-holes and increased frequency of routine maintenance (e.g. drain clearance) to reduce the frequency of major resurfacing/reconstruction (e.g. jobs or person hours per mile of carriageway).
- ▶ Labour intensity of planting new woodland (hours per hectare)
- ▶ Labour intensity of building new tramway, railway lines and schemes to increase walking and cycling.
- ▶ Jobs per MWh of energy storage – for both installation and subsequent maintenance (e.g. pumped hydro, compressed air, hydrogen production etc.).
- ▶ Jobs per MW to maintain current electricity grid and to labour intensity of increasing grid capacity (per additional GWh/year).

2. Data that would enable the modelling to be refined or additional activities modelled:

- ▶ Floor area of public sector and commercial sector buildings by NUTS area.
- ▶ Existing cycle paths per NUTS area.
- ▶ Existing recycling rates for commercial and industrial, and construction and demolition wastes.

²⁴ See Chapman, 2018 for information about the history of UK government support for renewable energy. <https://gef.eu/publication/community-energy-in-the-uk/>

²⁵ See <https://gef.eu/publication/beyond-capital-centered-growth/>

²⁶ See for example <https://www.agriland.ie/farming-news/eu-broadband-behind-target-particularly-in-rural-areas>

²⁷ For example, the Kirklees Warm Zone scheme which won an Ashden award in 2009 - www.ashden.org/winners/kirklees-council.



3. Further modelling work that could be carried out:

- ▶ Refining modelling of agriculture and forestry jobs. Currently job estimates are low because all proposed farming jobs are modelled to replace all existing ones and our model does not cover as many activities as have been included in the statistics on existing jobs. This could include calibrating the model against existing statistics on farming jobs. This may require adding multipliers for farm management and on farm processing/distribution/retail jobs and estimates for jobs in urban horticulture (on non-farm land).
- ▶ Model tram and railway infrastructure change required to deliver proposed modal shift so that km of new railway and tram way needed can be estimated.
- ▶ Model non-residential building retrofit required.
- ▶ Model energy demand & supply relationship so storage and distribution network changes can be identified and then jobs modelled.
- ▶ Work out locations for offshore renewable energy hubs and therefore jobs so the jobs involved can be allocated to NUTS areas.
- ▶ Model sewage, landfill and farm-based anaerobic digestion.

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Local green jobs – accelerating a sustainable economic recovery

An Ecuity Consulting report for the
Local Government Association (LGA)



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Project overview

This report provides analysis of the jobs required for a net zero economy in England, where these will be located in the coming years, and the role that local government could play working with industry to address the sector's skills demands. Based on industry insight from a series of expert interviews and literature review, this report includes an assessment of the number of jobs that will be required by sector. This estimate is further broken-down to regional and local authority level based on industry insight and the current sectoral breakdown in each area.

Accompanying this report is a dataset which includes the results of the employment projections made by low-carbon sub-sector, local authority and across two time-periods (2030 and 2050).

The employment figures included in both the dataset and this report are direct jobs in existing low-carbon and renewable energy industries. We expect new technologies and services to emerge as the UK transitions to a net zero economy, and recognise that this green growth will support a larger number of indirect jobs in the wider economy. This report focuses on England.

Nothing in these documents constitutes a valuation or legal advice. Any party that chooses to rely on this report or dataset does so at its own risk. Details of principal sources are set out within the document and we have satisfied ourselves, so far as possible, that the information presented in the report is consistent with other information which was made available to us by our stakeholders in the course of our work.

Date	Version number	Reviewed by	Description / revisions made	Approved by
27/03/2020	Version 1	James Higgins	Draft v1.0	Rob Honeyman
07/04/2020	Version 2	Rob Honeyman	Kent case study, acknowledgements and glossary added. Edits made to text, tables and figures	Rob Honeyman
11/04/2020	Version 3	Samantha Crichton	Edits to graphs. Inclusion of UK statistics in footnotes. Updated West Yorkshire case study	Rob Honeyman
20/04/2020	Version 4	Rob Honeyman	Integration of final comments provided by LGA	

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Glossary

AD	Anaerobic Digestion
BRES	British Register and Employment Survey [data]
CCC	Committee on Climate Change
CCS	Carbon Capture and Storage
CHP	Combined Heat and Power
EV	Electric Vehicle
FCEV	Fuel Cell Electric Vehicle
FCH JU	Fuel Cells and Hydrogen Joint Undertaking
FES	Future Energy Scenarios
Gigafactory	Battery production factory producing batteries with gigawatt-hours of storage
GW	Gigawatt – unit of power
GWh	Gigawatt-hour – unit of energy
ICE	Internal Combustion Engine [vehicles – e.g. diesel and petrol cars]
LCREE	Low Carbon and Renewable Energy Economy
LGA	Local Government Association
Net zero	UK's target to reach <i>net</i> zero greenhouse gas emissions – by 2050
NQF	National Qualification Framework
NVQ	National Vocational Qualification
PV	[Solar] photovoltaic panels
R&I	Research and Innovation
SIC code	Standard Industrial Classification of economic activities – set by UK Government
ULEV	Ultra Low Emission Vehicle



Introduction

Over 194 nation states have signed the Paris Agreement, a bloc that taken together accounts for 97% of the world's greenhouse gas emissions. Investment in the low-carbon economy has increased in recent years driven by rising concern about climate change from scientists, policymakers, and activists, and a recognition of the economic opportunities that new technologies and services will provide. The booming green economy is recognised as a global megatrend that will develop over the coming years as the world comes together to tackle dangerous climate change.

The pace of change in the UK economy will need to quicken if net zero is to be achieved by 2050. This mid-century target will require close to 28 million homes and the premises of 6 million businesses to change the way they use energy via the installation of energy efficient lighting and measures, microgeneration, and heating systems that produce next to no greenhouse emissions. All of this, including changes to the power system, development of alternative fuels, and low-emission vehicles, needs to be delivered in just under 30 years.

To deliver the substantial change needed in the UK economy by 2050, local government will play a key role in facilitating technology transitions in homes and businesses, informing constituents, supporting local businesses and the upskilling of the local workforce. Whilst the raft of national and local government net zero targets will drive demand for low-carbon goods and services over the coming years, it's crucial that there is a workforce in place to deliver the change needed by 2050.

In collaboration with Ecuity Consulting, the Local Government Association (LGA) has published research which considers the projected net zero jobs and the associated skills demands across England by 2030 and 2050. This project supports the LGA's analysis by utilising industry insight, as well as local economic conditions to estimate the spread of green jobs across England by sector.

This report highlights contributions needed from low-carbon power, low-carbon heat, alternative fuels, energy efficient products, low-carbon services and low emission vehicles. The analysis is based on available data and industry-leading views as to the technologies and industries required for England to meet net zero. Assumptions are presented and discussed in the report for transparency.

In addition to the estimation of regional jobs required to meet net zero, the report has included several case studies which provide tangible examples of the industrial and employment changes that are already taking place at a local level. In addition, this report presents results from key stakeholder feedback to provide insight as to the skills gap that will need to be addressed by each sector.

Section 1 of the report includes an analytical breakdown of the jobs required to meet net zero in 2030 and 2050. Section 2 considers the localised requirements to achieve net zero (broken down by Local Authority). Section 3 of the report contextualises the projections with an assessment of the skills gap in each low-carbon sector and an initial overview of the training needed to bridge the emerging gap - as supported by expert industry insight and views.

For the purpose of this paper and to illustrate our analysis more simply and clearly, the eight National Qualification Framework (NQF) qualification levels have been categorised into three skills groups – people with high, intermediate, and low qualifications. This structure is in line with existing [research and analysis](#) into deficiency as follows:

- Low qualifications equates to no qualifications plus qualifications below Level 2.
- Intermediate qualifications equates to Level 2 and Level 3 qualifications.
- High qualifications equates to Level 4 and above qualifications.

1. Jobs required to meet net zero

The UK's low-carbon economy

The green economy is booming. As a key pillar of the UK's Industrial Strategy and highlighted as one of four grand challenges, clean growth has been targeted by national and local governments as an area of economic opportunity. In 2018, the UK Government projected that the low-carbon economy could grow by 11 per cent per year up to 2030, which is substantially higher than the projected growth rate for the economy as a whole (estimated at 1-2% per year)¹, illustrating the potential for green growth as driven by international, national and local climate change targets. While the current Covid-19 (coronavirus) pandemic will lower UK economic growth, as the economy recovers, this could ignite and give rise to a greener global future², accelerating and prioritising investment in the UK's low-carbon sector.

Whilst technologies and services will evolve as the country moves towards 2050, the UK Government³ currently defines the low-carbon and renewable energy economy as consisting of the following industries:

Table 1: low-carbon and renewable energy economy sectors, and key sub-sectors

1. Low-carbon electricity

Wind power, solar PV, hydropower, nuclear, CCS

2. Low-carbon heat

Renewable heat, heat networks and CHP

3. Alternative fuels

Bioenergy and hydrogen production

4. Energy efficient products

Insulation, lighting, monitoring and control systems

5. Low-carbon services

Low-carbon financial, IT, and advisory services

6. Low-emission vehicles & infrastructure

Low-emission vehicles & infrastructure, fuel cells and energy storage systems

This report includes details of new analysis which utilises industry insight from expert interviews and leading reports, with an analysis of regional economic sector strengths to forecast future low-carbon employment across England.

In 2018, businesses active in England's low-carbon and renewable energy economy (LCREE) generated close to £37 billion in turnover and employed 185,000 full-time workers⁴. Around 71% of workers (132,000) are employed in the energy efficiency sector installing insulation materials, lighting and control systems. A further 12% are employed in the low-carbon electricity sector working mostly in the wind, solar and nuclear industries.

¹ OBR (2020) *Economic and fiscal outlook*. Accessed on 6th April 2020. Available from: https://cdn.obr.uk/EFO_March-2020_Accessible.pdf

² WEF (2020) *Could COVID-19 give rise to a greener global future*. Accessed on 31st March 2020. Available from:

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³ ONS (2020) *Low Carbon and Renewable Energy Economy (LCREE) Survey QMI*. Accessed on 6th March 2020. Available from:

<https://www.ons.gov.uk/economy/environmentalaccounts/methodologies/lowcarbonandrenewableenergyeconomy/lcreeesurveyqmi>

⁴ ONS (2020) *Low carbon and renewable energy economy, UK: 2018*. Accessed on 4th March 2020. Available from:

<https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/finalestimates/2018>

Turnover and employment for the UK was £47bn and 224,800 respectively.

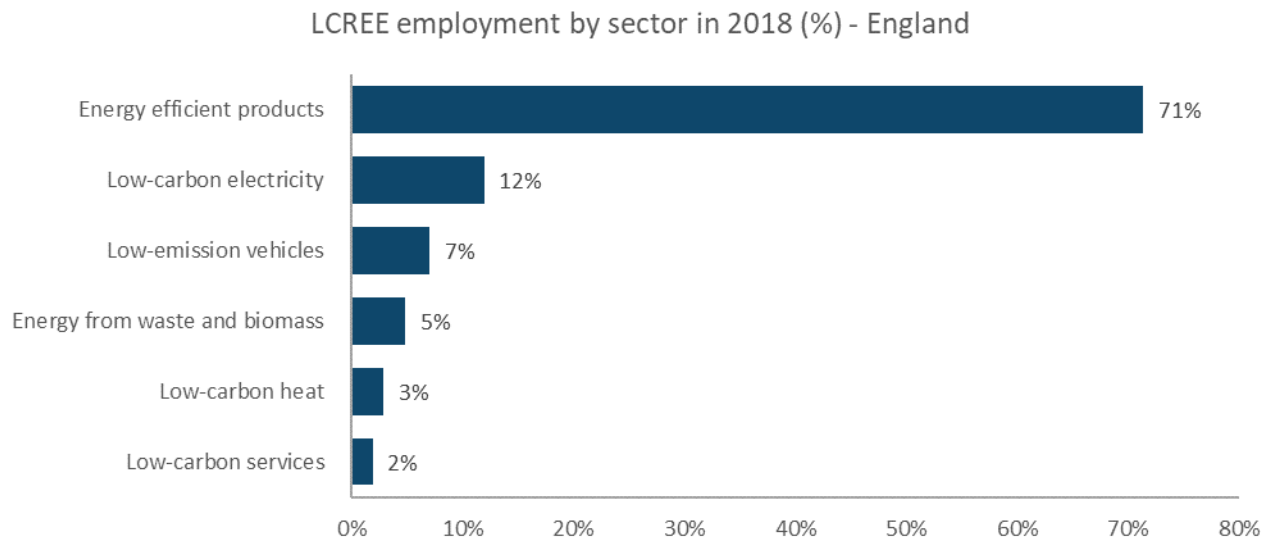


Figure 1 - current employment by LCREE sector (source: ONS)

The national picture

The Local Government Association commissioned Ecuity Consulting to estimate the total number of low-carbon jobs that will be supported by England's net zero transition by 2030 and 2050. The number of direct jobs estimated cover the value chain from manufacturing, construction and installation, to operation and maintenance (see appendix for the methodology on how these jobs were estimated). These are total jobs that we estimate will be needed to deliver the goods and services needed in a net zero economy.

This research found that there could be as many as 694,000 direct jobs employed in the low-carbon and renewable energy economy by 2030 in England, rising to over 1.18 million by 2050⁵.

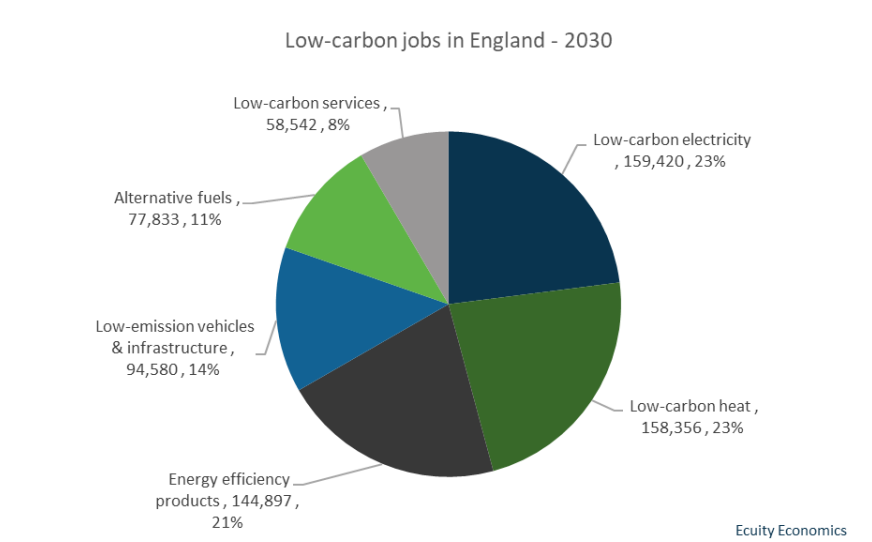


Figure 2 – split of LCREE (direct) jobs in England by 2030 (source: Ecuity estimate)

⁵ For the UK, the number of low-carbon jobs estimated in 2030 and 2050 is ~804,000 and 1.38 million respectively.

Nearly half (46%) of the total low-carbon jobs by 2030 will be in clean electricity generation and providing low-carbon heat for homes and businesses. These jobs will range from manufacturing wind turbines, deploying solar PV, constructing nuclear reactors, installing heat pumps and maintaining energy-system infrastructure.

Over one-fifth (21%) of jobs by 2030 will be involved in installing energy efficiency products ranging from insulation, lighting and control systems.

Around 19% of jobs in 2030 will be involved in providing low-carbon services (financial, legal and IT) and producing alternative fuels such as bioenergy and hydrogen.

A further 14% of jobs will be directly involved in manufacturing low-emission vehicles and the associated infrastructure. These jobs will range from manufacturing electric vehicles (and hydrogen vehicles), manufacturing EV batteries from the proliferation of gigafactories in England and sustaining low-carbon mobility by installing electric vehicle charge-points and hydrogen refuelling stations.

Between 2030 and 2050, the low-carbon workforce in England could increase by a further 488,569 taking the total level of jobs to over 1.18 million by 2050. These jobs will be directly supporting the UK's commitment in achieving net zero. Over this period, employment will be created mainly in low-carbon electricity generation, alternative fuels production, low emission vehicles and infrastructure and low-carbon services.

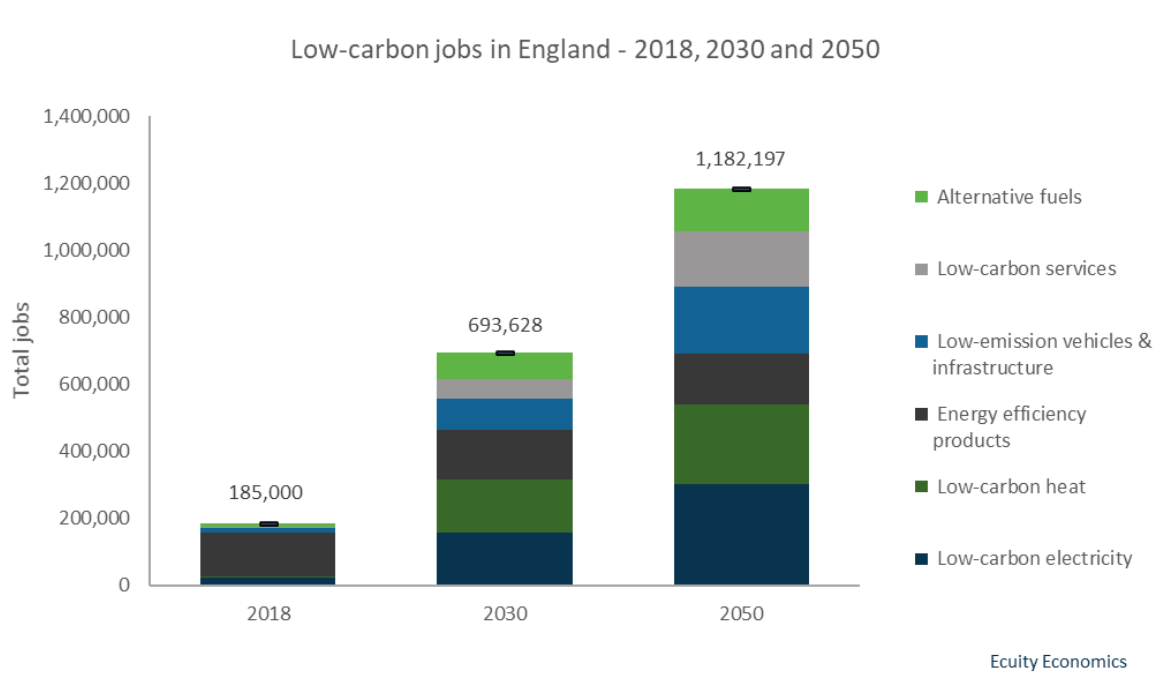





















Figure 3 – low-carbon jobs in 2018, 2030 and 2050 (sources: ONS and Ecuity estimate)

By 2050, we anticipate at least 1.18 million jobs directly employed in sectors supporting England's net zero commitment. These are total jobs, and will be engaged in different activities ranging from manufacturing/production, construction and installation of low-carbon plant, to operating and maintaining services, infrastructure and technologies.

The table below illustrates the job breakdown for each sector by function – manufacturing/production, construction/installation and operation and maintenance. For the low-carbon electricity sector, the job breakdown is fairly evenly split across function. It is interesting to note that while the job breakdown is fairly evenly split, there can be larger differences at a sub-sector level. For example, solar PV requires considerably more labour than offshore and onshore wind technologies. For the low-carbon heat sector, over 50% of the jobs are estimated to be involved in installing low-carbon heating technologies such as heat pumps. In the low emission vehicles and infrastructure sector, there will be more jobs manufacturing and producing low-emission vehicles and associated parts and components (batteries and modules). Additional jobs will be needed to install refuelling stations and chargepoints across the country.

	Manufacturing / Production 	Construction / Installation 	Operation & Maintenance 
1. Low-carbon electricity			
2. Low-carbon heat			
3. Alternative fuels			
4. Energy efficient products			
5. Low-carbon services	-	-	
6. Low-emission vehicles & infrastructure			

Key:

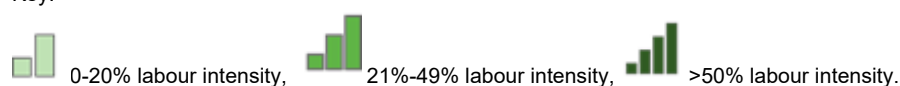


Table 2- Job breakdown by function (sources: Ecuity research and calculation)

By 2050, it is estimated that most jobs will be engaged in constructing or installing low-carbon technologies. This amounts to an estimated 491,000 workers or 42% of the total low-carbon jobs by 2050. Jobs supporting operations and maintenance are estimated to account for 35% (~410,000) of total jobs by 2050. Around one-quarter (~281,000) of jobs will be engaged in manufacturing and producing low-carbon technologies⁶.

⁶ For the UK - jobs in 2050 engaged in construction are estimated at 601,000 (44%); operation and maintenance ~478,000 (35%) and manufacturing ~298,000 (22%).

2. Localised breakdown of net zero job requirements

Local government's political response to the climate crisis

Many local authorities across England have declared a climate emergency. While there is no single definition, many local authorities are committing to becoming carbon-neutral in advance of 2050. As of February 2020, over 230 councils in England have declared climate emergencies⁷. Local declarations of a climate emergency can be a key driver of change.

Figures 4 and 5 below show a selection of the commitments made by local authorities in respect of net zero. Whilst definitions vary by local authority, it is clear that local authorities are driving the agenda at a local level, with some ambitious targets beginning to influence local economic growth plans, and skills-programmes.

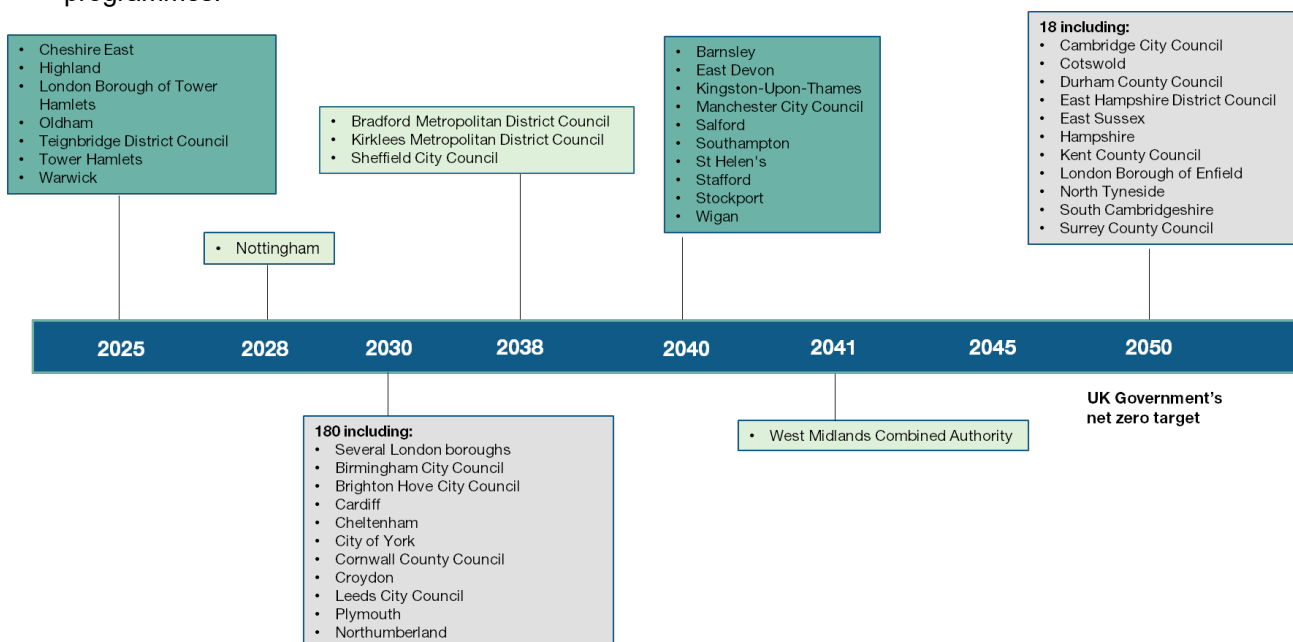
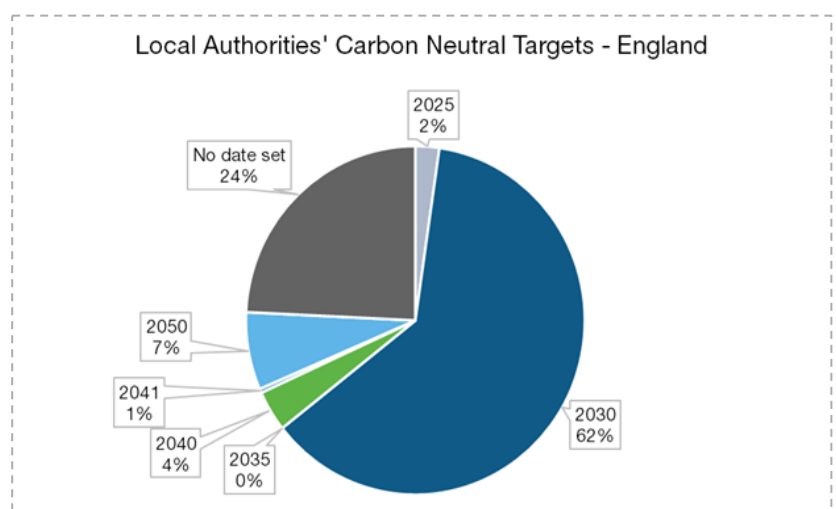


Figure 4 – select English local authorities' carbon neutrality commitments (as at February 2020, source: Climate Emergency)

Figure 5 - Share of English local authorities targeting a particular year to go carbon-neutral (as at February 2020, source: Climate Emergency)



⁷ Climate Emergency (2020) List of councils who have declared a climate emergency. Accessed 06/04/20. Available from: climateemergency.uk

Box 1 – Kent County Council Case Study

County characteristics impacting clean growth outlook:

Kent County Council has announced a climate emergency and committed to net zero by 2050. Kent's [Energy and Low Emissions Strategy](#) is a subsector of the Kent Environment strategy which defines an evidence-based approach to deliver clean growth, including actions to eliminate poor air quality, reduce fuel poverty and deliver an affordable, clean and secure energy supply through an integrated approach.

There have been key achievements in Kent made to-date that have supported the transition towards a cleaner society, including increasing the installed capacity of solar-power, wind-power, energy-from-waste and Combined Heat and Power (CHP) by over 7 times between 2012 and 2017. Further, a decision to extend the wind farm off the coast of Thanet is expected imminently and would increase Kent's renewable energy capacity by 340MW making it one of the largest producers of renewable electricity of any English county. There are plans to produce renewable hydrogen within the county which would make use of excess renewable electricity and offer a clean fuel to decarbonise transport and heat. Furthermore, through the delivery of the Low Carbon Across the South East (LoCASE) Programme consumer-focussed activities such as the installation of electric vehicle chargers to support the uptake of ultra-low emission vehicles and the scaling-up of the county's domestic and commercial retrofit installations have reduced energy demand and the carbon intensity of Kent's energy system – these activities will continue to be scaled up over the coming years and will require additional support for the low carbon supply chain to ensure the appropriate knowledge and skills are available.



The planned extension of Thanet Windfarm at Pegwell Bay will see Kent increase its contribution to the UK's low carbon power supply by up to 340MW. The planned extension will require up to 34 new turbines, up to 4 28km long offshore cables and 4 onshore circuits with a grid connection at the Richborough Port and Richborough Energy Park substations. This activity will require a number of high-skilled and low-skilled jobs to deliver on the project.

Picture source: [Vattenfall](#)

Existing resources/opportunities:

Work within the county is being undertaken to ensure that the workforce has the relevant skills to participate in key low-carbon activities within the region, Taskmasters (UK) Ltd received funding from Kent County Council. This funding allowed the SME to diversify from traditional training for the construction sector and to support the delivery of skills required to work within the offshore wind sector. Further support is to be received by The Electrical Academy in Maidstone and Ashford to support the move to a larger facility to enable the development of key transferrable skills that can support a career in the low carbon sector. Much of the specific support today for skills and retraining for individuals is covered by the South East Local Enterprise Partnership within the [Skills Strategy 2018 - 2023](#), this resource will be key to facilitate a smooth transition for the region's workforce.

Future outlook:

Kent County Council plays an increasingly important role in providing strategic direction, key information, and greater-certainty to the stakeholders that will need to play their part in delivering low-carbon growth and investment. This includes providing local training academies with insight into new demands for novel skills and the evolving skills gap in important sectors such as offshore wind.

Much work has been undertaken to define the low-carbon pathway that Kent will take, and as part of this work there has been evaluation as to how Kent can deliver new projects. For renewable-power plant developers, there is a recognition that further resource will be required to ensure work ready engineers are available that have both the technical skills, and sub-sector specific skills that will enable them to deliver this work.

Other key areas such as the development of new build homes using modern methods of construction will require evaluation and support in future. The council recognises its ongoing role as a leader in the energy transition; it will be required to coordinate different stakeholder groups including those within industry, Further Education institutions and individual workers to come together and resource the supply chain and address emerging challenges and opportunities within the energy sector.

Regional green economy employment

As England transitions to a net zero economy, demand for green jobs will rapidly increase. These jobs will require a diverse range of skills and expertise to support the production and deployment of clean technologies. Some of these jobs could involve installing heat pumps, manufacturing wind turbines, engineers with renewable energy skills and installers of EV chargepoints.

There is a strong split between manufacturing and services in the England, with services concentrated in London and the wider South East, and manufacturing in the North of England and the Midlands.

These regional specialisms should align with the split of jobs by region estimated for 2030 and 2050. For example, the north of England has strong expertise around generation, storage and low-carbon technologies and processes, especially in nuclear and (offshore) wind⁸. The Midlands is well-known for having a dynamic workforce engaged in the manufacturing and production of vehicles. Around half of automotive companies produce vehicle components in the West Midlands⁹.

Some sectors, however, do not display strong regional traits. For example, energy efficiency products are likely to be installed across all households and this will happen across the whole country. This is the same for the installation of low-carbon heating technologies such as heat pumps that are likely to be deployed in households across England. Some low-carbon heating technologies such as hydrogen boilers could initially see deployment in the north of England initially¹⁰ in proximity to industrial clusters and local hydrogen-hubs. By 2035 South Yorkshire and East/West Midlands, and East London could have hydrogen production and distribution facilities deployed¹¹.

The Office for National Statistics' Business Register and Employment Survey (BRES) publishes employee and employment estimates by geography and industry. BRES employment statistics are widely used, particularly by local government planning departments who use it to forecast trends in employment in their specific areas. Ecuity used this survey, alongside SIC mapping of sectors and sub-sectors, to robustly map where the 1.18 million jobs by 2050 will be located regionally. (More information on this can be found in the methodology section).

This estimation relies on the well-established observation in economic geography that clusters of industry develop in locations that have pre-existing resources that support a competitive advantage¹². We assume that parts of the country that already specialise in a particular industrial classification, will continue to have a competitive edge and interest in similar economic activities in a net zero economy. So, areas that are already involved in the current automotive industry are likely to have a strong involvement in the future. Whilst the dynamics of place and work will change, our approach utilises existing data to develop a robust projection based on what we know today.

This projection is then adjusted based on expert advice received during a 4-week period of interviews and stakeholder engagement, to better calibrate the projections.

Results

The path to net zero will be a major strategic opportunity for every region in England. Hundreds of thousands of jobs will be created across English regions by 2050 to support this transition. Significant employment opportunities could be created in the north of England where an estimated 422,500 jobs

⁸ IPRR (2017) *Net-zero North: Delivering the decarbonisation mission in the North of England*. Accessed on 26th March 2020. Available from: <https://www.ippr.org/files/2017-12/net-zero-north-report-1712.pdf>

⁹ Automotive Council *Mapping UK Automotive*. Accessed on 26th March 2020. Available from: <https://www.automotivecouncil.co.uk/mapping-uk-automotive/>

¹⁰ NGN (2017) *Leeds City Gate: H21 Report*. Accessed on 26th March 2020. Available from: <https://www.northerngasnetworks.co.uk/wp-content/uploads/2017/04/H21-Report-Interactive-PDF-July-2016.compressed.pdf>

¹¹ Element Energy (for Equinor) (2019) *Hy-Impact Series Study 1: Hydrogen for economic growth*. Accessed on 26th March 2020. Available from: <http://www.element-energy.co.uk/wordpress/wp-content/uploads/2019/11/Element-Energy-Hy-Impact-Series-Study-1-Hydrogen-for-Economic-Growth.pdf>

¹² Porter, M. (1990) *The Competitive Advantage of Nations*. Available from: http://www.economie.ens.fr/IMG/pdf/porter_1990_-_the_competitive_advantage_of_nations.pdf

will be supported by low-carbon industries. In the North West, new jobs could be created to increase England's wind capacity and nuclear operations. In the North East, and Yorkshire and the Humber, employment opportunities are expected to be created to construct, install and maintain Carbon Capture & Storage (CCS) plants to decarbonise energy production and carbon intensive industries (such as cement manufacturing and large oil refineries). Furthermore, employment opportunities will also be created from the installation of bioenergy facilities and the production of hydrogen to support industrial (and wider) decarbonisation.

Across the Midlands, there could be an estimated 194,000 jobs working in low-carbon sectors. Most of these jobs would be focused on manufacturing low emission vehicles, battery packs and modules in gigafactories situated near existing production sites. Jobs are also likely to be created to install low-carbon heating technologies, energy efficiency products and solar installations (particularly in the East Midlands).

In London and the south of England, an estimated 447,000 jobs could be supported to deliver the transition to net zero. Many of these jobs will be in the financial, IT or legal sector supporting low-carbon activity. This is due to the strong service sector in the London and south England regions. Other jobs are likely to be created to deliver low-carbon electricity generation in solar deployment (South West and South East) and nuclear operations and maintenance in the South West.

In the East of England, around 119,000 jobs could be engaged in low-emission vehicle and component manufacturing, and low-carbon financial and IT services. This is broadly in line with the region having a strong financial services sector and being active in automotive manufacturing.

Table 3- Number (and % share) of low-carbon jobs in 2050 split by region (sources: Ecuity calculations)

Region	Number of low-carbon jobs in 2050	% share of low-carbon jobs
North East	84,205	7.1%
North West	170,601	14.4%
Yorkshire and the Humber	167,697	14.2%
East Midlands	96,842	8.2%
West Midlands	97,015	8.2%
East of England	119,294	10.1%
London	143,764	12.2%
South East	163,014	13.8%
South West	139,765	11.8%
Total England	1,182,197	100%

The map below shows the number of low-carbon jobs in 2050 split across ceremonial counties in England¹³.

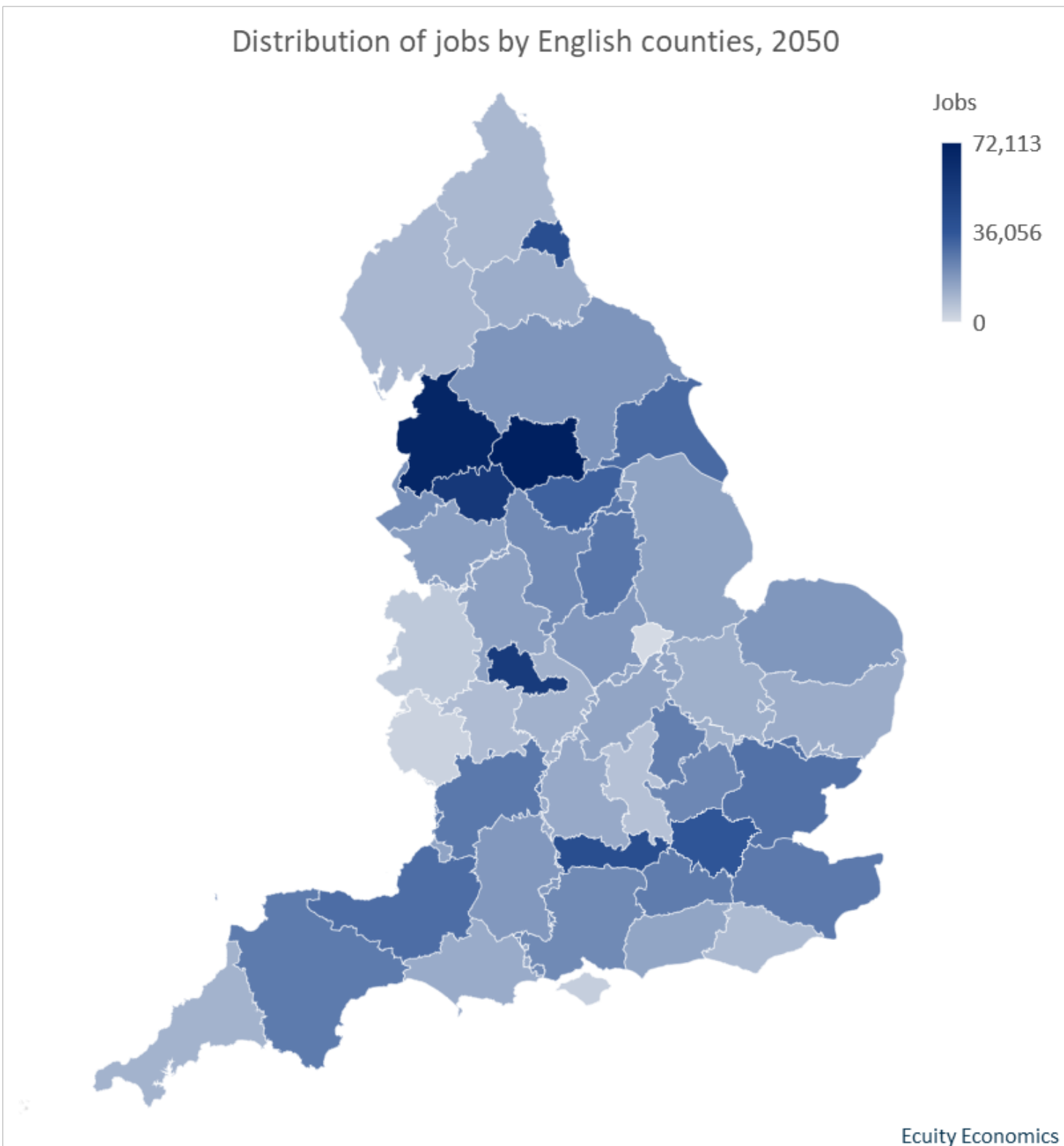


Figure 6 - Split of low-carbon jobs in 2050 by English county (source: Ecuity calculations)

¹³ Ceremonial counties, as referred to in [ONS](#), are metropolitan and non-metropolitan counties (created by the Local Government Act 1972) as well as Greater London.

3. Assessment of emerging skills gap

Low-carbon growth is rapidly evolving as wider government intervention accelerates the take up of low-carbon products and services. As part of this project, interviews have been undertaken with experts from individual sub-sectors to provide critical perspectives on the future requirements for green jobs, skills and training. Their perspectives are summarised in the Tables below.

Additional interviews were undertaken with local authorities to understand existing or future work to address the skills needs of the low carbon sector. This intelligence is included in Boxes 1, 2 and 3.

Table 4, which is below, provides an overview of perspectives from three key elements of the supply chain: research and innovation, manufacturing, and sales, installation and services. These comments serve as a valuable snapshot of expert opinion and aspirations. Policy commitments such as the accelerated phase out of ICE vehicles and a number of measures included in the 2020 Budget have been cited by interviewees as impacting their current perspectives, and as new policy mechanisms are introduced to support the transition to net zero, expectations will naturally evolve.

Table 4- Industry perspectives on status of the supply chain

	Sub sector	Research and Innovation	Manufacturing	Sales, installation and services
Low-carbon electricity	Solar	Significant progress has been made to reduce the cost of solar and research is ongoing – including by UK-based researchers – to increase efficiencies further.	UK primarily imports pre-fabricated PV cells; this is not core focus of the UK supply chain.	Provision of services are (and will be) demand led, and are broadly considered achievable within the sector today.
	Nuclear	Opportunity for UK nuclear to capitalise on additional supply chain activities; funding and resource are required to enable R&I to mature here which will require high-skilled jobs.	There is ambition to increase domestic activity; today much of prefabrication is conducted abroad and this signals a gap in UK competences.	Emerging skills gap expected to meet demand of existing and new nuclear commissioning, also in competition with nuclear submarine fleet and other large infrastructure projects.
Low-carbon heat	Heat pumps	Relatively mature technology means this is not core focus of UK companies today.	Expected increase in domestic manufacturing when industry reaches critical mass.	Likely to be a shortage in near-term (5 years) of people with low qualifications for design, specification and installation..
Alternative fuels	Anaerobic digestion	Relatively mature technology driven by policy/regulation; R&I not considered core activity of UK industry.	Plant construction is one of largest burdens on supply chain for high-skilled workers.	Plant commissioning and grid connection is one of largest burdens on supply chain for high-skilled workers.

Energy efficient products	Hydrogen fuel cells	R&I is critical for sub-sector to maintain competitive edge versus. international competition. The challenge for organisations is to maintain highly skilled workers in UK.	Near term there is scope to capitalise on downscaling of UK automotive sector. However, long term demand for jobs may curtail due to automation.	Low-skilled jobs may be undertaken in other countries close to large demand centres. Key activities related to sales and installation may naturally follow.
	Smart controls	R&I will preserve jobs within the sub-sector in the coming years, although these jobs will switch from electrical engineering to software-based.	Relatively mature and stable sub-sector within the UK, evolving consumer expectations should sustain jobs.	Additional services to support service to aid integration into homes/businesses may be required in longer term.
	Consultancies and financial services	R&I is an ongoing aspect of service sector business models to exploit opportunities in the transition and emerging demand for novel technologies. Ongoing demand for highly-skilled jobs.	N/A	Services are demand led and are critically impacted by sector wide activities. Ongoing demand for highly-skilled jobs.
Low-carbon services				
Low emission vehicles & infrastructure	Electric vehicles	An emerging technology sub-sector where scope to innovate remains.	Job preservation, switching from ICE to electric motors.	Job preservation of existing automotive services will be required in the future, further as this sub-sector grows there could be growth and corresponding need for skills in activities ranging from infrastructure installation, servicing and other high-skilled jobs.

Table 5, below, summarises the key perspectives outlined in Table 4 to highlight the skill level gap that has been identified as the main challenge for industry to manage in each individual sub-sector. This is considered purely as indicative information given that investment and innovation within industry (i.e. automation, retraining) can change the longer-term outlook and implication for skills. Furthermore, industry and local authority stakeholder interviews demonstrated that understanding the true demands on skills and jobs is an ongoing and iterative process particularly as national initiatives are introduced.

In Table 5, the column on the right hand-side indicates the time horizon within which emerging skills gaps are expected to emerge with respect to the NVQ level equivalent outlined in the comments column. **Those sub-sectors that are considered to have key near-term (2020 – 2025) skills gaps are coloured red, those that are considered to have a skills gap emerging in the longer-term (2025 – 2035) are coloured yellow.**

Table 5 - Comments on key area of skill level for individual sub-sector (corresponding to relevant NVQ Level)

Table 5: Comments on key area of skill level gap for individual sub-sector (corresponding to relevant NVQ Level)			
Sub-sector		Comment on skill gap areas	Time horizon
Low-carbon electricity	Solar	Supply chain considered relatively secure, however an uptick in demand would require technicians to be trained at NVQ level 3 equivalent to develop a larger installer base to deliver grid connected solar for utility scale/decentralised generation.	
Low-carbon electricity	Nuclear	Entire supply chain in need of upskilling to meet emerging demand; NVQ level 1 – 3 for construction; NVQ level 4+ for design and planning.	
Low-carbon heat	Heat pumps	Key skills gap area to meet increasing demand is in the design, specification and installation of heat pumps; NVQ level 2 – 3 .	
Alternative fuels	Anaerobic digestion	To meet forecasted demand, higher skill levels would be required NVQ 4+ to design and connect AD plants to the grid and ensure biomethane is of sufficient quality for DNOs.	
Alternative fuels	Hydrogen fuel cells	Highly skilled jobs (NVQ level 4+) for R&I required in future; a good stock of technicians expected to be available from existing automotive sector to meet manufacturing demand (i.e. NVQ 1 – 3).	
Energy efficient products	Smart controls	Highly skilled NVQ level 4+ in software engineering is considered as a key skill to enable future innovations within the sub-sector; good stock of manufacturing technicians expected to be available (NVQ 1 – 3) for manufacturing demands.	
Low-carbon services	Consultancies and financial services	Highly skilled NVQ level 4+ demand is ongoing and required to ensure service sector organisations can exploit emerging opportunities.	
Low emission vehicles and infrastructure	Electric vehicles	Sector is expected to preserve jobs across all NVQ levels as existing, large automotive capacity in UK switches to ULEV technology. Ongoing R&I activities demands highly skilled researchers NVQ Level 4+ .	
Key	Sub-sectors that are considered to have key near-term (2020 – 2025) skills gaps		
	Sub-sectors considered to have a skills gap emerging in the longer-term (2025 – 2035)		

For the purpose of this paper and to illustrate our analysis more simply and clearly, the eight National Qualification Framework (NQF) qualification levels have been categorised into three groups – people with high, intermediate, and low qualifications. This structure is in line with existing [research and analysis](#) into deficiency as follows:

- Low qualifications equates to no qualifications plus qualifications below Level 2.
- Intermediate qualifications equates to Level 2 and Level 3 qualifications.
- High qualifications equates to Level 4 and above qualifications.

Box 2 – Portsmouth City Council Case Study

City characteristics impacting clean growth outlook:

Portsmouth City Council has declared a climate emergency, with an ambitious net zero target set for 2030. Portsmouth's [economic development and regeneration strategy](#) recognises the significant opportunity that clean growth offers the region, with a particular focus on the region's marine and maritime sector, which offers a unique opportunity for the city's existing workers, corporations and education institutions to play an important role in shaping the city's low-carbon future.

There are specific activities underway in Portsmouth today to scale-up its low-carbon agenda with the Victoria of Wight hybrid electric ferry that runs to the Isle of Wight, and Brittany Ferries are now making trips to France running on LNG from Portsmouth International Port which is owned by the Council and aims to be the first carbon neutral port in the UK by 2030. These activities can deliver immediate emissions reductions for the city. Further initiatives are under development to ensure the city transitions in a timely and coordinated manner including participation with the Plastic Revolution (a new plastic eating enzyme research programme) and massive expansion of Portsmouth's integrated Park and Ride facility to support the move to a possible Class B Clean Air Zone, and through concerted efforts to scale up key adjacent sectors such as in advanced manufacturing and autonomous mobility. Portsmouth also has proposals to develop an innovation quarter (or quarters) focussing on clean growth and clean energy which would see key activities happening in the heart of the city centre. The City's [Tipner West](#), a car-less and kerb-less new community currently under development, puts sustainable design in the centre of its design as indicative of the ambition within Portsmouth. The community will integrate a low-carbon business zone that will have a focus on deep water marine and the University of Portsmouth's research and development.



Portsmouth's Tipner west will be a home to a new community focused explicitly around sustainability and low-carbon living, including a designated space for low-carbon businesses.

Picture source: [Portsmouth City Council](#)

Existing resources/opportunities:

Portsmouth's ambitious net zero commitment means that work is already underway to support the transition. Given the area's established maritime and marine sector much of the existing activity will directly support job growth and low-carbon skills within this sub-sector. The Council funded membership organisation [Shaping Portsmouth](#) is one such initiative that sets out its vision as being "...to grow the number of Jobs and increase the overall educational attainment of the population... by bringing business education and the community together". Portsmouth City Council is also part of the Department for Education's [Opportunities for Apprenticeships](#) project that is soon to complete year one, and Portsmouth Council has the aspiration to be a lead council on further activities to develop this work further.

The [Marine Enterprise Zone](#) (MEZ) is an employer led group by the Navy is also looking at skills and development with support from the Southampton and Portsmouth Councils. The Portsmouth Advanced Manufacturing and Engineering Cluster (PAMEAC) is a broader cross-sector collaboration within the region that aims to ensure growth continues and works to deliver on STEM skills and innovation – sharing capability and capacity is considered its priority within this work. The PAMEAC will collaborate with schools to support careers within the sector, and ensure that the Apprenticeship Levy is effectively distributed across the sector to build productivity in line with the clean growth agenda. There is ongoing work to continue strengthening links with Further Education colleges and the workforce which includes formal plans and working with the Apprenticeship Levy including working with Solent's Apprenticeship Hub. The Local Authority is considered a key facilitatory of much of this work.

Future outlook:

The ongoing development of skills and training resources in Portsmouth must be done in line with key resources such as the National Skills Fund and National Retraining Scheme, and with 2 of Portsmouth's feeder colleges are also leading on pilots for the phase in of T Levels, the area is well poised to benefit from this transition.

Research to date from the Skills Survey also demonstrates that whilst the region is well developed and the majority of organisations feeling that their workforce do meet their current business needs, some specific areas including engineering, management/leadership and IT/computer skills. Given that the achieving net zero is both a binding commitment and a key opportunity to build prosperity for the region, further analysis of the skill needs of businesses is critical to ensuring a smooth transition. The work done to date in close collaboration with the city's strong marine and maritime sector demonstrates the city is shaping up well to participate in the low-carbon transition by leveraging its existing strengths, expertise and resources – integrating this approach to all of its energy related activities will be the next step.

The following Tables (6 – 13) outline a more detailed summary of perspectives from industry stakeholders as to the current state-of-play for several sub-sectors. In considering the broader outlook of the sub-sectors, additional detail can be drawn out to inform local authorities on the trajectory that businesses are moving in and the implications that this may have on skills and jobs. Specific comments on regional demand and skills more generally are also included. The perspectives of stakeholders have been split in to four categories, as follows:

- **High level outlook:** includes comments on the existing conditions of the sector, and key perspectives that should be considered moving forwards
- **Regional demand on jobs:** includes comments on sub-sector specific demand on jobs from the regional perspective.
- **Skills:** includes direct comments on perspectives raised around skill specific challenges and opportunities
- **Key considerations for local authorities:** includes comments on the sub-sectors on the role that Local Authorities can play to aid the transition to net zero.

Table 6 – Solar Photovoltaics

High level outlook	<p>Solar PV industry matured rapidly due to the 'solar boom' in the global market place, and in the UK due to the Feed in Tariff and Contracts for Difference, the removal of the Feed in Tariff in 2019 has however led the industry to plateau somewhat.</p> <p>Over next few years the growth of industry may well remain stable, however specific policy intervention could see increasing demand for the solar supply chain. A key market opportunity for the sector is noted in the installation of rooftop solar where deployment has lagged behind other European nations countries. However, support is not yet in place to i) grow demand or ii) grow the supply chain in England.</p>
Regional demand on jobs	<p>The low cost of PV cells means that there is potential to deploy solar across England and the whole of the UK to decarbonise power in the grid, for businesses or households. This low cost means that even northern areas with low levels of solar irradiation can still benefit from PV independent of geographical differences in solar irradiation levels. Thus, the regional opportunity for this sector is not based in specific localities.</p> <p>PV installers and the wider services required within the sub-sector are relatively evenly distributed and are able to travel for work due to relative quick install times and limited need for ongoing maintenance of the technology.</p>
Skills	<p>For the time being professional services (legal, financial and so forth) are considered relatively secure in England and achievable in the long-term, there could be some uncertainty here if demand was to rapidly ramp again – these services are primarily required for utility scale solar.</p> <p>Solar technician skill requirements will also be demand led; Level 3 Electrical Installations qualification are required to install grid connected solar, however there is relatively robust installer base due to previous boom in the sector. If there was an increased demand in rooftop solar, this would be a skill area that could require strengthening.</p>
Key considerations for local authorities	<p>There has been engagement with local authorities from this sub-sector, primarily where they have commissioned their own solar projects; engaging with the supply chain to achieve these installations strengthens the relationship with the sub-sector.</p>

Table 7 - Nuclear

High level outlook	<p>There will be a net increase in demand for jobs from new projects and decommissioning on top of maintaining existing fleet. The construction of proposed plants (Hinckley Point C, Sizewell and others) and the major transformation programme for nuclear submarines are noted as two critical drivers for increasing this demand. It is also noted that this increase in demand for engineering expertise and technical skills will be in competition with demand from other large infrastructure projects in adjacent sectors.</p> <p>There is also scope to increase competence in wider supply chain activities including pre-fabrication of components to build the UK's domestic nuclear industry to benefit projects here and to exploit the international export opportunity, however given there is limited UK activity on this front to-date this is not considered to be an immediate factor that will create a skills gap.</p>
Regional demand on jobs	Nuclear employment is, and will continue to be, highly localised around key projects for example in Clyde, Sellafield, Hinckley Point. Workers with low qualifications involved at the construction phase of projects typically travel for work for the set period of time they are required for. Those higher skilled individuals that are involved in the planning phase may be able to work remotely or intermittently visit the site depending on project specific requirements.
Skills	<p>Increasing standards within the nuclear industry may change skill requirements in the near-term, for example enforcement of French standards (RCC-M) could increase need for high-skilled welders and other supply chain workers and will require businesses to invest in these skills.</p> <p>Across the entire sector there is need to upskill and reskill individuals to work on nuclear from other sectors, this includes construction workers that have non-nuclear specific skills, as well as civil contractors and mechanical engineers.</p>
Key considerations for local authorities	<p>A coordinated approach to upskilling the entire supply chain will be beneficial to allow UK-based operations to meet demand sufficiently. Ensuring industry, universities, colleges and local authorities collaborate on this can ensure this transition is smooth and prosperous for all stakeholders involved in the UK.</p> <p>It is further recognised that there is an opportunity for local authorities in 'nuclear regions' to ensure provisions are in place for the nuclear industry, as training and reskilling individuals to work on projects can increase prosperity to these areas by ensuring the local workforce can participate in a key area of local economic activity and remain in the area for the long-term.</p>

Table 8 – energy efficient products: heating controls

High level outlook	<p>Demand for energy efficient technologies and products will remain towards 2050, although the key aspects of digital technologies will likely change to become increasingly 'smart'. Whilst key infrastructure, services and capacity of manufacturers will therefore likely remain constant and manageable, there is likely to be a shift away from traditional electrical engineering skills to digital skills.</p> <p>The most recent policy intervention via Building Regulations Part L and the Domestic Heating Compliance Guide, known as "Boiler Plus" set the bar for heating controls in 2018, and future policy shift including the Future Homes Standard and prospective 'smart' requirements could catalyse further growth.</p> <p>There is also some dependence on installer network of heating systems to effectively translate information on emerging heating control technology to the customer (see heat pumps for detail on the skill demands here).</p>
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Regional demand on jobs	Highly localised in the area of manufacturers' core operations; this includes manufacturing, sales, communications/marketing and research. Again, this sub-sector is dependent on the existing heat installer supply chain to install the technology within homes/businesses.
Skills	<p>Engineering, hardware, firmware and software engineers are a staple of the industry today, however a concerted shift to increasing software engineering competence is expected as technology changes to be a core port of the 'smart' energy system.</p> <p>Today, employment in key supply chain operations including in R&D, manufacturing and services is largely satisfied by the regional workforce in the operations' key localities. However, increasingly requiring highly-skilled software engineering expertise has anecdotally required a change in a recruitment tactic to broaden recruitment to wider regions.</p> <p>The workforce primarily includes experienced professional and graduates. Much of the company's training comes from investing in the existing workforce, apprenticeships, as well as in undergraduates with a year in industry.</p>
Key considerations for local authorities	This sub-sector is well-placed to develop its own competences by investing in the younger workforce to ensure they have the skills and context to contribute to technical work. However, Local Authorities would be well-placed to recognise the types of skills that organisations within their regions are requiring and ensuring that local education is geared towards this – doing so will ensure that those who live in the region can participate in a key low-carbon activity.

Table 9 – alternative fuels: anaerobic digestion (AD)

Table 9 – alternative fuels – anaerobic digestion	
High level outlook	Similar to the solar market there was a real boom in the 2010s due to the Feed in Tariff and the Renewable Heat Incentive, however growth has plateaued more recently as these policies have expired or are expiring. Positive inclusions for this sub-sector in the 2020 budget (i.e. the biomethane levy) indicate there could be further growth, however this is a recent announcement and the response from the AD industry is still to be seen.
Regional demand on jobs	Regional demands for this sub-sector varies from being close to municipal centres where there are large volumes of waste feedstock to rural (off-grid areas) where farm waste can be used as a feedstock. Ultimately, plants are relatively evenly spread across the country, with larger ones close to municipal waste centres. Those installations close to municipal centres will require grid-connection; those in rural locations may feed directly in to Combined Heat and Power (CHP) generators, demonstrating some variance in specific activities related to the sub-sector.
Skills	There is a diverse set of skills required throughout the supply chain for AD, this includes farmers who have detailed knowledge in the management of land and feedstocks, to specialist grid-connection engineers and operators who ensure grid connections are safe, and that the biomethane fed in to the grid is of suitable quality and calorific value as per the grid operators requirements. As demand increases, this wide-range of skills must be managed.
Key considerations for local authorities	Local authorities have a key role in ensuring that there is sufficient internal education and understanding of AD technology and its low-carbon credentials to support this industry. Indeed, the management and enforcement of Compulsory Food Waste recycling will require local authority action – ensuring this policy is functioning will ensure that municipal waste feedstocks can be sourced by AD operators for mutually beneficial circular economy outcomes.

Table 10 – hydrogen fuel cells

Table 10 – hydrogen fuel cells	
High level outlook	A highly innovative sector that is continually pushing boundaries of research and innovation with the aim of exploiting economies of scale and remaining ahead of international competition in a burgeoning marketplace. Hydrogen demand is broadly expected to increase (globally) towards 2050 and fuel cell manufacturers are critically aware of this – there are challenges associated with continuing to innovate, retain highly skilled workers and to remain ahead of international competition.
Regional demand on jobs	Job demand is highly localised in areas where primary operations are, this includes manufacturing, research, design, sales and marketing. In future it is possible that manufacturing could be moved abroad to meet major demand markets internationally, whilst key research and innovation jobs would likely remain in the UK. This sub-sector could feasibly capitalise on existing expertise from automotive manufacturing workers in localities where current automotive operations are downsizing.
Skills	<p>Again, for low-skilled jobs, there is an expectation that downsizing of existing UK automotive operations can be exploited by the hydrogen fuel cell sub-sector in areas where key operations take place.</p> <p>The primary skill demand is however expected to be for highly skilled workers including engineers and scientists that can support innovation and research activities. However, given the significance of this market segment and the evolving competition from other large economies that are pursuing hydrogen opportunities, there is a need for UK higher education institutions to deliver key skills such as engineering, physics and other core STEM subjects within the workforce.</p> <p>It is recognised that automation in this sub-sector could reduce the demand for low-skills workers in the long-term.</p>
Key considerations for local authorities	Local Authorities can play a critical role in identifying emerging technologies and championing them to increase local demands, awareness and understanding of technology. This can have knock on benefits including preparing the young workforce for employment in the sub-sector through awareness raising/education and in developing local markets – some local authorities are cited as having already done this to the benefit of manufacturers and progress towards decarbonisation.

Table 11 – low carbon heat: heat pumps

High level outlook	<p>The design, specification and installation of heat pumps is key for this sub-sector. In the UK there were 2,000 heat pump installers at peak capacity, today there is closer to 800, this is in contrast to the existing 133,000 gas safe registered heating engineers.</p> <p>With the onset of the Future Homes Standard from 2025 there needs to be a step change in the resource committed to ensuring there are enough installers on the ground to deliver electrification of heat requirements. Towards 2050, much of the heat sector will be electrified and demand will be significant and ongoing for installation and maintenance services.</p>
Regional demand on jobs	Rural areas and new builds will see the deployment of heat pumps, but this is not region specific, and all UK homes could theoretically see them installed. Those who install heat pump technologies are decentralised and dispersed and are essentially contained within the existing heat installer supply chain; there are many micro, small and medium enterprises across the country.

Skills	The challenge is currently one of training and upskilling of the existing supply chain which is currently able to meet conventional heating demand requirements. In the future there may be more of a question around how to ensure there are more heating engineers trained and ready to enter the supply chain, but given the 133,000 of existing Gas Safe engineers, the challenge today remains around upskilling to support the transition to low carbon technologies.
Key considerations for local authorities	<p>Indication in the 2020 Budget that there is money for skills/training is positive, although this is non-specific – collaboration with local authorities on the allocation of skills budgets would be productive. Furthermore, individual local authorities could be innovative where there is decentralised community demand for low-carbon technologies, or where there is a large rural population (e.g. in Lincolnshire, Cambridgeshire) to ensure that early provisions for skills are utilised.</p> <p>A broader challenge is that there needs to be a clear training route to get certified for installers, as today it is far from clear.</p>

Table 12 – professional services: financial services and consultancy

High level outlook	<p>A diverse sector that commands a range of skills and expertise from environmental impact assessments, to finance and technical consultancy. The personnel employed are typically highly-skilled with graduate or post graduate level qualifications – these skills requirements are broadly expected to remain similar towards 2050.</p> <p>The sub-sector will be demand led and will flux based on the ongoing activities including large-scale infrastructure projects and the up-scaling of emerging technologies such as hydrogen. This means that there will competition within the sector as many of the technical transferable skills are pulled in multiple directions.</p>
Regional demand on jobs	Much of the work can be undertaken remotely from offices (in urban hubs), although some critical skills are required onsite, particularly activities needed to conduct environmental impact assessments or location specific activities.
Skills	<p>Skill and training requirements are broadly influenced by wider sustainability agenda and infrastructure projects – specific subsectors that have greater demand will see the service sector build their competence through training and resource allocation.</p> <p>Whilst resource is finite and will be in competition with the wider energy sector demands, it was noted by interviewees that they have the capacity to pivot and build competence relatively quickly – with examples of consultancies focussed on utility-scale solar switching to wind power, and competence within the hydrogen sector building quickly to meet emerging opportunities.</p>
Key considerations for local authorities	Whilst these companies do critically work with local authorities on a range of projects and initiatives, including on Climate Action Plans, local authorities would likely be less involved in specific support for skills provisions. Broadly speaking, ensuring that younger generation are educated on ways to participate in low-carbon sector from school level would support this sector, and indeed all low-carbon sectors, to draw on a qualified workforce towards 2050.

Table 13 – electric vehicles

High level outlook	Expectation is that there will be significant scale-up of the sector in the near-term due to the 2035 phase out of ICE vehicles, future demand towards 2050 is uncertain due to considerations around autonomous vehicles, integrated public transport and the competition with Hydrogen Fuel Cell Vehicles.
Regional demand on jobs	Demand for jobs will likely be focussed in regional hubs where existing manufacturing capacity lies; this could be in the North West and West Midlands where automotive manufacturing supply chains are already well developed, to South Wales where there is proximity to raw material suppliers.
Skills	Primarily there will be job preservation for lower-skilled workers in the short to medium term as there is a structural change in the automotive sector from ICE to electric motors. There will be ongoing requirements for those high-skilled workers involved in research and innovation.
Key considerations for local authorities	The notable and rapid downsizing of the existing automotive sector in the UK jeopardises a significant number of jobs and risks seeing unemployment levels within the sector rise sharply in certain local authority regions. They can therefore play a key role in signposting opportunities and engaging with activities that will reskill the workforce to ensure that these individuals can play a role in the future low-carbon automotive industry to deliver multiple benefits for local economies and the climate.

The insight contained within the ten tables in this chapter serve to overlay an additional level of context for readers. The evidence collected suggests that there are some key sub-sectors that require additional intervention from industry, local government, central Government and/or the country's education institutions to ensure that the work force is sufficiently well resourced to deliver on emerging demand. Sub-sectors that will require early intervention from this research are considered to be the heat pump supply chain, the nuclear sector and professional services. Ensuring that existing resources are managed effectively, and specific problem areas have additional resources made available to them will reduce the burden on industry to manage challenges independently.

The other sub-sectors considered in this research are expected to face some unique challenges in the longer-term, however the specifics of these challenges are not yet fully clear and will also likely be influenced by the low-carbon pathways that are defined by both local authorities, central government and at the whole energy system level. Furthermore, it is noted that innovations and changing market conditions may be critical to the future job and skill requirements of these industries. Whilst automation within manufacturing could ultimately reduce the number of jobs only requiring low qualifications, demand for certain technologies that currently remains unknown could create 'booms' in certain sub-sectors – such events could require entire supply chains rapidly mobilise to build capacity and capitalise on the opportunity. Thus, ensuring that ongoing analysis is undertaken to assess industry specific challenges associated with skills and employment will enable them to be overcome.

Interviews with industry stakeholders and the local authorities demonstrate that there is consensus that local authorities are indeed well placed to support the transition to a low carbon economy through their place shaping role. They can keep ahead of the curve by:

1) **Understanding local implications of national low carbon policy**

At the high-level, local authorities should remain abreast of emerging policy opportunities to leverage support that will benefit their local low-carbon supply chains; this could range from engaging with the Compulsory Food Waste regulation to support the anaerobic digestion sub-sector to access necessary feedstocks, or engaging with government to understand how new funding for skills can be pulled down and best put to use within their regions.

2) A pipeline of skills to support a low carbon economy

Local authorities also have a role to play in identifying and drawing down funding for skills and training from a variety of sources to support the local economy. These include existing European funding, its successor UK Shared Prosperity Fund, other national initiatives and programmes as well as securing private investment. It is crucial that they can identify how these funds can be maximised locally to support the creation of new jobs and develop a pipeline of skills locally. Funding is limited and uncoordinated however, which has been cited by local authority stakeholders as a key challenge today.

Local authorities are place shapers and bring together a wide range of stakeholders (including between industry and further education institutions) within their areas. This can ensure that local areas take an integrated and forward-looking approach to skills and training within the low-carbon sector.

By playing this role, local authorities can provide certainty to the supply chain and other stakeholders to take the lead on activities that have been traditionally demand-led in their approach to allocating resources. This type of activity also enables local authorities to build their own internal understanding of the opportunities within the sector to inform low-carbon strategies.

The work underway in Portsmouth (see Box 2) where the maritime and marine sector is working with schools, universities and the local authority to share resources and capacity, and ensure that the workforce is able to engage with low-carbon opportunities is an example of productive collaboration across stakeholder groups, pursuing this approach in other localities based on specific sector strengths would be beneficial.

3) Leading by example

By taking an early lead in investing in low-carbon technologies, local authorities stand to gain not only by reducing their own carbon emissions and savings costs (e.g. by securing low-cost solar energy for their own needs), but also to promote technologies to the public within their local areas and to position themselves as leaders within the energy transition in their own right. This can build internal understanding of low-carbon within the local authority itself and strengthen working relationships. Moreover, it also serves to benefit industry and the wider supply chain by providing the early market for new technologies that may not otherwise materialise immediately within an area.

Warrington Borough Council's solar project in York and Hull is cited by industry as being a progressive project which deployed new technologies in the UK to support decarbonisation efforts and was supportive of cross-sector collaboration and the supply chain. Further, the deployment of Hydrogen Fuel Cell Vehicles in Swindon is also cited as an example of mutually beneficial activity that helped some of the UK's first hydrogen vehicles to be deployed and develop the town as a hydrogen hub that has one of the country's first electrolyzers through capitalising on a local industrial strength¹⁴.

Finally, local authorities should strive to be innovative where possible to capitalise on highly localised opportunities; there are certain location specific activities such as those associated with the nuclear supply chain that could benefit local regions and the wider industry significantly if forward-thinking local collaboration can be undertaken. As new technologies approach market-readiness there will be more scope to be innovative to support supply chain and skill development, in rural regions identifying local communities that may benefit from heat pumps could prepare the early market here; in city centre regions there could be ways to support low-carbon vehicle markets which are yet to scale in the UK.

¹⁴ Hydrogen Hub (2020) Accessed on 10th April 2020. Available from: <https://www.hydrogenhub.org/>

Box 2 – West Yorkshire Combined Authority Case Study

City characteristics impacting clean growth outlook:

The West Yorkshire Combined Authority has declared a climate emergency and, with the Leeds City Region Enterprise Partnership (the LEP), has made the commitment to achieve net zero by 2038 at the latest. The energy sector is identified as fundamental to the region's success, offering the highest level of productivity of any sector whilst being a relatively small employer of less than 1% of the workforce. Decarbonisation could therefore bring growth to the energy sector and make a strategic contribution to the performance of the West Yorkshire economy.. Work is ongoing to define the low-carbon pathway to achieve net zero and a Clean Growth Audit has been produced, which makes early suggestions of sub-sectors where there may be a skills gap including construction, smart cities and agri-tech. Other sub-sectors including the financial sector and retrofit services are also recognised as being influential in the transition of the region.

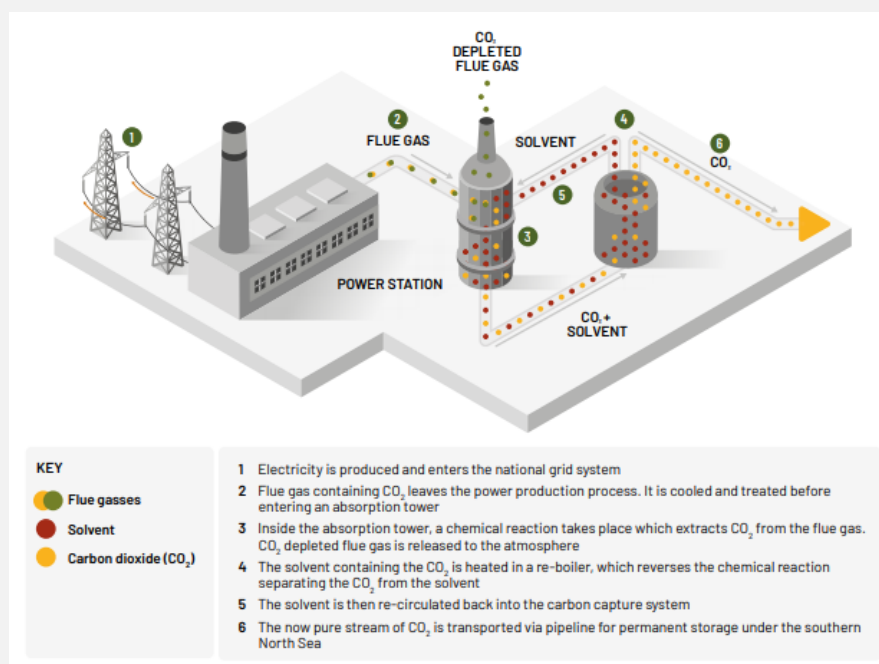
Low-carbon activities in the Leeds City Region are underway in response to the climate emergency which indicates other sub-sectors that may demand skills in the future. Flagship work includes Drax's operations which are being decarbonised via fuel switching to biomass and Combined Cycle Gas Turbines (CCGT). Over the next decade, the power plant will trial world-leading Carbon Capture Usage and Storage (CCUS) technology to enable the power station to deliver net emissions reductions. The opportunity and required expertise here means there is scope for the region to be instrumental in the UK's wider decarbonisation efforts as part of the negative emissions policy for Bio Energy with Carbon Capture and Storage (BECCS). Furthermore, some of the region's core manufacturing operations including glass manufacturing, agrochemicals and food and drink will be required to transition to low-carbon solutions in the future if the net zero target is to be achieved – this represents a distinct challenge for the region, but also an opportunity to scale-up low-carbon competences.

Existing resources/opportunities:

The Combined Authority has a small Energy and Sustainability team working on clean growth and tackling the climate emergency. There are a range of skills provisions and resources contained within the Combined Authority, however it is recognised that these skills programmes remain relatively non-specific and are not targeted specifically at the low-carbon transition. Existing resources include support for individuals via the LEP's [Future Goals programme](#), and from [West Yorkshire Consortium of Colleges](#) (WYCC) [Higher Performing Workplaces](#) and [Progression From Low Pay](#) projects. WYCC also offers targeted support for businesses to upskill their workforce via [The Skills Service](#) and for career changers through [re|boot](#). WYCC's [Let's Talk Real Skills](#) project takes a more sector specific approach and will ring-fence support for the low-carbon sector with work ongoing to define the critical sub-sectors that will require support.

Future outlook:

The Combined Authority is working to scope out the specific pathway to deliver on net zero, part of this is quantifying the scale of change within the energy sector and identifying sub-sectors that will require skills and training support, e.g. in scaling up domestic energy efficiency retrofit and increasing the pace and scale of deployment of heat pumps. Ensuring collaboration between stakeholders (including further education, employers and individuals) will increase the understanding of the low-carbon sector challenges and continued coordination with the LEP and WYCC will ensure skills provisions are available and that the low carbon sector is considered a cornerstone of regional activity.



The Drax power station is the UK's largest power station and is transitioning from coal to lower carbon alternatives via CCGT and biomass. The power station has an [ambition](#) to be carbon negative by 2030. This diagram illustrates how carbon dioxide (CO₂) is captured from biomass generation at the Drax power station [Picture source: Capture for Growth](#)

Methodology

Ecuity utilised the Office for National Statistics (ONS) classification of low-carbon jobs and identified six high-level sectors ranging from low-carbon electricity to energy efficiency and low-emission vehicles and infrastructure. These six sectors were split further into 23 sub-sectors to ensure broad coverage of the low-carbon energy spectrum.

Part 1 – Estimating the route to net zero

Ecuity analysed the uptake of clean and low-carbon technologies required to meet Net Zero by 2050. To do this, Ecuity used a mix of high quality sources such as the Committee on Climate Change's (CCC) Net Zero report and National Grid's Future Energy Scenario (FES) 2019 workbook. These sources enabled estimation of the uptake of clean and low-carbon technologies by 2050 to meet Net Zero. The CCC's Net Zero report was particularly useful for analysing the uptake of low-carbon electricity generation sources (offshore wind, solar PV etc). National Grid's FES workbook provided a detailed overview on the uptake of different low-carbon technologies that could deliver net zero. Ecuity also made use of other credible sources to analyse uptake of low-carbon demand such as the Faraday Institute (for EV battery and production uptake), ScottishPower and the Fuel Cells & Hydrogen Joint Undertaking (FCH JU).

Taken together this enabled Ecuity to make a credible and informed assessment on the uptake of low-carbon technologies and generation sources by 2050 to meet the net zero commitment.

Part 2 – Creating a time series on annual changes in supply and demand

To inform the pathway over the next 30 years, Ecuity developed a time series for the uptake of each low-carbon technology. For example, the annual installed capacity of offshore wind was estimated between 2020 and 2050 based on the trajectory projected by the CCC or National Grid. This method would enable estimation of the annual workforce demand between 2020 and 2050 dependent on the projected installed capacity of each technology.

Part 3 – Employment intensities

Ecuity then sought to research and estimate the employment intensity associated with each technology. This aimed to identify and quantify the number of workers required to manufacture, install and operate, maintain and decommission (where relevant i.e. nuclear) low-carbon generation and infrastructure. A range of sources and internal modelling were used to research and calculate average annual employment intensities for each technology. These intensities captured the number of jobs required to construct, manufacture, install, operate, manage and decommission one unit of installed generation capacity. For low-carbon electricity, the employment intensity captured the jobs required to install one GWh of generation. A review of the relevant literature found that in general, renewable energy technologies are more labour-intensive in terms of electricity produced compared to fossil fuel-fired generation.

Since the time series is over a 30-year period, it is plausible to assume that labour productivity increases as more and more clean energy generation is installed. Research of labour productivity gains across the relevant sectors was conducted and applied to the employment intensities to reflect productivity gains. In the absence of this data and information, proxies such as the projected levelised cost of generation were used to fill the gap.

Part 4 – Estimating the number of jobs to meet net zero

Combining the research and analysis in Part 2 (uptake of each technology) with the analysis in Part 3 (employment intensity) enabled an estimation of the number of new jobs required to construct, install and maintain a particular technology or energy source by 2050. The jobs calculated are known as 'direct' jobs and refer to those jobs that arise directly as result of the investment or installed capacity. In

other words, the jobs related to designing, manufacturing, constructing, operating and maintaining a particular technology or energy source.

Part 5 – Mapping the jobs by region

Once the national estimates for the number of net zero jobs by 2030 and 2050 was complete, the regional picture was developed. Ecuity utilised open access datasets from the Business Register and Employment Survey (BRES). This dataset provides a detailed breakdown of jobs by region and industry. The split of industry was conducted at a four-digit Standard Industrial Classification (SIC) code. This was an important step in order to enable an accurate mapping of the low-carbon sector (and sub-sector) to official industrial classifications. It should be noted that the low-carbon sectors (and sub-sectors) do not map well to the standard industrial classification codes and many of the firms operating in low-carbon also participate in other, non-low-carbon sectors (e.g. oil and gas). However, this is currently the best method of mapping the low-carbon sectors to industry sectors while the ONS develop a new methodology to enable a more accurate split. The split of region was expanded to local authority districts.

For each sector and sub-sector, the employment intensity was broken down by function (e.g. manufacturing, construction/installation and operation & maintenance). This was conducted using existing evidence from a wide-review of the existing literature, expert feedback and internal consultation.

Taken together, the share of industry employment (by local authority district) and the split of jobs by function were computed to produce an accurate picture of the split of low-carbon jobs by sector (and sub-sector) and by local authority district.

Qualifying for the race to net zero

How to solve the net zero skills challenge



Ted Christie-Miller | Alex Luke

ONWARD➤

About Onward

Onward is a campaigning thinktank whose mission is to develop new ideas for the next generation of centre right thinkers and leaders. We exist to make Britain fairer, more prosperous and more united, by generating a new wave of modernising ideas and a fresh kind of politics that reaches out to new groups of people. We believe in a mainstream conservatism – one that recognises the value of markets and supports the good that government can do, is unapologetic about standing up to vested interests, and assiduous in supporting the hardworking, aspirational and those left behind.

Our goal is to address the needs of the whole country: young as well as old; urban as well as rural; and for all parts of the UK – particularly places that feel neglected or ignored in Westminster. We will achieve this by developing practical policies that work. Our team has worked both at a high level in government and for successful thinktanks. We know how to produce big ideas that resonate with policymakers, the media and the public. We will engage ordinary people across the country and work with them to make our ideas a reality.

Onward is an independent, not-for-profit thinktank, registered in England and Wales (Company Registration no. 11326052).

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About the programme

This year-long programme of work, culminating at COP26 in November 2021, will explore the practical challenges to net zero and set out a series of bold, deliverable and politically possible policies to achieve it. It will be framed around how the green transition can be aligned to the economic recovery, turbocharging green growth and levelling up productivity rates and employment levels across the whole of the UK. It will focus on three core components: a large-scale analysis of key incumbent industries; research on the green skills and jobs opportunity; and an exploration of the possibility for future innovation to materially drive down or capture emissions at the pace required.

The programme follows on from Onward's 2019 report, *Costing the Earth*, which set out the case for decarbonisation through innovation and greater government accountability. This, combined with Onward's work on levelling up and political strategy ahead of the 2019 election, puts Onward in an ideal position to be a bold voice for practical and politically possible decarbonisation policy.

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Summary of the argument



It is not possible to precisely predict which jobs will be created in the pursuit of decarbonisation, or what skills will be needed among the workers who fill them. But the scale and nature of the future transformation in the UK's workforce is starting to become visible. And as it does, it is becoming increasingly clear how underprepared Britain's labour market is for the challenges - and opportunities - that net zero necessarily entails.

Irrespective of the exact composition of the UK's future energy mix, net zero is likely to require two specific groups of skills. First, the transition to clean energy is likely to require significant numbers of people trained in high level science, technology, engineering and maths (STEM) skills, such as environmental scientists and engineers. Second, the process of decarbonising existing industry and assets will require a sizable workforce with strong low and medium level technical qualifications, such as retrofit installers.

On this basis, the UK labour market is not well adapted for the transition, suffering from both low levels of STEM graduates and a comparatively underpowered supply of vocational skills.

- Of the current occupational categories related to net zero, more than half (56%) require STEM skills (11 out of 17 of the Low Carbon and Renewable Energy Economy sectors identified by the ONS have a strong reliance on STEM backgrounds). This is our own analysis based upon the descriptions of each Standard Occupational Classification (SOC), which allows us to determine for which occupations degree holders would hold a majority of STEM degrees. The UK is third (out of 38) in the OECD league table for the share of students (16%) studying humanities, languages and arts, but 30th in the equivalent ranking for the share of students studying engineering, manufacturing and construction.
- Of the 1.7 million jobs that Onward has predicted could be created in net zero industries by 2030,¹ 1.3 million are in occupations which currently require strong low and medium level technical qualifications, which are in short supply. In the last quarter, there were 83,900 Level 2 qualifications and 59,100 Level 3 qualifications passed in construction, planning and the built environment.

This leaves a large qualification gap at both the specialist and operational ends of the skills spectrum. The green jobs challenge is therefore not just a low skill retraining challenge or a high skill innovation challenge. It is both and ministers must take action on both fronts.

Overall, we cautiously estimate that up to 3.2 million workers in the UK are in jobs which are in need of upskilling for the net zero transition. There are some industries, such as construction, that have as many as one third (30%) of employees in need of upskilling. Their task is complicated by geographic and demographic factors.

- Looking at the existing skills base of different regions within the UK, we find that the regions with the widest skills gaps tend to be those with the greatest exposure to decarbonisation. The largest skills deficit is in Scotland, which has an average skill level of 2.56, followed by the North East (2.57) and East

Midlands (2.58). The highest skilled region is London, with an average skill level of 3.00. At a local level, the places where the skills challenge is most acute are places with higher levels of deprivation, lower wages and weaker housing stock, such as Sandwell, East Lancashire and Stoke-on-Trent. Politically, the places that are in a high need (top decile) of upskilling overwhelmingly voted leave in 2016 and Conservative in 2019. Red Wall seats have on average 3% higher proportion of jobs needing upskilling than the national average.

- The workers that currently make up carbon intensive industries are typically older, having worked as a steel worker or an oil rigger, for example, for much of their working lives. But the jobs that will replace them - turbine or battery manufacture, for example - are perceived as being for younger generations. Meanwhile, those training for net zero roles appear to be nearly as male and white as existing carbon intensive industries, suggesting action is needed to support a more diverse jobs transition.

Moreover, as qualitative research for this paper shows, people are not prepared for this transition. In focus groups with workers in carbon intensive industries, we found a distinct lack of engagement with the transition to net zero, or the likely effects on their industries. While people are broadly positive about the opportunities that the green economy might bring, they had little detailed understanding of the changes required or how their skills might translate into the new economy.

This is a challenge of paramount importance. Without the labour supply or the skills base to develop net technologies or deliver the decarbonisation of existing industry or housing stock, net zero is not deliverable. Ministers have rightly set up the Green Jobs Taskforce to advise on this challenge, and to corral industry to act. But much more will be needed, and soon, if net zero is to be delivered.

This report argues for a profound and coordinated shift in policy. Recognising that the government has limited ability (at best) to predict the jobs and skills of the future economy, and the limited knowledge that workers themselves have of the skills needed for the future economy, we recommend a business-first approach, using market incentives and institutional support to help employers recruit and train their workers for net zero. Our plan is broadly made up of three kinds of policies: national incentives to support the entire economy; locally targeted policies to provide additional support for industries which will struggle on their own; and agile policies which can be scaled up or down according to need.

First, we recommend the introduction of a Green Human Capital Tax Credit, to allow businesses to offset the costs of retraining for net zero against their tax liabilities as they currently do for R&D. This should be limited to accredited training levels and training specific for net zero. To support this, ministers should update vocational qualification standards, particularly for T Levels and apprenticeships, to include routes related to net zero. This should be complemented with funding for 2,800 net zero aligned PhDs, to drive basic and translational research around net zero.

Second, ministers should respond to geographic skills variation by establishing a number of prestigious Net Zero Technical Institutes to provide relevant training to meet the demands of the net zero economy. Like the HS2 Academy and Openreach's engineer training centres, these institutions would work with employers to identify skills needs, align with accredited standards and deliver high quality training at pace and scale. This will be particularly important for technical roles such as insulators, heat pump engineers and electricians, where skills are scarce and demand is rapidly rising.

Third, we argue that the Government should use the Apprenticeship Levy underspend, which last year totalled £1 billion, top-up employer training spending for net zero skills. This would mean that employers would receive match funding from the government to deliver net zero related training, over and above their existing apprenticeship levy pot. This could be scaled up or down depending on the industry or even targeted by locality. This should be complemented by an expectation that industries receiving taxpayer subsidy to accelerate decarbonisation should take responsibility for retraining their existing workforce for net zero.

If ministers succeed in their ambitions, the UK economy will in the next few decades undergo a profound shift from carbon intensity to carbon neutrality. But for this to happen, the workers that make up the economy will have to retrain, upskill and be supported into fundamentally new jobs. For this to be delivered, we will require bold action, and serious political will.

Summary of recommendations

Problem	Solution
There is a significant skills gap in the UK. The average skill level of net zero jobs is 26% higher than the current average occupational skill level in the UK.	<ol style="list-style-type: none"> 1. Introduce a Green Human Capital Tax Credit to encourage employers to invest in their employees for the transition. 2. Make financial support packages related to decarbonisation conditional on employers retraining their workers.
<p>To fulfil the 2030 target, the UK needs 170,000 more workers to qualify each year than currently do so in domestic retrofit, renewable heat and electric vehicle manufacturing and infrastructure.</p> <p>Apprenticeships are a key route into these industries, but currently there are few routes available. There is also a severe gender imbalance in these industries.</p>	<ol style="list-style-type: none"> 3. Urgently develop new Apprenticeship Standards, T Levels and Degree Apprenticeships to support net zero industries. 4. Specific funding should be offered to encourage the take up of net zero apprenticeship standards by women. 5. Release unused Apprenticeship Levy revenue for apprenticeships engaged in net zero related training.
The UK needs to bolster its domestic engineering capability to achieve net zero.	<ol style="list-style-type: none"> 6. Fund 2,800 net zero aligned PhDs.
The statistics used to measure job creation and economic activity are outdated and fail to reflect the move to a net zero economy.	<ol style="list-style-type: none"> 7. Commission a review of occupation and industry data to improve the ability for departments and organisations to understand the green economy.
The list of free qualifications under the Lifetime Skills Guarantee fails to include crucial training for the net zero transition, such as domestic retrofit and electric vehicle engineering.	<ol style="list-style-type: none"> 8. Review the free qualifications offered within the Lifetime Skills Guarantee, to include all qualifications registered under the new PAS2035 retrofit certification.
More than 3 million people are in need of upskilling for the transition to net zero emissions, with some regions particularly affected.	<ol style="list-style-type: none"> 9. Invite applications from existing further education colleges or new providers to become prestigious Net Zero Academies.

The challenge of a net zero labour market



We know the destination but do not yet know how we plan to get there. Parliament has pledged to reduce emissions to net zero by 2050, and committed to waypoints including a 68% cut in emissions by 2030 and a 78% cut by 2035.² But we are far from having a clear technological pathway to net zero emissions and still further from understanding what is needed to effect the industrial transformation required.

The next step is for ministers to make a number of key strategic decisions about the future of our homes, our energy system, our industry and our transport system. This will determine where the biggest jobs and skills dependencies are for delivering net zero. To ministers' credit, they have established the Green Jobs Taskforce "to improve our understanding of the challenges and opportunities" relating to the green economy, which will report shortly.³

But even before further data is available and decisions are taken about how we get to net zero, it is clear that decarbonisation will require enormous changes to the UK labour market. In previous research for this programme, Onward estimated that up to 10 million jobs in high emitting industries may be partially or wholly disrupted by the transition to net zero by 2050. This disruption is likely to be offset by the creation of 1.7 million new net zero jobs between now and 2030 alone, and many more in the subsequent two decades.⁴

This chapter explores what jobs and skills are likely to be needed for net zero and how the UK currently compares. As we set out, there is likely to be particular reliance on two types of jobs: low-to-medium skilled technical occupations, such as renewable heat and buildings retrofit, and higher skilled jobs in engineering and science. At present, the UK has limited supply of both.

Defining net zero jobs

The term "green job" is difficult to define. Green jobs may be directly linked to the drive to reach net zero (for example in the manufacture of heat pumps) or indirectly linked to efforts to reduce emissions (such as administrative staff at nuclear power plants). There are also definitional challenges among decarbonising industries: a gas worker, for instance, while inherently working in a fossil-fuel industry, could be a "green" worker if they are responsible for the manufacture of green hydrogen. Categorisation is complicated further by the fact that ONS Standard Industrial Classification (SIC) codes have not been updated for some time and do not reflect the emerging green economy.

In this paper, we define "net zero jobs" as jobs related to the industries identified in the ONS Low Carbon and Renewable Energy (LCREE) survey. This dataset estimates employment (and other variables) in businesses related to activities that are either 'low carbon' or associated with the production of renewable energy. It uses 17 activity categories which encompass, for example, low emission vehicles, energy efficient products, and various means of energy production such as wind or solar. The LCREE survey is not perfect, as it fails to take into account jobs related to nature-based

solutions and regenerative agriculture, but it is the most accurate and comprehensive dataset of net zero related economic activity currently available.⁵

Using the ONS LCREE methodology, we identify 23 four-digit Standard Industrial Classification (SIC) codes which contain the primary activities within these 17 sectors, through a keyword search of SIC code descriptions. These SIC codes represent industry subsectors in which many conventional LCREE activities take place. The limitations of the current SIC classification mean that it is difficult to identify codes which contain low carbon or “green” activities exclusively and in their entirety, as found by Connolly *et al.* (2016) and Kye (2010).⁶⁷ However, our goal is to build up a picture of the typical profile of occupations and employees within LCREE sectors. At a four-digit level, SIC codes are specific enough for this purpose and so with these limitations in mind, we define “net zero industries” as these 23 LCREE SIC codes, and “net zero jobs” as occupations within these SIC codes.

As Table 1 below sets out, these net zero industries have a range of different skills requirements. Considering “Other energy efficient products” for instance, a certified qualification under the retrofit PAS2035 certification is necessary. For “Low emission vehicles and infrastructure” a bachelor’s degree or higher in Engineering is the key qualification for any R&D related role. Overall, it is clear that these sectors require either degree-level qualifications in engineering and technology or technical qualifications in electrical engineering, construction and heating.

Table 1: Qualifications required for typical net zero jobs in LCREE sectors

Source: ONS LCREE Statistics, BEIS Ten Point Plan, Onward Analysis

LCREE Sector	Typical jobs	Key Qualifications	Current jobs (2019) ⁸	Jobs supported by Ten Point Plan
Renewable combined heat and power	Installers of heat pumps and other heating systems Heating engineers	Minimum NVQ Level 2 in Plumbing & Heating or equivalent Plus Water Regulations/Byelaws Energy Efficiency Certificates and G3 Qualifications.	3,500	Support for around 50,000 jobs in 2030.
Energy monitoring, saving or control systems	Electrical engineers Electricians Electric technicians Instrument mechanics and technicians Also roles in manufacturing and sales	For typical jobs in R&D: Degrees in Electronic and Electrical engineering For typical jobs in installation, monitoring and maintenance: NVQs/SVQs and Apprenticeships at Levels 2 and 3 in subjects such as Electrical installation, Installation and maintenance electricians, Access to Building Services Engineering (Electrical)	38,700	
Energy efficient lighting	Electrical engineers Electricians Electric technicians Also roles in manufacturing and sales	For typical jobs in R&D and specialist/industrial installation: Degrees in Electronic and Electrical engineering For typical jobs in installation and maintenance: Apprenticeships at NVQ/SVQ Levels 1-3 in Building and Construction.	49,500	
Other energy efficient products	Construction operatives, glaziers, installers of heat insulation measures, plumbers Also roles in manufacturing, sales and customer service	Qualifications listed under PAS2035 standard specification for retrofitting homes. NVQs/SVQs in Building and Construction at Levels 1, 2 and 3 and apprenticeships in some areas are available. Also available in areas such as Engineering Maintenance and Plumbing and Domestic Heating.	159,800	
Low emission	Automotive, design,	For typical jobs in R&D: Bachelors or	28,700	Support for

vehicles and infrastructure	mechanical, electrical and industrial engineers Vehicle mechanics, technicians and electricians	higher in Engineering ⁹ , Physics, Chemistry. For typical jobs in manufacture, maintenance and construction of infrastructure: Apprenticeships and NVQs/SVQs at Levels 2 and 3 in vehicle electronics and mechanics		around 40,000 direct new jobs in 'accelerating the transition to low emission vehicles' by 2030. Onward analysis in <i>Greening the Giants</i> forecasts 367,000 new jobs in total in this sector by 2030.
Bioenergy	Biological scientists	Bachelors or higher in Engineering or Sciences	21,700	
Nuclear power	Nuclear power plant operatives Nuclear, mechanical, industrial and electrical engineers Process workers (nuclear fuel production)	Bachelors or higher in Engineering ¹⁰ or Sciences NVQs/SVQs and apprenticeships in: Process Technology, Electrical Power Engineering, Engineering Maintenance,	43,600	Nuclear power plants will support a peak of up to 10,000 jobs each during their construction (and around 25,000 in total, 900 of which will be permanent).
Offshore wind	Wind turbine technicians Mechanical, industrial, civil and electrical engineers	For typical jobs in design, planning, overseeing construction and maintenance: Degrees in Civil; Design; Electronic & Electrical; Environmental sciences; Marine; Mechanical; Naval; Production / Manufacturing Engineering; Structural; Mechanical Engineering; Physics. ¹¹ For typical jobs in construction and maintenance: Apprenticeships, Higher Apprenticeships, HNC, HND, NVQs and SVQs in Electrical Power Engineering, Mechanical Engineering and technical skills like welding, platers, electricians, fitters.	15,200	Support for up to 60,000 jobs in 2030.
Onshore wind	Wind turbine technicians Mechanical, industrial, civil and	For typical jobs in design, planning, overseeing construction and maintenance: Degrees in: Civil; Design; Electronic & Electrical; Environmental	12,100	

	electrical engineers	sciences; Mechanical; Production / Manufacturing Engineering; Structural; Mechanical Engineering; Physics. ¹²		
		For typical jobs in construction and maintenance: Apprenticeships, Higher Apprenticeships, HNC, HND, NVQs and SVQs in Electrical Power Engineering, Mechanical Engineering, Building and Construction and other technical skills like welding, platers, electricians, fitters.		
Solar photovoltaic	Electrical and mechanical engineers Production managers and directors in mining and energy	For typical jobs in design, planning, construction and maintenance of major sites: Degrees in electrical and mechanical engineering. For typical jobs in installation, manufacture and maintenance: Apprenticeships at NVQ/SVQ Levels 1-3 in Building and Construction.	14,600	
Hydropower	Hydraulic, mechanical, civil and electrical engineers Energy plant and power station operators	Bachelors or higher in Engineering or Sciences	3,500	
Other renewable electricity	Mechanical, civil and electrical engineers Energy plant and power station operators	For typical jobs in R&D: Bachelors or higher in Engineering or Sciences For typical jobs in construction, manufacture and maintenance: Apprenticeships, HNC, HND, NVQs and SVQs in Electrical Power Engineering and Mechanical Engineering,	700	
Alternative fuels	Chemical and Physical scientists Chemical, mechanical, industrial, and automotive, and grid-connection engineers Farmers	Bachelors or higher in Business, Engineering and Sciences HSD/GED/OJT/TS apprenticeship ¹³	1,700	Up to 5,200 jobs supported by a domestic Sustainable Aviation Fuels industry in 2030.

Carbon capture and storage	Chemical and Physical scientists Chemical and mechanical engineers	PhDs in Chemistry, Physics, Chemical Engineering and Mechanical Engineering. Some roles may be open to those with a Bachelors' or Masters' in these subjects. As the sector develops, qualification requirements will likely become less stringent.	200	Support for around 50,000 jobs in 2030.
Low carbon financial and advisory services	Energy managers Environmental consultants Environmental engineers Land management advisors Investment bankers Financial and treasury managers	Bachelors or higher in Business, Finance, Economics, Environmental Sciences	6,800	
Fuel cells and energy storage	Physical and Chemical scientists	PhDs in Materials Science, Chemistry, Chemical Engineering, Physics, Electrical Engineering	1,700	Support for up to 8,000 jobs in Hydrogen by 2030 (potentially rising to 100,000 by 2050 in a high-hydrogen net zero scenario.
Nature restoration and afforestation ¹⁴	Forest managers Tree surgeons	Bachelors or higher in Forestry, Arboriculture and Forest Management. Level 2 qualifications in Forestry and Arboriculture, and Level 3 Diplomas in Work-based trees and timber. ¹⁵	8,300 (From ONS Environmental Goods & Services estimates)	

If the transition to net zero is likely to demand both degree-level STEM skills and low-to-medium level technical qualifications, how well prepared is the UK labour market today?

Looking at the number of workers already working in net zero jobs, as defined by the LCREE, we find that 32.1% hold degrees, of which more than 56% are in STEM subjects. A further 30% of net zero workers currently have qualifications no higher than Level 3, nearly 50 per cent higher than the national average 21.8% of workers who only hold qualifications at Level 3 and below. This reinforces the bifurcated nature of the net zero skills challenge.

Unfortunately, the UK labour market is particularly underprepared for this twofold skills challenge, given enduring weaknesses among both high level STEM skills and low and medium level technical qualifications.

- The UK has the 30th highest proportion of engineering, manufacturing and construction graduates (9%) out of the 38 member countries in the OECD. This is around half the share of STEM graduates as key competitors Germany (22%) and South Korea (20%) and 5% lower than the OECD average.¹⁶ Instead, the UK is a leader in graduates which are less suitable for the net zero economy: the UK has the third highest proportion of Humanities, Languages and Arts degrees (16%) and the sixth highest proportion (30%) of Social Sciences, business and law graduates. The Government's 2017 Industrial Strategy noted that 40% of employers reported a shortage of STEM graduates.¹⁷
- This has not changed substantially despite sustained policy action in recent years. Student enrolments in Engineering and Technology - both undergraduate and postgraduate - have risen only marginally, from 156,985 in 2009/2010 to 165,180 in 2018/2019¹⁸, while student numbers in Physical Sciences actually fell from 95,170 in 2016/17 to 94,845 in 2018/19.¹⁸ Meanwhile, students in Humanities, Language and Arts degrees have continued to grow from an already high base, from 572,600 in 2014/2015 to 600,640 in 2018/2019.¹⁸
- Moreover, a large share of these students are not UK-domiciled and therefore may not stay on to work in the UK after study. At undergraduate level, one quarter (24%) of engineering and technology students are international, rising to 61% of taught students and 57% of research students at postgraduate level.¹⁸ At undergraduate level, 15% of physical science students are international. This rises in taught and research postgraduate levels with 45% and 38% of students being non-UK domiciled respectively.¹⁸
- The limited supply of STEM graduates is a consequence of a longstanding pipeline issue at secondary school level. In 2019, just 36,000 students took physics at A level while 85,000 took maths, equivalent to 14.7% and 34.7% of school leavers. This compares to 47,000 for History and 39,000 for Art.¹⁸ Research from National Grid finds that the UK needs to increase the number of

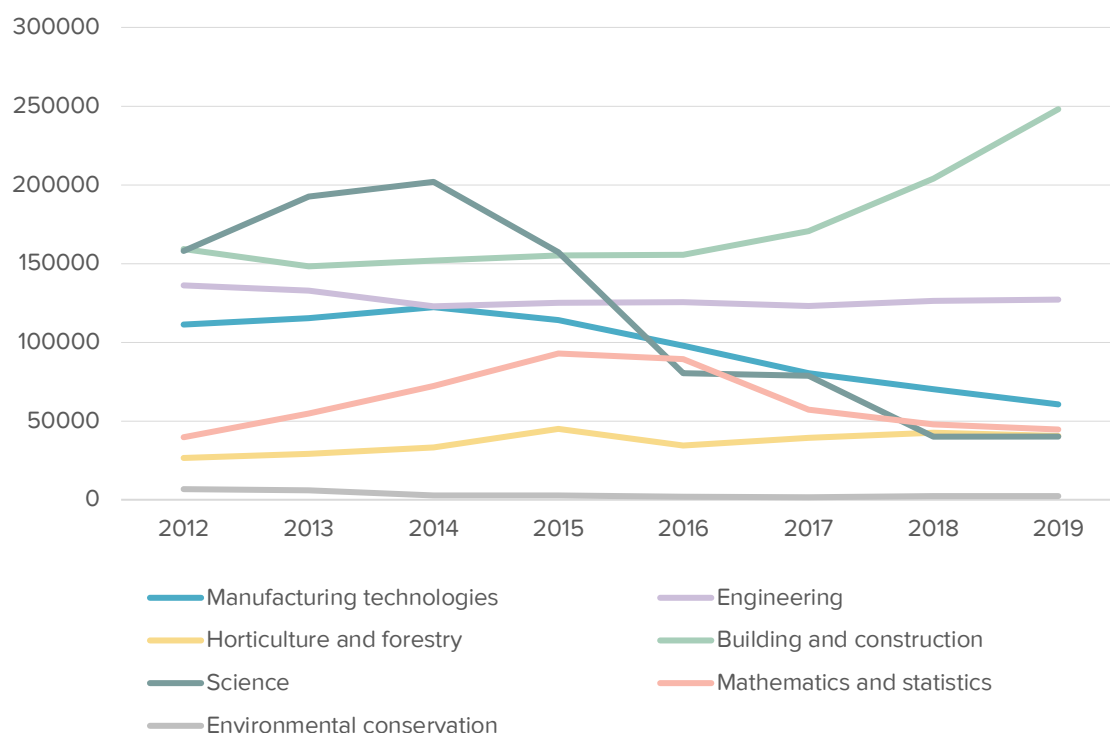
A Level candidates for physics and maths by 24% and 19% respectively just to maintain the already existing pipeline of engineering capacity.¹⁹

At the other end of the scale, the UK labour market lacks the necessary depth among workers with low-to-medium technical qualifications related to decarbonisation as a result of two decades of policy support for universities at the expense of vocational qualifications.

- Within the OECD, the UK has a low rate of technical qualifications. The Sainsbury Review in 2016 found that the UK was 28th out of 33 OECD countries for intermediate skills.²⁰ The share of adults with an upper secondary vocational qualification is 18% for 55-64 year-olds and 19% of 25-34 year-olds in 2019 compared to 26% and 21% respectively across the OECD. At secondary level, the most common broad field is arts and humanities with 21% of upper secondary vocational graduates earning a qualification in this field, compared to 6% on average across OECD countries.²¹
- There is a particularly worrying trend amongst STEM technical qualifications. Since 2012, the number of vocational qualification certificates awarded has fallen by 33%.²² As Figure 1 shows, the number of certificates awarded has fallen in many of the key subject areas for net zero such as Science and Engineering, with the exception of Building and Construction and Horticulture and Forestry. For example, there have been declines in the number of Level 3 Extended Diplomas in Engineering Maintenance (39% decline), and the number of Level 3 Diplomas in Electrical/Electronic Engineering (46% decline). Between 2016 and 2020, the UK's apprenticeship starts in engineering and manufacturing fell from 75,000 to 52,000.²³
- This is compounded by spending disparities. In 2017, OECD average expenditure per student in upper secondary vocational programmes was \$1,470 higher than in general programmes. But in the UK, this pattern is reversed: general programmes receive \$4,451 more than vocational programmes at secondary level. This is partly because spending on adult education outside apprenticeships has fallen by two-thirds since 2003 in real terms, according to the Institute for Fiscal Studies.²⁴ Since 2010, funding for Further Education colleges has dropped 12% and the number of adults in further education has fallen sharply from 4.4 million in 2004, to just 1.5 million today.²⁴

Figure 1: Vocational qualification certificates issued by year and subject area.

Source: Ofqual vocational qualifications dataset (2021), Onward Analysis.



This is particularly concerning for net zero jobs, especially in high volume industries such as domestic retrofit and renewable heating which will require substantial numbers of workers in the coming years.

In the last quarter on record (Q3 2020) there were 83,900 workers completing Level 2 qualifications in Construction, Planning and the Built Environment and a further 59,100 completed Level 3 qualifications in the same subject.²⁵ As just 51,900, or 4%, of the 1.3 million strong construction workforce are in energy efficiency improvements, it is fair to assume that just 4% of these quarterly technical qualifications were in domestic heating and retrofit, equivalent to 5,700.^{26 27 28} With up to 1.1 million new jobs in these two sectors forecast by 2030, then by this measure the current number of workers training in this space annually is just 1.6% of the level we require.

Successive government interventions have failed to fix these skills shortages

Successive governments have attempted to fix the UK's enduring deficits of technical and STEM qualified workers through various policy measures. These include the introduction of T Levels, the creation of degree apprenticeships, the introduction of the Apprenticeship Levy, over £400 million of funding for STEM skills in the 2017 Industrial Strategy,²⁹ and, more recently, the National Skills Fund and Lifetime Skills Guarantee.³⁰

These are all welcome, but more needs to be done in order to truly fix the skills problems of the UK labour market and deliver net zero.

The new ‘T Level’ system was announced in the 2017 Spring Budget, to provide new qualifications in technical education equivalent to their academic counterparts, ‘A Levels’.³¹ The new qualifications take two years to complete and consist of classroom learning alongside an ‘on-the-job’ industry placement lasting around 45 days. Their objective is to overhaul vocational education by both streamlining the system, and increasing the quality of learning. T Levels have been announced in 15 subjects, ranging from Agriculture to Engineering, Manufacturing, Processing and Control, with initial courses being rolled out in 2020 and all subjects available from 2022 onwards.³²

The introduction of T Levels represents a positive step towards addressing the problems that the technical education system has faced: an overabundance of qualifications on offer (currently numbering around 13,000), students not becoming adequately equipped with the skills required for the workplace, and a lack of parity between academic and technical qualifications.³²

However, under the current plans, T Levels will not sufficiently address the technical skills shortage that exists below the levels necessary for net zero. Currently planned T Level courses are not well aligned with the requirements of the net zero transition. For example, ‘Construction’ T Levels only dedicated a small portion of the core content to “sustainability and the environmental impact of construction”, while the core content in ‘Science’ T Levels revolves around the link between health and science, with a focus on biology and biochemistry. It remains to be seen what is included in the course content for T Levels beginning in 2022/23. These include T Levels such as “Maintenance, Installation and Repair for Engineering and Manufacturing” and “Engineering, Manufacturing, Processing and Control”, which are likely to be better aligned with net zero.

The net zero challenge is urgent and T Levels take a long time to complete; lasting two years, students from these courses will not begin to graduate until 2025 at the earliest. Uptake is likely to be more of a trickle than a flood in these first few years, since it will take time for schools and colleges to prepare to teach the new courses, as demonstrated by the fact that just 44 institutions offered any of the first three T levels when they were launched last year. Of the institutions which offered T Levels last year, two-thirds missed their enrolment targets.³³ It is also worth remembering that T Levels only provide a route into an entry-level job in specific industries, during which further training will be required. T Levels, while a valuable step towards addressing the technical skills gap, will not do so alone in the timeframe demanded by the net zero transition.

The Apprenticeship Levy, announced in the 2015 Summer Budget, was also introduced to try and drive-up technical education. The levy is set at 0.5% of an employer’s annual pay bill, minus a £15,000 allowance, and is paid by all employers with an annual payroll of greater than £3 million.³⁴ The funds are then held in a separate account for two years, during which the employer can use them to fund apprenticeship training at training

providers. Any funds unspent after the two year period elapses are returned to the Exchequer.

Since the levy was introduced, apprenticeship training has shifted to a higher level. Pre-levy, 55.1% of apprenticeship starts were at Level 2 with the remainder at higher levels, and 6.3% at Levels 4-7. Post-levy, the proportion of starts at Level 2 has fallen to 40.6%, while the proportion at Levels 4-7 increased to 15.5%.³⁵ Levy paying employers are even more likely to offer apprenticeship starts at these highest levels; 21% of apprenticeship starts in these companies are now at Levels 4-7 with just 36% at Level 2.³⁶

However, the apprenticeship levy has not been without issues. While the quality of training has increased, starts have fallen - from 509,000 in 2015/16 to 393,000 in 2018/19.³⁷ As Conlon *et al.* discuss, this is likely due to “the introduction of apprenticeship standards and removal of frameworks, the new requirements of a 12-month minimum duration and a lower threshold of 20% of off-the-job training”.³⁸ This rightly addresses the weaknesses of apprenticeships under previous governments, when numbers were prioritised over quality, undermining the rigour of the qualifications and the value generated for employers. However, as the previous section set out, apprenticeship starts in the key areas needed for net zero are not at the levels that we urgently require, and in some subjects are even declining. The levy has thus far failed to address this issue.

In addition, many employers simply treat the levy as a tax, with 45% of levy-payers reporting having not spent any funds within the two-year expiry period.³⁹ One reason for this is that for many employers, there are no available programmes which fit their requirements and developing bespoke programmes is only plausible for the very largest employers. Additionally, levy funds are capped at £27,000 for individual apprenticeships despite some engineering and manufacturing apprenticeships costing upwards of £100,000 for programmes in engineering and manufacturing. The net result is that nearly £2 billion of levy funds have gone unspent in the last two years, equivalent to an additional 72,000 apprenticeship starts at the maximum funding of £27,000. As funding for the majority of apprenticeships is well below this, hundreds of thousands of additional apprenticeships could have been funded.

This is unlikely to be ameliorated by recent Government interventions. The 2017 Industrial Strategy White Paper announced £406 million of funding for STEM skills, all of which has gone ahead, but over a third of the total (£144m) was reserved for programmes aimed at improving digital and cybersecurity skills and the remainder for mathematics.⁴⁰ Meanwhile the 2017 Clean Growth Strategy made no reference to the need to increase these STEM skills, nor did it discuss the necessity of training or retraining the workforce to meet the needs of the industries the strategy sets out to support.⁴¹

The £2.5 billion National Skills Fund announced in the 2019 Conservative Party manifesto will generate significant further funding for vocational education after two years of decline. The Fund pledges to provide matching funding for individuals and SMEs for “high-quality education and training”, in addition to funds for “strategic investment in skills.”⁴²

From this year, the fund will also be used to back free, fully-funded Level 3 qualifications for adults who do not hold a qualification at that level through the Lifetime Skills Guarantee. It covers 387 qualifications, including a wide range of activities, including a number which will provide people with skills that may be of use in the net zero transition.⁴³ Such courses include generic STEM subjects such as science or mathematics A Levels, along with technical skills such as arboriculture, electrical engineering, welding, and vehicle technology. With more than 10 million adults in employment but not yet in possession of a Level 3 qualification or above, nearly a third of the workforce are eligible for the scheme.⁴⁴

However, the Government has allocated only £95 million of the National Skills Fund in 2021/22 and given the average cost of several net zero related qualifications is high - for example, a Level 3 NVQ Diploma in Installing Electrotechnical Systems and Equipment costs £6000 with some suppliers, it is unlikely that current funding will be sufficient to support the scale of labour market transformation necessary.^{45 46}

Net zero jobs are good quality jobs

Workers in net zero industries tend to earn more than the national average. The median gross income of a full-time employee in one of these industries is £37,190. This is around 18% higher than the national average for a full-time employee, which is £31,461.⁴⁷ There is an even larger wage divide (30%) between net zero industries and carbon-intensive industries, which have a median income of £28,610. This wage divide is not surprising, given the fact that there is a significant skills gap between the national workforce and those employed in net zero industries, as will be discussed in the following chapter. But it is very welcome that the suite of net zero jobs that will enter the UK Labour Market are set to be much better paid than those of carbon-intensive industries and the national average.

These Onward findings chime closely with an array of academic research including that of the Brookings Institute in the United States, which in 2019 found that green jobs were higher paying jobs than the national average. Using 2016 data, Brookings found that the mean hourly wages in each major category of green jobs (clean energy production, energy efficiency, and environmental management), were above the national average by at least \$2 per hour.⁴⁸ This correlates closely with the wage gap identified in this paper.

While a clear inequality exists between the earnings of male and female employees in net zero industries, this inequality is less pronounced than when looking at the gender pay gap as a whole. In terms of median earnings, male employees average 17% higher earnings than their female colleagues across net zero occupations. Across the entire economy, the average median earnings of male employees are 21% higher than females, and so net zero occupations have a smaller disparity in pay between the genders than the national average.

Table 2: Earnings in net zero industries versus the national average.

Source: Annual Population Survey 2019, Annual Survey of Hours and Earnings 2019, Onward Analysis.

Industry	All employees		Male employees		Female employees	
	Median	Mean	Median	Mean	Median	Mean
Net Zero industries	£37,190	£40,216	£37,872	£40,989	£32,339	£36,497
National Average	£31,461	£38,600	£33,923	£42,231	£27,981	£33,259

The net zero workforce will be dominated by men without intervention

There is a significant gender divide in net zero industries, with workers much more likely to be men. Nationally, the workforce across all industries is around 53% male and 47% female. However, in net zero industries, approximately 82% of employees are male and just 18% are female. This is marginally lower than incumbent industries - where 85% are male and just 15% are female - but is still a significantly bigger gap than the national average.

If Ministers want to increase the gender balance in the net zero workforce, intervening in the skills pipeline will be crucial. This is because these jobs require a relatively high proportion of engineers and technicians which are skills overwhelmingly dominated by men. In engineering just one fifth (20%) of engineering students are female. In physical sciences just two fifths (41%) of students are female. In biological sciences there are just 4% more males than females.⁴⁹ Research by the Young Women's Trust in 2018 found that for every one female apprentice in the construction sector, there were 50 males. In engineering, just 4% of apprentices are female. This gender imbalance is as much a skills pipeline issue than an employment equality one.

So, net zero jobs are significantly better paid and much more likely to be taken up by men. This is important because it outlines two major obstacles for net zero industries. First, there is a demographic challenge, with men being the dominant employment force for net zero industries. There is an array of research showing that diversity in the workforce helps businesses perform, with a study by Boston Consulting Group showing that companies with more diverse management teams have 19% higher revenues due to innovation.⁵⁰ If net zero industries are limited to a certain demographic, it will be a detriment to their success. Secondly, there is a supply issue, as it restricts the size of the workforce which could potentially move into net zero industries in future. For example, approximately 97.5% of the roles within the domestic heating and retrofit space are occupied by men. Up to 1.3 million new jobs are forecast in this space by 2030, and so if these jobs appeal solely to men it will be difficult to find the sheer number of new workers required to fulfil these roles.

Quantifying the skills and qualifications gaps



This chapter examines the skills and qualifications gaps between the current UK labour market and the net zero economy. Numerous previous pieces of research into the workforce requirements for the net zero economy have identified both economy-wide and sector-specific shortages in the current knowledge and skills of the workforce, including by Seidu *et al.* (2019), Aldersgate Group (2020), and Energy & Utility Skills (2018).^{51 52 53} However, to date, few attempts have been made to quantify these shortages, other than estimations of the raw numbers of people who will need to retrain or upskill.

It is important to quantify these shortages in a way that not only provides a clear measure of the scale of the challenge, but which also allows for analysis of how this challenge is influenced by various social, spatial and political factors. In this chapter, we do this by using a novel methodology to show the extent of the net zero skills and qualifications shortages in the UK, across both the workforce as a whole and those employed in carbon-intensive industries.

The skills gap

There is a gulf between the average level of skill across the UK's regions, and the average level of skill necessary for net zero employment. This divide we term *the skills gap*.

For this analysis, we used the ONS four tier classifications of skill level ranging from 1, low skilled, to 4, highly skilled. Every occupation listed under the Standard Occupational Classification (SOC) correlates to a skill level, allowing us to determine the occupational skill level of each worker in the UK. These skill levels are classified “by the length of time deemed necessary for a person to become fully competent in the performance of the tasks associated with a job”.⁵⁴

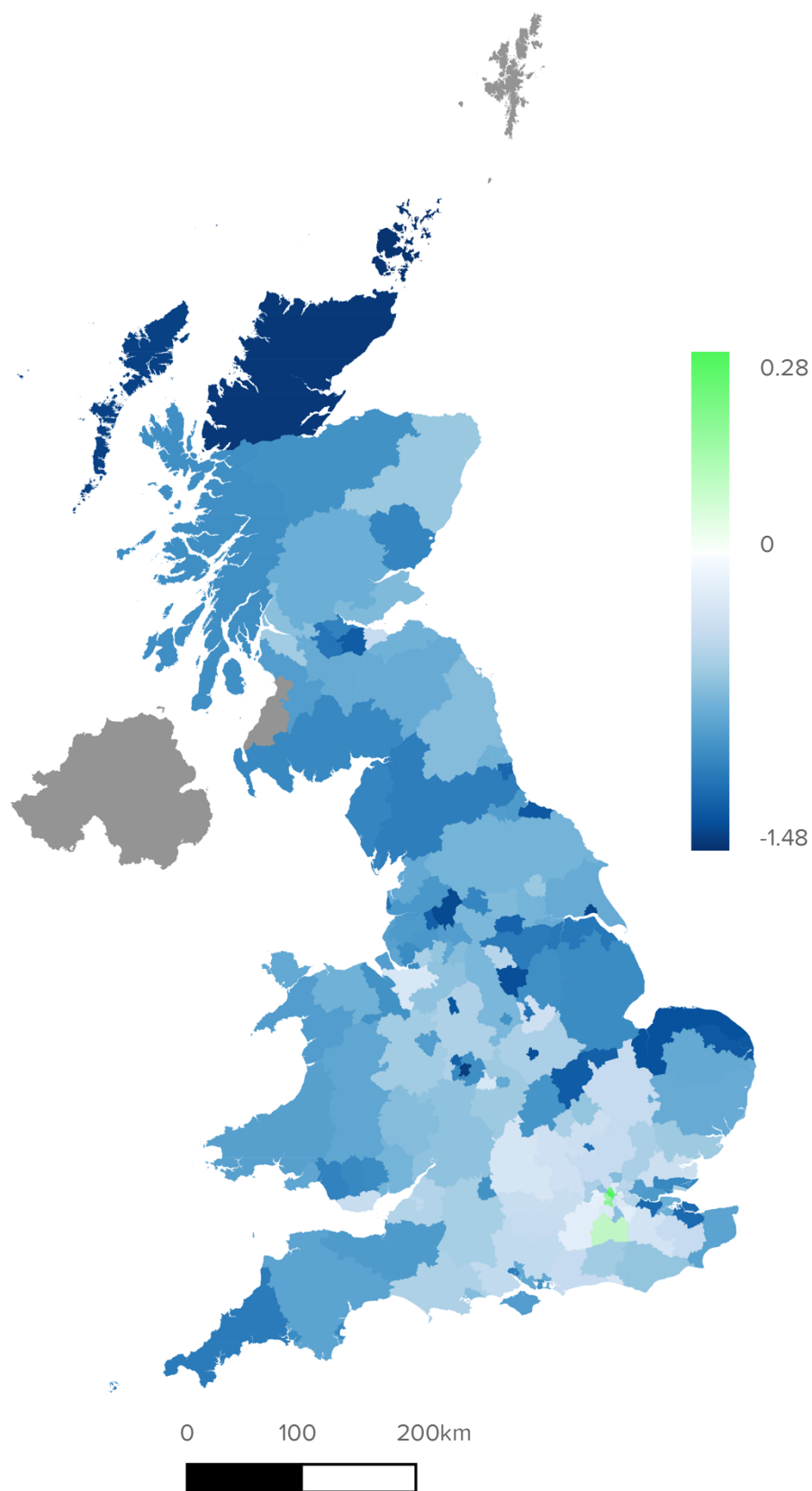
Skill levels therefore provide a different means of assessing the requirements to fulfil a job to qualification levels - as they are influenced by both the length of time required to complete the necessary qualifications for each occupation (such as degrees, apprenticeships and NVQs), along with the length of time necessary to become fully competent in the job.

Using this classification and by deploying our own novel methodology set out in the annex of this paper, we find that the average occupational skill level of an employee in the UK is 2.74. Among net zero industries specifically, the average is 3.19, around 26% higher, demonstrating the considerable upskilling requirement inherent in net zero.⁵⁵

The skills gap varies significantly across regions, as shown in Figure 2. Scotland, the North West and the East Midlands suffer from the most acute skills gaps, as these regions have particularly low average skill levels of 2.56, 2.57 and 2.58 respectively. Just six NUT3 regions have a positive skills gap, with a skill level sufficient for net zero, all located in London and the South East. These regions are shown in green in Figure 2.

Figure 2: Skill gap by NUTS3 region.

Source: Annual Population Survey 2019, Onward Analysis

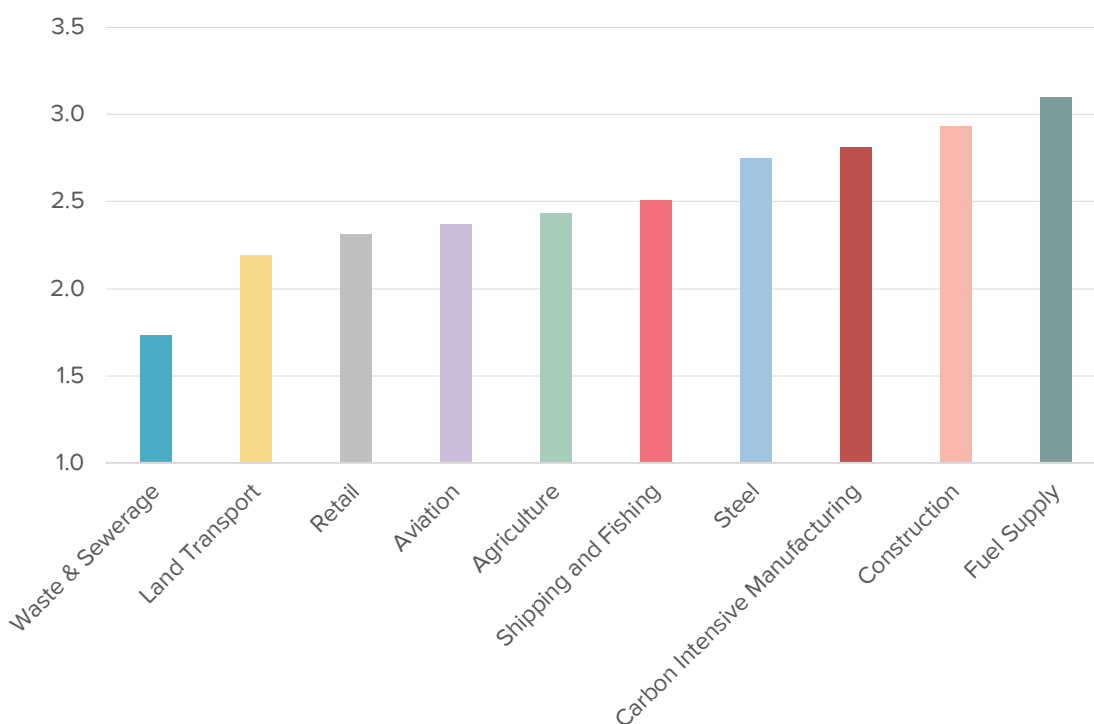


This skills gap is even bigger between the net zero workforce and those employed in existing carbon-intensive industries, for whom the average is 2.52, or 46% lower. This rises to 2.70 when excluding Retail. This suggests that retraining into net zero industries will be disproportionately more difficult for those in carbon intensive industries than for the average worker.

There are understandably differing skill levels between different carbon-intensive industries, as shown in Figure 3. Fuel supply and construction, for instance, have average skill levels of 3.10 and 2.93 respectively. This is significantly higher than industries like Waste and Sewerage and Land Transport, which have average skill levels of 1.73 and 2.19 respectively. This intuitively suggests that carbon-intensive industries will have varying degrees of skills challenge and may need higher or lower levels of support for retraining based on their existing skill level.

Figure 3: Average skill level by carbon-intensive industry.

Source: Annual Population Survey 2019, Onward analysis.



The qualifications gap

Looking at the qualifications gap, i.e. the difference between the average qualification level of employees in each workforce, we see a different picture. At an aggregate level, the average qualification level for workers employed in net zero industries is roughly the same as the national average, at 4.36 and 4.33 respectively. This suggests that the workforce does not simply need more graduates for the net zero transition, it needs more of the right kind of graduates - in STEM subjects for instance - and an increase in

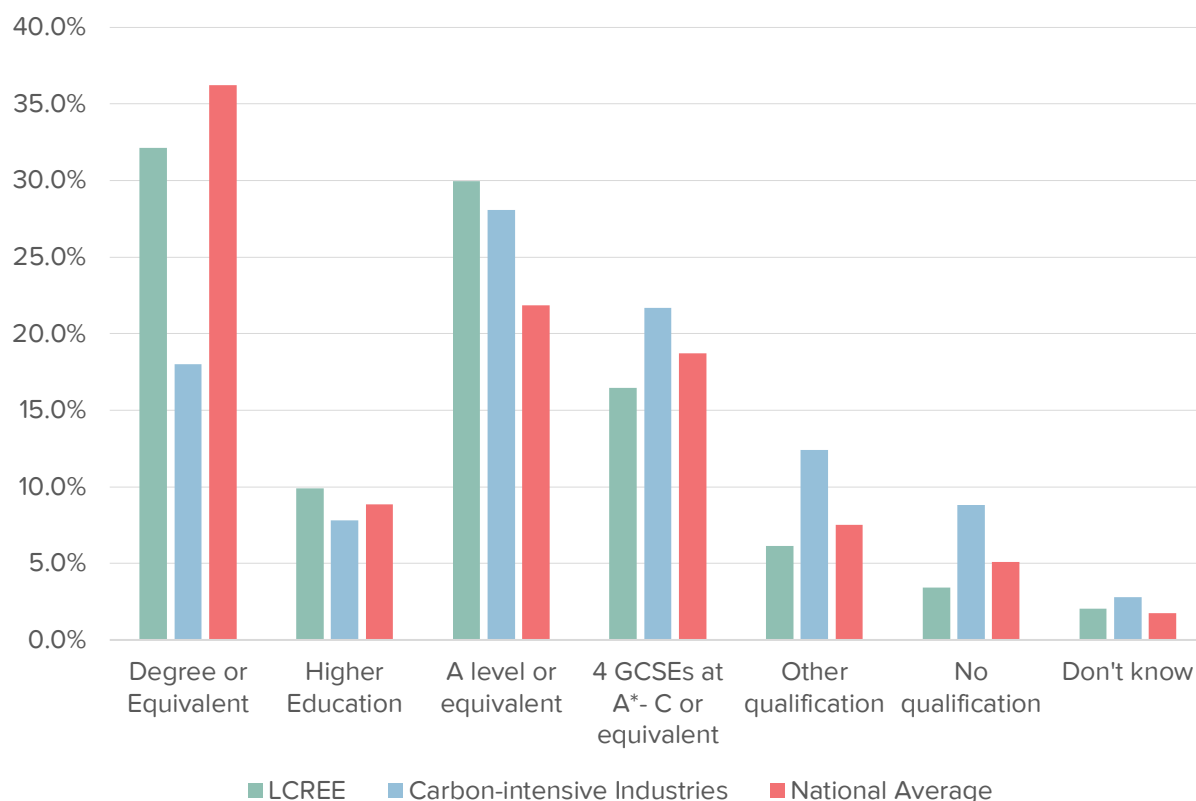
on-the-job learning. There is a large qualification gap between those employed in net zero jobs, at 4.36, and those in existing carbon-intensive industries, for whom the average qualification level is 3.70.

Looking at it another way, 42% of current workers in net zero jobs are educated to degree or higher education level, as shown in Figure 4. This compares to 26% in carbon-intensive industries (or 25.8% including Retail). The high reliance on engineering and technology degrees in net zero jobs is likely to be a key reason for this difference. In contrast, 44% of those working in carbon-intensive industries are educated no higher than GCSE level, or possess no other qualifications, compared to 26% of those in net zero industries. This suggests that it is unreasonable to expect many workers to make the transition from carbon intensive industries into net zero jobs without high levels of retraining and upskilling.

These two measurements surface two important conclusions. First, they reinforce earlier evidence of the wide gap between the current UK skills mix and what will be needed to service the net zero economy. Second, because the current workforce is far behind that of net zero industries in terms of skills - but not in terms of qualifications - the answer is not necessarily more qualifications but different qualifications and higher in-work skills. In practice this likely means more apprentices and in-work learning, rather than more university students.

Figure 4: Highest qualification achieved, by workforce.

Source: Annual Population Survey 2019, Onward Analysis



The stories behind the skills gap

As Onward set out in the Greening the Giants report, there are twelve carbon intensive industries in the UK which are responsible for 62% of the UK's emissions and employ 21% of the UK workforce. As that report exposed, the East Midlands, Scotland and Wales are particularly vulnerable to the net zero transition, as they have one seventh of annual GVA (16%) that comes from these industries.

To assess the different stories that this skills analysis tells, we cross referenced our skills-gap data with six different variables:

- Low skill, high risk areas (regions with high proportion of jobs in carbon intensive industries, but a low average skills base).
- Skills and deprivation (regions with a high Index of Multiple Deprivation score and a low average skills base).
- Skills and wages (regions with a low ratio of skill level to gross annual income).
- Skills and opportunity (regions with a high potential for industrial emissions abatement and high average skill level).
- Skills and retrofit opportunity (regions with a low average EPC rating and low average skills base).
- Skills and Nature-Based Solutions (Woodland opportunity cross referenced with average skill level).

Low skill, high risk areas

The first category represents the most vulnerable areas in terms of both carbon intensity and low skills. These are the areas which will need to be the focus of place-based skills policy interventions, as they are set to lose jobs from the transition to net zero emissions, but also less likely to benefit from huge numbers of jobs in the green economy. Figure 5 maps the geographical distribution of these at-risk regions.

The regions that are most affected are disproportionately located in Scotland, the East Midlands and the North West of England. Scotland is by some distance the most at-risk, containing nearly one in three NUTS3 regions in the worst-affected decile. In comparison, parts of London, the South East and South West of England tend to be less at-risk, as these regions tend to have a higher skills penetration in combination with a smaller proportion of jobs in carbon intensive industries. London contains half of the regions in the least-affected decile, while the South East and South West account for a further 25% combined.

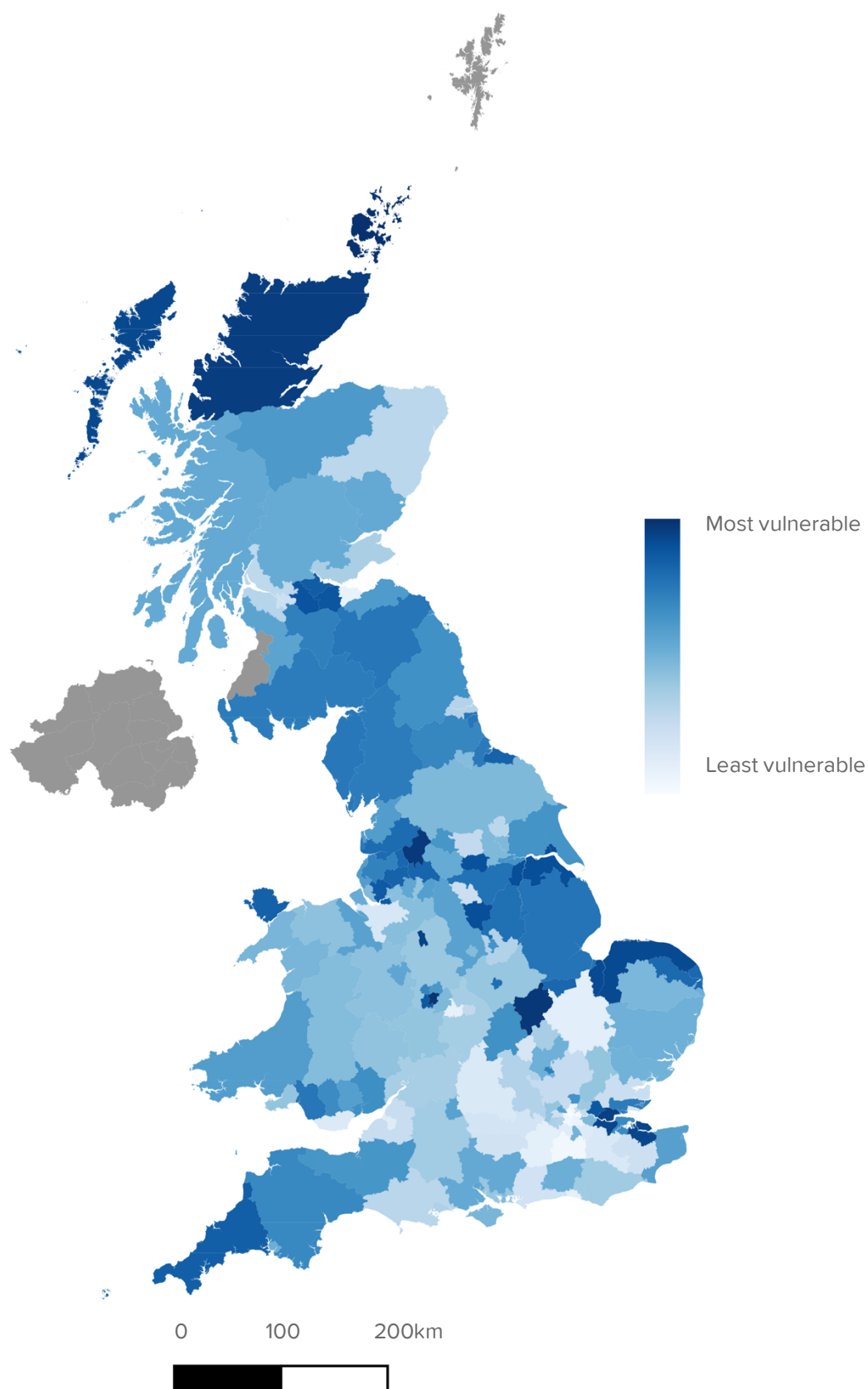
Table 3: Low-skilled regions with a high proportion of jobs in carbon-intensive industries.

Source: Annual Population Survey 2019, Onward Analysis

Region	Average Skill Level	Proportion of jobs in carbon intensive industries
Orkney Islands	1.71	28%
Sandwell	2.23	27%
North Northamptonshire	2.41	32%
East Lancashire	2.31	27%
Caithness & Sutherland and Ross & Cromarty	2.21	23%
Thurrock	2.61	34%
Stoke-on-Trent	2.38	27%
Kent Thames Gateway	2.45	28%
Na h-Eileanan Siar	2.24	21%
North and West Norfolk	2.37	25%

Figure 5: Proportion of jobs in carbon-intensive industries cross-referenced with average skill level across the workforce.

Source: Annual Population Survey 2019, Business Register and Employment Survey 2019, Onward Analysis



Low skill, high deprivation areas

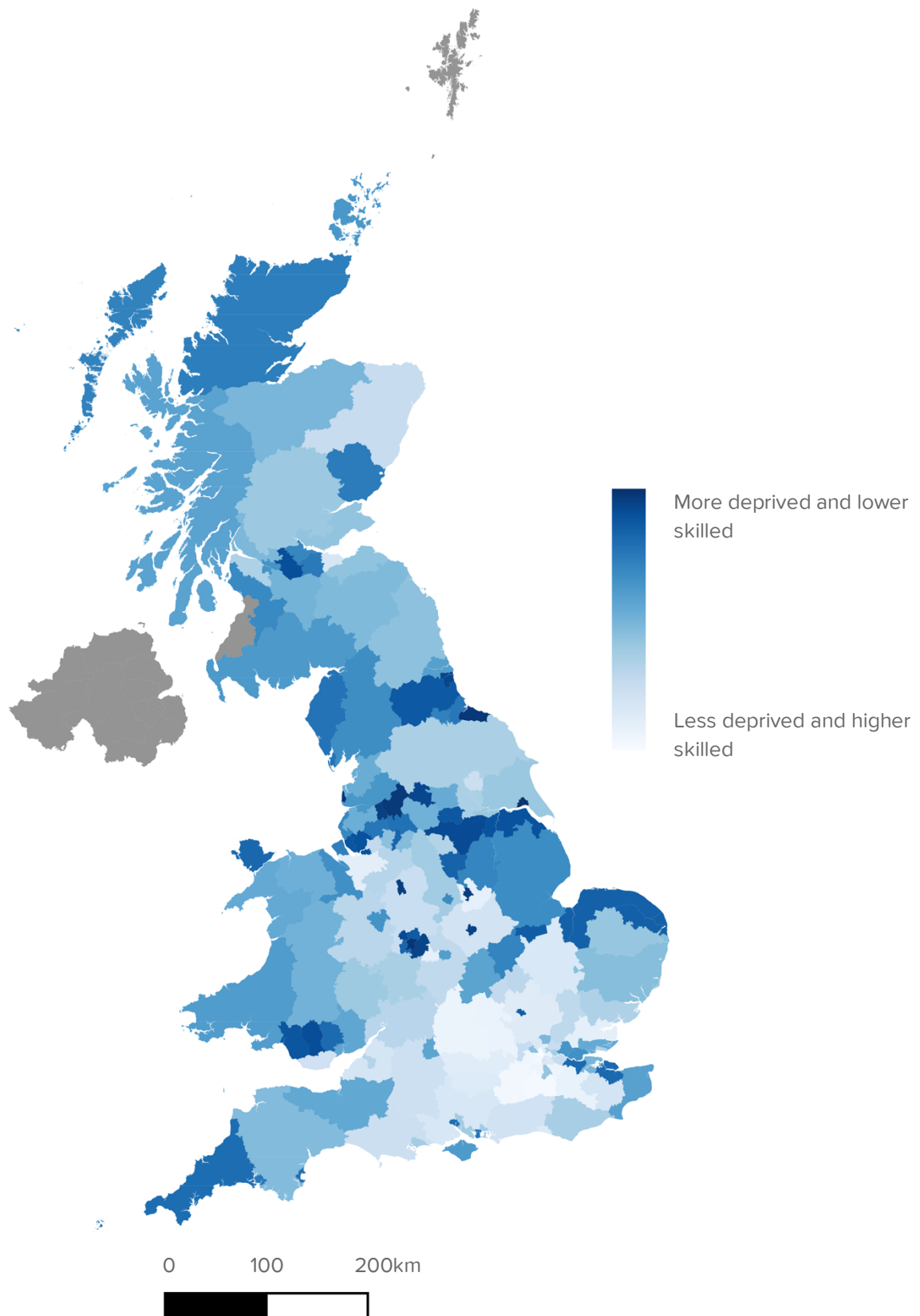
The second category of places we examine are those with a high level of deprivation and those that have a low average skills base for the net zero economy. Each of the four nations within the UK produce their own datasets on the level of deprivation by region, known as indices of deprivation. The methodology for producing these indices differs between countries, in order to best tailor to the needs of the nation. For example, higher weights may be given to different forms of deprivation and as a result, they are not directly comparable.

For this analysis, in order to compare how deprivation is linked to the skill of the workforce across the country, we use Parson's dataset which attempts to create a unified index of multiple deprivation across the UK, based on methodology from Abel et al (2016). This dataset provides a unified index of deprivation at constituency level, which we then mapped to NUTS3 level by averaging deprivation scores across NUTS3 regions.

This reveals that there is a high correlation between those regions in the UK which have a high Index of Multiple Deprivation (IMD) score, and those which have a low skills base for the net zero economy. As Figure 6 shows, the NUTS3 regions with both high deprivation and low skills are disproportionately located in the North of England and the Midlands. The North West and the West Midlands are particularly vulnerable, each accounting for 24% of NUTS3 regions in the worst-affected decile, followed by Yorkshire and The Humber with 18% of the worst decile. The top three areas in terms of both high deprivation and low average skill levels are Kingston upon Hull, Blackpool, and Sandwell.

Figure 6: Map of deprived and low-skilled regions

Source: Annual Population Survey 2019, Abel et al. (2016) "Adjusted indices of multiple deprivation to enable comparisons within and between constituent countries of the UK including an illustration using mortality rate", Onward Analysis



High skill, low wage regions

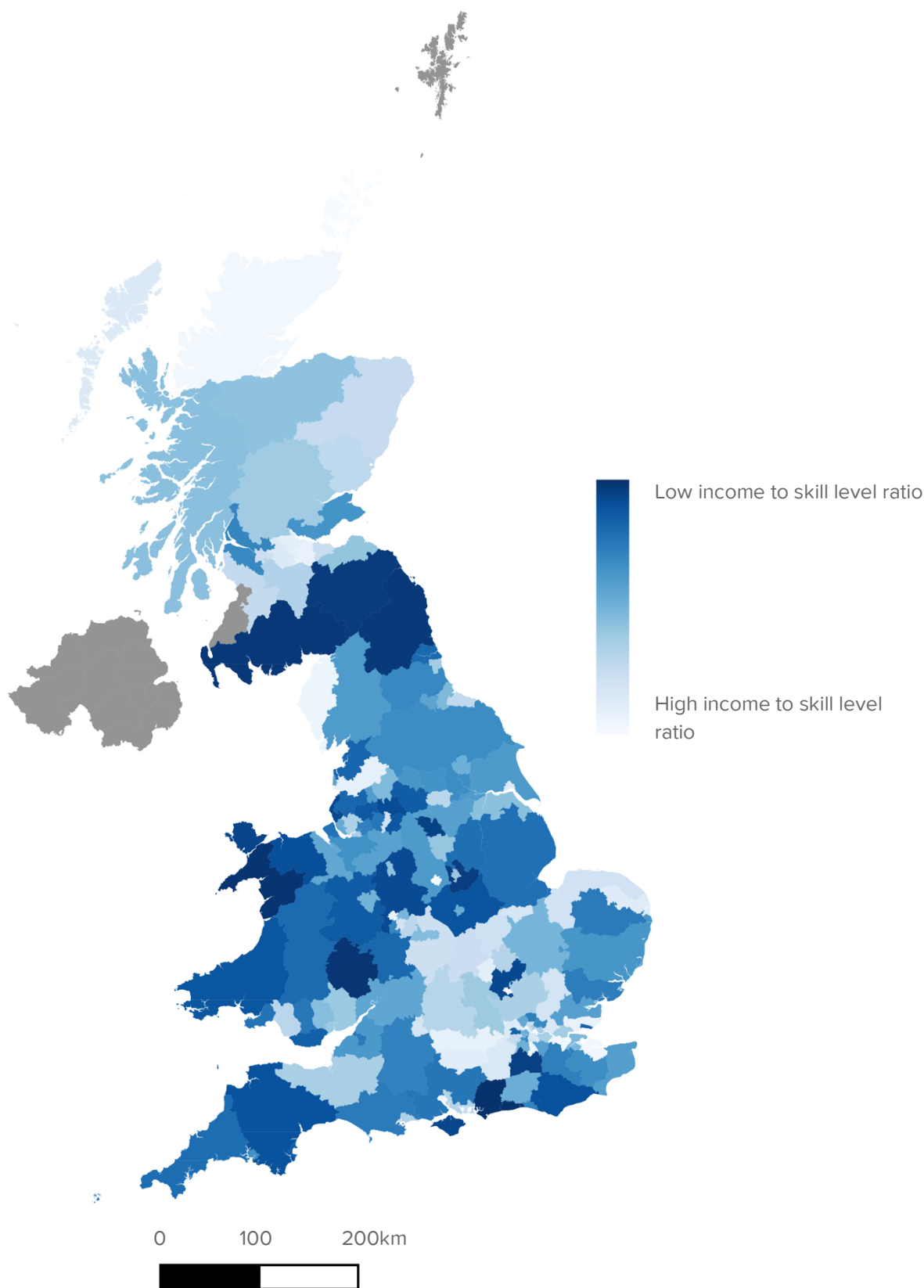
Skill level does not always correspond to higher wages. The third category or regions includes a number of regions with a high ratio of skill level to gross annual income suggesting that workers are paid lower than the average level for their skill level. These high skill, low wage regions show potential employment opportunities for net zero industries who need a higher skill level than existing industries and typically pay more.

This measure reveals that NUTS3 regions in Wales, the North West of England and West Midlands are particularly characterised by relatively high levels of skill but relatively low wages. These regions account for 18%, 18% and 12% of the most underpaid quintile of NUTS3 regions respectively. The regions which have the lowest skills relative to wages are London, the South East and the East of England, accounting for 24%, 18% and 18% of the highest decile of NUTS3 regions respectively.

This corresponds closely to areas of political volatility in recent years: looking at the 33 NUTS3 regions that contain one or more Red Wall seat, we can see that they are disproportionately likely to be in the bottom quintile for this metric (33% of these regions are Red Wall regions, despite only accounting for 20% of all NUTS3 regions) and account for 38% of total Red Wall constituencies.

By contrast, only 12% of regions within the highest decile, which have a high ratio of average skill level to annual gross income, contain Red Wall seats, accounting for just 10% of all Red Wall constituencies. This data demonstrates that there are disproportionately higher skilled workers in the Red Wall, working on comparatively low wages. This strongly indicates that regions in the Red Wall would be opportune areas for net zero industries which require a higher level of skill.

Figure 7: Ratio of average skill level to gross annual income.
Source: Annual Population Survey 2019, Annual survey of hours and earnings 2019, Onward Analysis



Skills and abatement opportunity

The fourth category of regions includes regions where there is both a high opportunity for emissions abatement from future technologies and a high average skill level within the workforce. This helps to create a clearer picture of where key net zero industries could rise in the years to come, as their emissions abatement potential correlates with a high latent skill level.

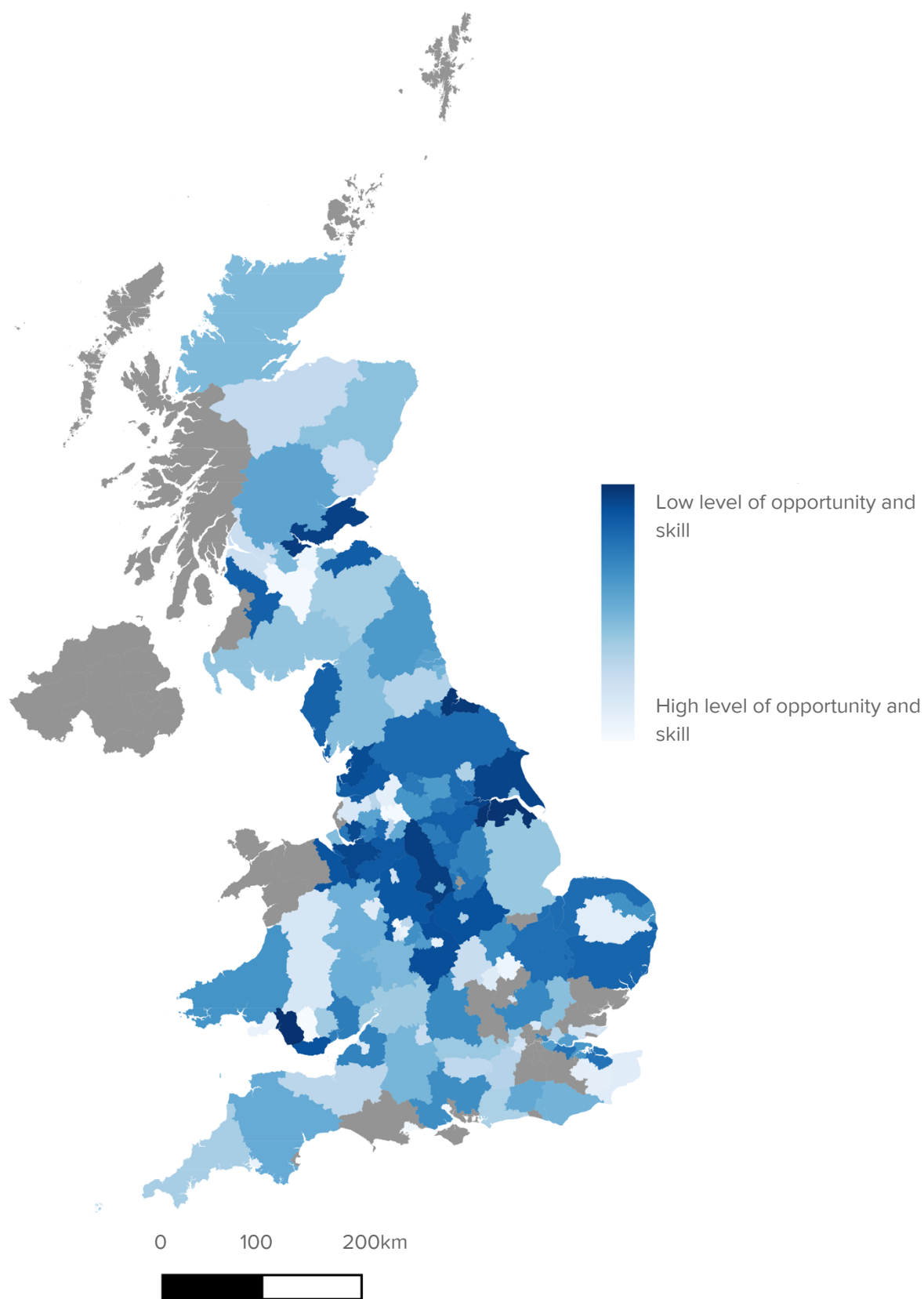
For this analysis, we used estimates from the Climate Change Committee's Sixth Carbon Budget for the abatement potential of new net zero technologies to reduce emissions from heavy industry. These technologies are electrification, hydrogen, carbon capture and storage (CCS), bio-energy with CCS, and reduced flaring, venting and leakage of methane. Jobs in these technologies are likely to be technical and highly-skilled. As a result, the most viable opportunities for the rapid rollout of these technologies are likely to exist in regions where the workforce is already well-skilled and so minimal upskilling will be required. These regions are identified in Figure 8, by cross-referencing the total industrial abatement potential of a region with the average skill level of the workforce there.

We find that many of the regions that are most vulnerable to the transition to net zero are the very same regions that stand to gain the most from the rollout of these new technologies. Regions containing heavy industry with the greatest abatement potential, such as Bridgend & Neath Port Talbot, and North & North East Lincolnshire, continue to stand out using this system. However, in regions with smaller industrial abatement potentials, the average skill level has more of an impact in determining the opportunity size.

We find that the regions with the most significant opportunities are the North West and Yorkshire and The Humber, accounting for 24.2% and 18.2% of NUTS3 regions within the top quintile respectively. By contrast, London and the South West have the fewest opportunities, despite their relatively high skill levels, and these regions contain no NUTS3 regions within the top quintile.

Once again, Red Wall constituencies are also more likely to be located within the NUTS3 regions with the greatest opportunities. Of the top quintile of regions, one third (33%) contain Red Wall seats, and these account for 27% of all Red Wall constituencies.

Figure 8: Industrial emissions abatement potential cross-referenced with average skill level.
Source: Annual Population Survey 2019, Climate Change Committee Balanced Pathway, Onward Analysis



Skills and retrofit opportunity

Given the importance of building retrofit in the net zero transition, which has been well discussed in this report, our fifth category examines the - likely temporary - opportunity of building retrofit in the UK. This consisted of cross-referencing regions with a low average skill level with a low average EPC rating. The key aim of this analysis was to uncover the areas which have poor housing stock and a lower skilled workforce, allowing policymakers to see exactly which regions could be the focus of targeted retrofit strategies.

The average EPC rating awarded to residential buildings since 2012 varies significantly across regions. EPC certificates are awarded on a seven letter alphabetical scale based on the energy-efficiency performance of a building, from A, the most energy-efficient, to G, the least. Translating these into a numerical scale, where a score of 7 represents an A rating and a score of 1 represents a G, allows for comparison of the average rating of certificates between regions. Since 2012, buildings in London have received the highest average EPC rating, with an average score of 4.30. The worst-performing regions are Wales and Yorkshire and The Humber, scoring 3.80 and 3.92 respectively. This suggests that decarbonising housing stock will present a greater challenge in some areas than others; those areas with the lowest average EPC ratings are likely to require the greatest number of retrofit installations, have the highest average spend, and demand the most urgent action to meet emissions targets. NUTS3 regions such as North-Eileanan Siar, Gwynedd and South West Wales face a particular challenge, with average EPC ratings of 3.10, 3.40 and 3.50 respectively in the past nine years.

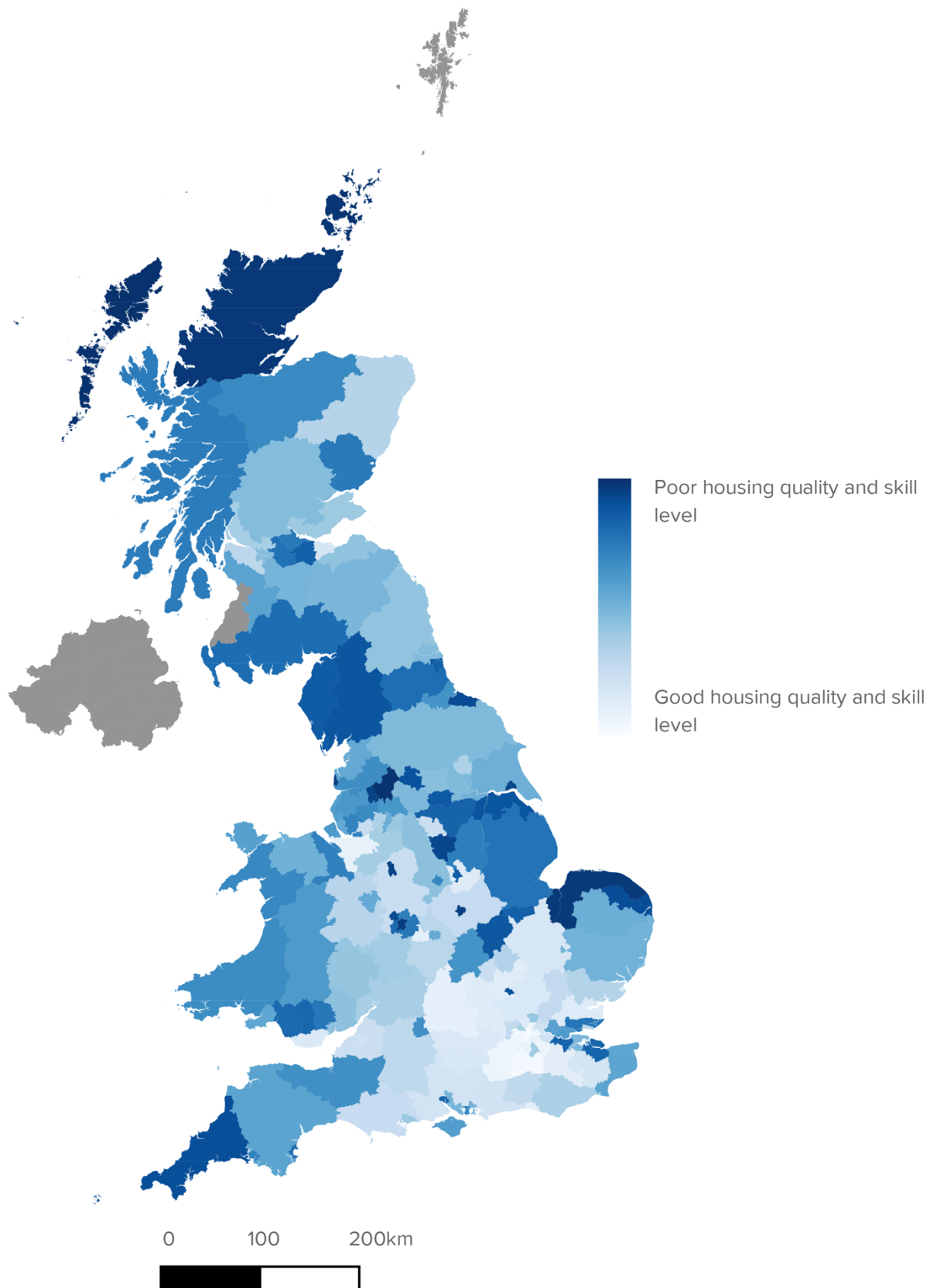
The majority of jobs in retrofit require a mid-range skill level. For example, 'electricians and electrical fitters', 'plumbers and heating and ventilation engineers' and 'glaziers, window fabricators and fitters' are all considered to be ONS skill level 3 occupations. As a result, regions with a low average skill level across the workforce may find it difficult to deliver the number of retrofits required to decarbonise their housing stock using local labour supply.

But, in comparison to other net zero jobs, domestic retrofit employment is more accessible for the low-skilled. For instance, to become an engineer it takes on average four years studying in higher education and a proficiency in STEM subjects. Electricians and window glaziers are more likely to become qualified via the apprenticeship route, with no tertiary qualifications necessary, and often a shorter qualification period.

Areas with both poor quality housing stock and low skilled workers are in many ways the areas which need the most investment in technical skills, but also have the largest market for retrofit. These areas are disproportionately located in the West Midlands, the North West and Scotland, which each account for 18% of the regions in the worst-affected decile. Figure 9 maps out the geographical distribution of these regions likely to face the biggest retrofit challenge. Red Wall constituencies are also more likely to be located within these NUTS3 regions. Of the worst-affected quintile of regions, one third (36%) contain Red Wall seats, and these account for 35% of all Red Wall constituencies.

Figure 9: Average EPC rating awarded since 2012 cross-referenced with average skill level.

Source: Annual Population Survey 2019, Energy Performance of Buildings Register, Scottish EPC register, Onward Analysis



Our final category of places is distinctly different to the other industries discussed: areas with a high potential for nature-based solutions. It is not included in the LCREE survey, unlike the other industries reviewed in this report. It is an industry which is also not so reliant on engineering, technicians and trade occupations, but instead has a wide mix of different skill sets and occupations needed. Raymond et al. (2017) found that nature-based solutions such as afforestation, agroforestry, the creation of green spaces and management of protected parks generate jobs which have a wide-range of skill requirements, from low-skill entry level to high-skilled jobs.

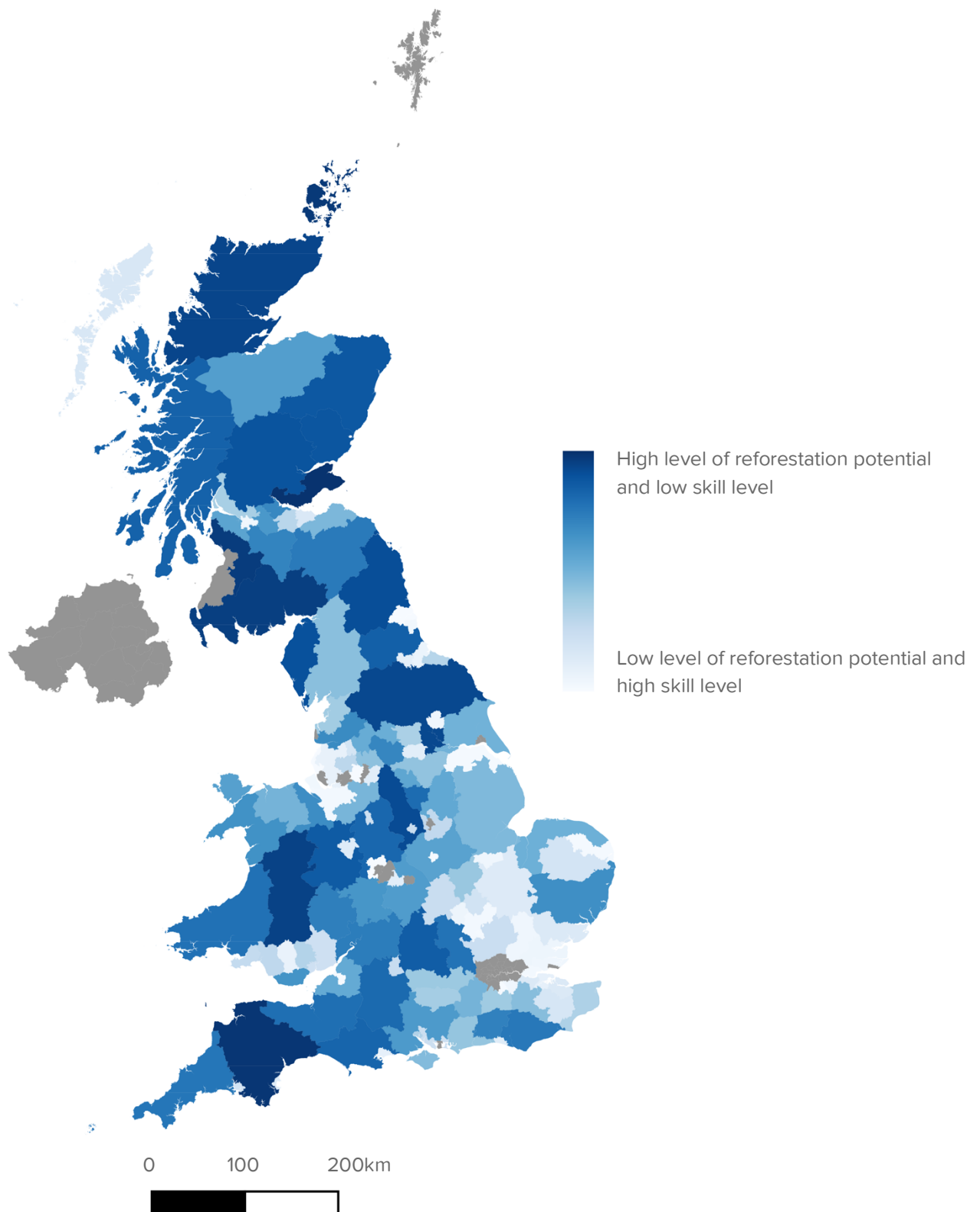
At entry level, these jobs give people the opportunity to acquire some transferable certifications. Arboriculture for example, can require licences in chainsaw use, felling trees and tree hazard assessment. As research by WPI and the Green Alliance have pointed out, many of these skills need to be built up over a long time working “on-the-job”, something which was highlighted in the qualitative research for this paper.

Using data from WPI’s Green Renewal report on nature-based solutions and cross-referencing with the skills gap data in this report, the regions which have the highest jobs potential in nature based solutions in afforestation are spread across the country, as Figure 10 shows. These are regions which not only have high potential for the planting of new woodland, but which also suffer from lower skill levels. The jobs potential is highest in these regions as a low skill level is not a barrier to employment in this instance, since the nature restoration industry’s entry jobs require a mixed skills base; the average skill level of a job in this industry is 14% lower than the national average. The regions which stand to gain the most from nature restoration, in employment terms, are Clackmannanshire & Fife, Devon and the Orkney Islands. The top decile of these regions have an average skill level of 2.59, compared to a national average of 2.74, according to the ONS skills categorisation, meaning they have on average a 9% lower skill level than the national average.

The regions of West Cumbria, Caithness & Sutherland and Ross & Cromarty, and the Orkney Islands are fertile ground for employment in nature restoration. Scotland presents a particular opportunity, accounting for 33% of the top quintile of regions alone. These regions are in the lowest quintiles for skill level and proportion of carbon intensive jobs, while in the highest quintile for possible employment in nature restoration. WPI found that at least 16,050 jobs could be created from nature restoration activity; these are the regions where the focus should be concentrated.

Figure 10: Woodland potential cross-referenced with average skill level.

Source: Annual Population Survey 2019, Green Alliance and WPI Economics "Jobs for a Green Recovery", Onward Analysis



Upskilling



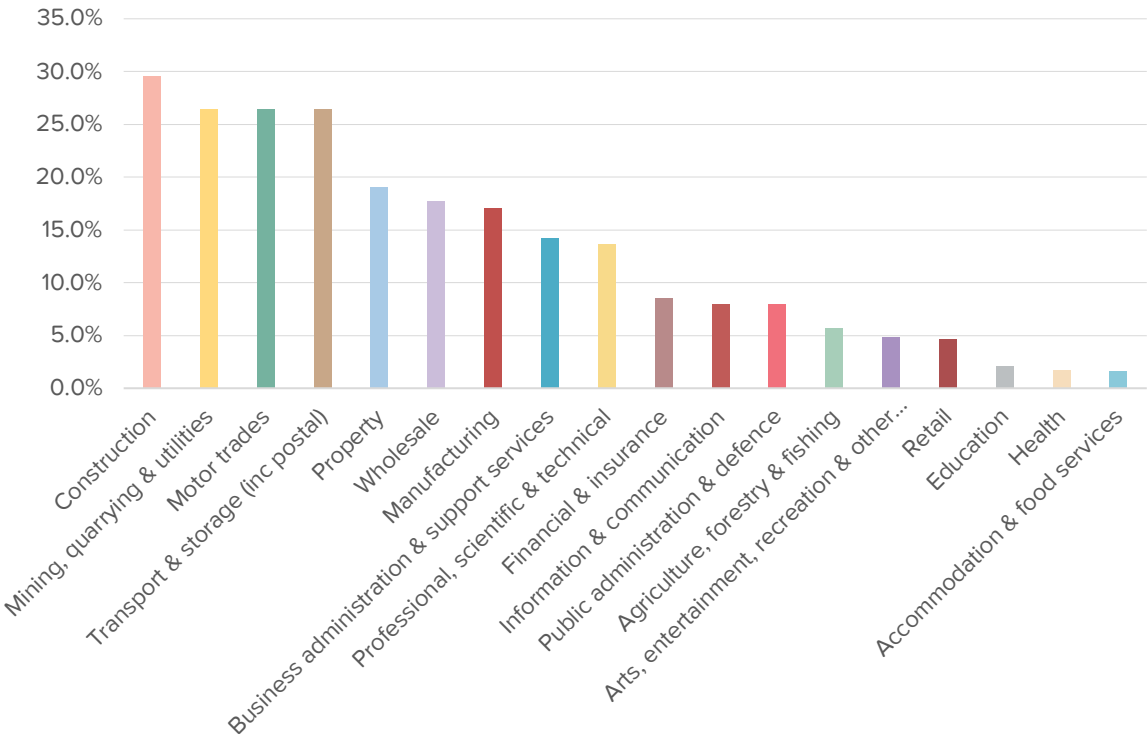
It is clear that millions of workers will need to update and increase their skills during the net zero transition over the next thirty years. Using data from the LSE, Onward finds that there are a total of 3.2 million jobs which will require upskilling in the transition to net zero emissions. This represents about 11% of all UK jobs and the proportion of jobs needing upskilling differs substantially between industry and region.

Unlike some other labour market challenges, this will include many workers who have already gained their skills in another - likely carbon-intensive - industry, and will need to retrain and upskill in order to fit into the net zero workforce.

This need varies considerably by industry. Using data from the LSE Just Transition Jobs Tracker, we estimate that construction has the highest need for upskilling, with 30% (433,963 jobs) requiring upskilling for the net zero transition. This is closely followed by Quarrying and Utilities with 26% (102,168 jobs), Motor Trades with 26% (150,480 jobs) and Transport and Storage with 26% (388,608 jobs).

Other industries have workforces with a very low estimated need of upskilling. Some industries, such as Accommodation and Food Services, Health and Education have less than a tenth of the proportion of jobs requiring upskilling than Construction. Accommodation and Food Services has the lowest vulnerability, with just 1.6% of jobs needing upskilling (36,784 jobs). This is closely followed by Health and Education who have 1.7% and 2.1% of jobs respectively in need of upskilling (66,725 and 54,600 jobs respectively).

Figure 11: Proportion of jobs needing upskilling by industry.
Source: N. Robins, A. Gouldson, W. Irwin, and A. Sudmant, LSE; Onward Analysis



It will also require different policies in different places given the distribution of skills around the country. As Onward's Greening the Giants report exposed, there are particularly high concentrations of carbon intensive industries in some regions, particularly in the Midlands, North and Scotland. The East Midlands has the highest proportion of jobs in need of upskilling (11.5%), closely followed by the West Midlands (11.2%). Wales is the region with the lowest proportion of jobs requiring upskilling (10%).

On a constituency basis, the difference is even more stark. More than a third (35%) of constituencies in the top decile needing upskilling are in the Midlands. A third (33%) of constituencies in the top decile for upskilling are in the North of England. In contrast, the South East and South West have just three seats (5%) and two seats (3%) respectively in the top decile. These findings echo those in previous Onward reports *Getting to Zero* and *Greening the Giants*, which found that seats with high proportions of carbon-intensive jobs were disproportionately in the North, Midlands and Scotland and typically voted to Leave at the 2016 referendum.

Looking at specific constituencies, Hayes and Harlington, has 15.4% of jobs requiring upskilling, most likely due to Heathrow Airport, whereas for Liverpool West Derby this figure stands at just 5.3%. Looking at the constituencies set out in Table 4 and Figure 12, the constituencies with the highest proportion of jobs needing upskilling are concentrated around large construction and aviation hubs.

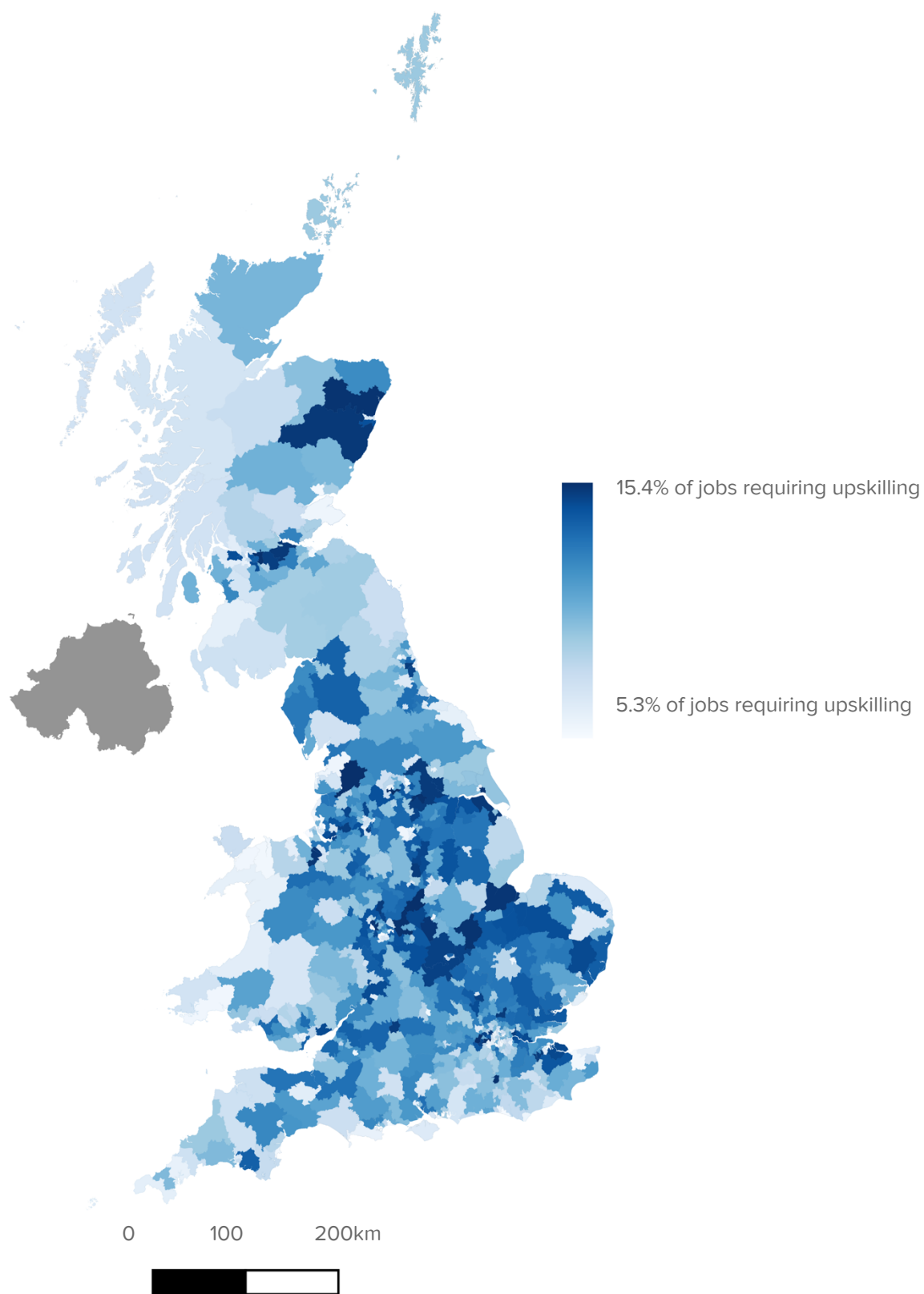
Table 4: 5 highest and lowest constituencies by proportion of jobs requiring upskilling

Source: N. Robins, A. Gouldson, W. Irwin, and A. Sudmant, LSE; Onward Analysis

Rank	Constituency	Average proportion of jobs requiring upskilling
1	Hayes and Harlington	15.4%
2	North West Leicestershire	15.2%
3	Brentford and Isleworth	14.9%
4	Ribble Valley	14.9%
5	Bradford South	14.6%
549	Birmingham, Edgbaston	6.4%
530	Tooting	6.3%
531	Edinburgh South	6.1%
532	Wirral West	5.4%
533	Liverpool, West Derby	5.3%

Figure 12: Proportion of jobs needing upskilling, by constituency.

Source: N. Robins, A. Gouldson, W. Irwin and A. Sudmant, LSE; Onward Analysis



Of seats in the top decile needing upskilling, 87% voted to Leave in the 2016 referendum and 60% voted Conservative in the 2019 election. Nine of the seats in the top decile (15%) were Red Wall seats at the 2019 election. There is a clear weighting of those seats which were and continue to be the political battlegrounds, and the focus of the Government's levelling up agenda, with those seats that will require large amounts of upskilling.

Figure 13: Average proportion of jobs needing upskilling by 2019 election vote

Source: N. Robins, A. Gouldson, W. Irwin, and A. Sudmant, LSE; Onward Analysis

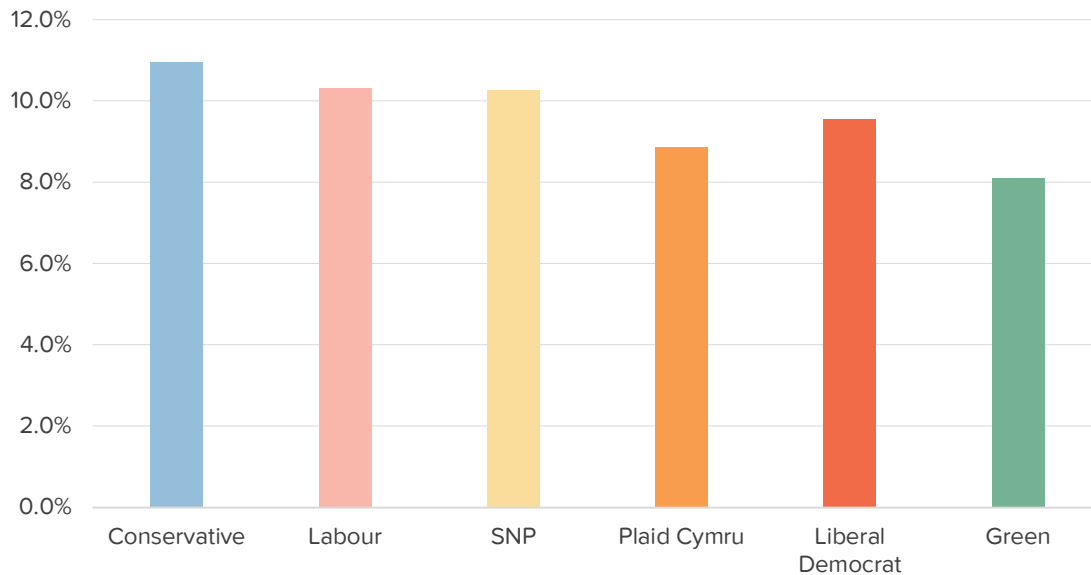
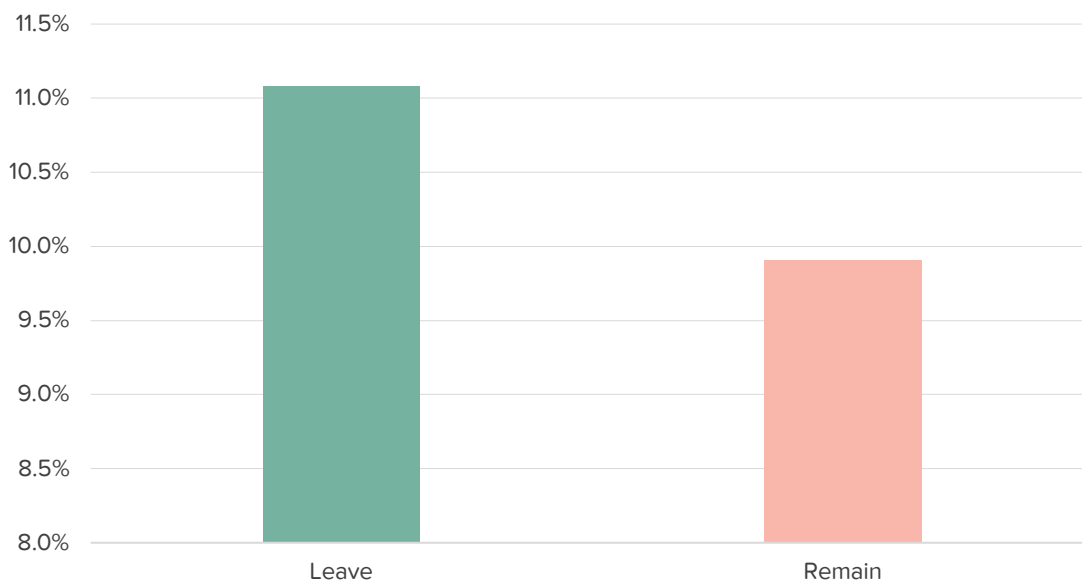


Figure 14: Average proportion of jobs needing upskilling by 2016 referendum vote

Source: N. Robins, A. Gouldson, W. Irwin, and A. Sudmant, LSE; Onward Analysis



There are a small selection of seats which have a high need of upskilling but also high levels of Education, Skills and Training (EST) deprivation. Of the 13 seats that are in the top decile of both the EST deprivation and in proportion of jobs needing upskilling, all voted to leave and more than half are “Red Wall” seats. Table 5 demonstrates this skew in the data.

Table 5: Constituencies in top decile of both Education, Skills and Training deprivation, and proportion of jobs in need of upskilling for net zero.

Source: Source: N. Robins, A. Gouldson, W. Irwin, and A. Sudmant, LSE; Onward Analysis

Parliamentary Constituency Area	2019 Vote	Referendum Result	Red Wall	Proportion of Jobs requiring upskilling	Education, skills and training deprivation score
Bradford South	Lab	Leave	Red Wall	14.6%	43.02
Normanton, Pontefract and Castleford	Lab	Leave		14.4%	41.41
Kingston upon Hull East	Lab	Leave		14.4%	43.20
West Bromwich West	Con	Leave	Red Wall	14.2%	40.89
Hemsworth	Lab	Leave	Red Wall	13.6%	39.20
Washington and Sunderland West	Lab	Leave		13.6%	34.96
Barnsley East	Lab	Leave	Red Wall	13.3%	41.84
Bolsover	Con	Leave	Red Wall	13.3%	34.74
Sittingbourne and Sheppey	Con	Leave		13.2%	37.29
Ashfield	Con	Leave	Red Wall	13.1%	35.73
South West Norfolk	Con	Leave		13.0%	35.93
North East Cambridgeshire	Con	Leave		12.8%	36.23

Perceptions of the challenge

Qualitative research into attitudes towards green jobs



Alongside the quantitative analysis for this report, we conducted detailed qualitative research in the form of two focus groups overseen by J.L. Partners. They were conducted in Cleethorpes in Yorkshire and the Humber and Coatbridge in Scotland, and contained people from a range of demographic backgrounds within the social classes of C1, C2 and D. Many were working in industries directly impacted by net zero, including construction, manufacturing and fishing.

This research identified a number of ways in which people living in areas heavily reliant on carbon-intensive industries feel about the transition to net zero. In the section below we have summarised key themes, particularly focusing on what motivates and frustrates workers from thinking about green collar jobs.

Motivation

When asked about the possibility of “green” jobs, respondents were not enthused by the moral imperative of environmental jobs, and do not see green jobs as being particularly attractive. Instead, they were motivated by higher pay, progression and social status. One participant spoke for the groups when he said: “if it meant a better wage or a more permanent job then definitely I would take it”. It appears that voters do not recognise the idea of “green jobs”, and instead just care about “jobs”.

This response was echoed throughout the groups, as well as in specific breakout sessions. “Better pay” was repeatedly highlighted as the key driver of employment. Some respondents had colleagues that had left for the offshore wind industry, with one saying his colleague was given a “well paid job, a lot more than what he was on at our place”. A higher wage seemed to be a prerequisite to even considering a green job or looking further into it. In the words of one respondent: “if the pay was right I’d look into how far I could go”.

Beyond compensation, other real-life factors were outlined as drivers to work in green jobs. For some of the respondents, the idea of relocating and travelling was an allure. Already in relatively insecure jobs, they expressed positivity at being paid for travel, but also spoke of a desire to leave their area for “a better place”. One respondent said a “better working environment” would influence their decision to take up a green job. This theme of a better work-life balance was recurrent in both groups.

Finally, it was apparent that many of these respondents had not even considered working in a green industry and that communicating opportunities related to net zero could be an issue in future. It became clear that these respondents simply had a low level of prior knowledge and were therefore sceptical until they found out more. One respondent said: “I had never thought of it... I don't see a barrier to it... I do like to gain new skills... it may be something after tonight's discussion... let's have a look”.

There was very little acknowledgment of the disruption that net zero is likely to entail. When asked whether their jobs faced change or threat, respondents either highlighted automation risk or the damage from COVID, with one warehouse worker even saying “I don't see my industry changing at all” and another security worker saying “no, I can't see much changing really”. One fish factory worker said, “eventually the oceans will run

out of fish... not sure when that will be”, but most of the respondents felt that their industries would be strong for at least “thirty years”. There was no mention of green jobs, carbon reduction or upskilling and no sense that environmental change and targets would impact their jobs.

In one group there was one mention of the Oil and Gas industry, linking its decline to the phase out of petrol and diesel vehicles by 2030. Notwithstanding this isolated comment, the respondents had no visible awareness that the transition to net zero was going to affect their jobs, despite all of these workers being in carbon-intensive industries like manufacturing and construction.

“I think most industries will still be there, it’s just whether they downsize, or some industries will grow but that happens all the time. Every year some are growing and some are shrinking”.

- *Female, warehouse worker, discussing whether they believe any industries will disappear in the next 20 - 30 years.*

“When I think back on it, when I grew up it was all coal and steel, and never would I have thought that the coal industry would’ve went away, or the steel works... in the future I don’t know where it’ll be”

- *Male, gardener & support worker, discussing how he thought industries may change in the future.*

“I would definitely jump at the chance. In terms of training I would definitely do it if it fit around [my] schedule when it comes to kids and that. If it meant a better wage or a more permanent job then yeah definitely, I would take it”.

At the ballot box, respondents said that climate change had little impact on how they voted. When asked how they feel when politicians talk about green jobs there was widespread apathy. One even said they “ignore it and change the channel”. Most respondents saw the Green Party as the only party that was strong on climate issues, but some in Cleethorpes saw the Conservatives “are trying to do it” and in Coatbridge the SNP were seen as the stronger of the two main parties, with one respondent, an admin worker, saying “the end game for the SNP is independence and self-sufficiency and [green jobs] fits their narrative and they’re doing very well at it”.

"I think that given the Conservatives have just announced all this extra funding for the military, trident, and a new yacht, I certainly wouldn't be putting them top of the list. I would say the SNP, because while they've been in government in Scotland they have given quite a lot of focus onto green issues, renewable energy and jobs for the future, so I would say out of the three of them it would be the SNP for me."

- *Female, admin worker, discussing which of the SNP, Labour and Conservative parties are best on 'green' issues.*

Prevention

Respondents consistently saw age as the biggest barrier to working in green industries. Green jobs are seen as the preserve of the young, and older participants struggled to envisage themselves moving into such roles. Respondents were also worried they wouldn't be physically able to do the training and were fearful of the work itself, perceiving some green jobs - such as offshore wind installation and nuclear energy - as dangerous.

There was a view that companies did not want to invest in older workers and instead wanted younger staff. It was noted that companies could "get [young people] at a cheaper rate". Older respondents in both groups expressed no desire to retrain in the latter stages of their career or close to retirement. One manual worker explained, saying: "Now I'm 60-odd, a couple of years left to go... At this stage of life definitely not, but maybe for a younger person".

Many respondents saw these jobs as high-risk and dangerous, putting them off from wanting to work in them. The Cleethorpes group in particular saw jobs working on wind turbines or fitting insulation as "dangerous" for their health. When discussing the possibility of working in battery production, respondents saw it as "high risk", identifying "exploding batteries" and "acid inside batteries" as particular concerns for their health.

"No, I think I would go back into catering if possible, but not into a factory or wind farms or anything like that now... I presume [green jobs are] for the younger generation because I'm not very computer literate and such like. They'll obviously get training but then they don't want the older generation in some of these places"

- *Female, factory worker, discussing whether she could see herself moving into a 'green' job in the future*

Others saw the idea of training as simply out of reach. While some industries seemed more achievable for someone with their skillset, such as building retrofit, there was a perception that most green jobs were “highly skilled”. This was particularly the case for two manual workers in one group, who did not want to sign up to something that they “just wouldn’t be any good at”. One respondent said “not for me... I’d be too frightened... I’ve got no trade or no skill or anything... I just know it’ll be beyond me”.

People spoke quite openly about what they described as their own intellectual limits, and their habit to “wander off” if the work was not stimulating, to not be able to take in classroom training, and one fish factory worker even confessed they were “too lazy” to learn new skills.

Preference

When asked about what kinds of training they would be most supportive of, on-the-job training is vastly preferred to classroom training, particularly for those with a background in manual work. The respondents were put off when “classroom training” was suggested, with many saying that they “can’t learn like that”. Many respondents instead said that practical “on-the-job” training was the best way of learning and retraining into something, however, one respondent mentioned that they thought green jobs “don’t seem like the kind of job where you’re going to learn on the job”. Another admin worker said that they saw green retraining as “maybe going to college two days a week... but a lot of the learning would be on the job”.

While there is an appetite for on-the-job training, such as apprenticeships, there is also a perception among some respondents that green skills are not often learnt in this way. On top of this, even on-the-job training was not seen as without its difficulties. They perceived green jobs as requiring “quite a large amount of training”. Many also highlighted that they would expect some training to be online and that a hybrid of online and on-the-job training could work for them.

“You’re sitting in a classroom and it’s information overload, and you only start learning when you start doing the job, and I would say that a lot of industries are like that. You’re out there doing it, and that’s where you learn your trade and you learn the job you’re supposed to do. [Classroom training] is alright for a week or so but it just becomes monotonous. You go out there with all this info that you’ve only remembered probably 10% of... on-the-job training is far better”.

- *Male, construction admin worker, when discussing the strengths and weaknesses of classroom and on-the-job training.*

Ultimately, respondents agreed that whether a job was ‘green’ or not would not be a major factor in determining their future job choices. One admin worker said that “if I was looking for a job, I don’t think I would base my decision or even much of my thinking on whether that company was green”. Another added that whether a job is ‘green’ or not “wouldn’t sway me... it isn’t something I would deliberately look for” and that “it really wouldn’t have an impact on my decision”.

Conclusion

These groups imply that workers may on the whole be relatively unaware of the changes that are likely to take place in the coming decades as a result of net zero and almost completely unprepared to undertake retraining or jobs changes as the economy decarbonises by 2050.

This is worrying, suggesting that Ministers will need to develop a set of interventions that are easily accessible to workers, for example through on the job training, and which clearly articulate the benefits in terms of pay and progression. Otherwise, policies to deliver net zero risk breeding resentment among the very workers and places most important to the transition. The next chapter sets out a range of policies to deliver that shift.

Recommendations



As this report has outlined, there is a considerable gap between the skills profile of the UK labour market today and what will be needed to deliver net zero. This gap is particularly acute among highly skilled STEM workers and among low-medium vocational skills. And some regions, notably Scotland, the North East and the East Midlands, are worst affected.

Policymakers could take the view that, as decarbonisation gathers pace, the market is best placed to identify the skills needs of the net zero economy and firms will deliver these skills naturally, either themselves or through pressure on government.

There are two problems with this approach. First, in other analogous transitions, such as the switchover to electrical wiring, the rollout of 5G and full fibre, and the development of high speed rail, there has been an expectation that the government will fund at least some of the training costs. Second, given the Government's 2030 interim targets, there is simply not enough time to wait for it to become profitable for companies to train their own retrofit installers or heat pump engineers.

However, where the Government can play a powerful role is in sharpening the incentives and building the institutions at local, national and industry level to encourage both firms and individual workers to consider retraining. This chapter sets out a range of policies which, put together, would drive up retraining in the places, and among the workers, where it is most needed.

We broadly separate our policies into three categories: (a) National policies which should apply everywhere; (b) Targeted, local policies which could be used to support the most at risk places; and (c) Agile policies which can be scaled up and down according to circumstance and budget.

National policies

This section explores a series of policies that will be necessary to encourage retraining everywhere, given the need to sharpen incentives and build institutions in all parts of the country to meet the challenges of net zero.

1. Introduce a Green Human Capital Tax Credit to encourage employers to invest in the skills of their employees.

The average skill level needed for a net zero job is 3.19, while that of the current workforce is 2.74 and that of carbon intensive industries is 2.70. As a result, some industries have a high proportion of jobs in need of upskilling. 30% of the workers in construction, for instance, will be in need of upskilling for the net zero transition.

There are different ways the Government could approach this challenge. Ministers could introduce individual learning accounts, as tried unsuccessfully in this country in the past and successfully elsewhere. Or they could identify skill sets that they have a high degree of confidence will be needed in the net zero economy, and fund the expansion of training in these areas.

These options are valid but have limitations. The former assumes a high level of knowledge about what kinds of skills will be needed for net zero by workers, while the latter assumes a high degree of prescience by officials in government. The history of skills interventions in the UK and elsewhere suggests that neither workers nor governments are particularly good at predicting labour market demand.

Instead, a more reliable approach would be to create incentives for employers to invest in retraining their existing or future workers, drawing on the more complete understanding, and stronger incentives, that they necessarily hold. At present, human capital investment is relatively underpowered compared to other forms of capital spending at a firm level.

Even before the Chancellor's recent Super Deduction policy, companies could claim up to 230% tax relief on research and development through the R&D Tax Credit and up to 100% on the costs of capital items such as equipment, machines, computers and office transport. Now, due to Super Deductions, companies can claim up to 130% of the costs of some capital investments but only until 2023. However for human capital investments, companies can only claim relief on the costs of training an employee for courses related to their current job, irrespective if this role is likely to be made obsolete due to net zero.

This is despite the fact that human capital investment has proven positive spillovers. The link between human capital investment and long-run economic growth is well-founded in a number of studies, including Zvi Griliches (1997) who estimated that rising human capital over the second half of the last century accounted for approximately one third of US productivity growth in that period.

In Human Capital, Onward proposed the adoption of Human Capital Tax Credits in the UK to accelerate company investment in skills, which has fallen in recent years. This would mirror successful schemes in other countries. In Austria, companies can claim a full tax allowance for training expenses and a further 20% of actual expenses is deducted from taxable income. This implies a 120% tax allowance in real terms. Similarly, France provides a business credit for entrepreneurs equal to the number of training hours multiplied by the minimum wage.

If introduced in the UK, this could mirror the R&D Tax credit, with differing rates for SMEs and Large Companies as Box 1 sets out. If the considerable cost of the policy was prohibitive, it could be targeted specifically at upskilling and retraining related to net zero activity. Based on methodology in our Human Capital report, this policy would cost £1.8 billion a year, over a period of 5 years, to retrain all 3.2 million jobs requiring upskilling for the net zero transition.

Box 1: Tiered system of Green Human Capital Tax Credits

Large Companies	<ul style="list-style-type: none">• 100% of spend training those with secondary qualifications or below;• 50% of spend training those with post-secondary qualifications;• 25% of spend training those with graduate or equivalent qualifications.
SMEs	<ul style="list-style-type: none">• 230% of spend training those with secondary qualifications or below;• 115% of spend training those with post-secondary qualifications;• 57.5% of spend training those with graduate or equivalent qualifications.

2. Urgently develop new Apprenticeship Standards, T Levels and Degree Apprenticeships to support net zero industries

There are currently 619 Apprenticeships, T Levels and Degree Apprenticeship standards outlined by the Education and Skills Funding Agency. These standards dictate what an apprentice or vocational learner should be doing and the skills required of them, by job role, at different levels of skill. They are developed by groups of employers known as Trailblazers in partnership with the Government. Standards are accredited by the Institute for Apprenticeships and Technical Education and without accreditation the training is not recognised or able to access taxpayer or apprenticeship levy funding. These qualifications range widely in terms of training cost, from £27,000 for an Environmental Practitioner down to £2,500 for a Business Fire Safety Advisor.

Despite the importance of net zero, apprenticeship and technical education standards are badly misaligned to the demands of decarbonisation or a zero carbon economy. For example, according to the Institute for Apprenticeships and Technical Education, there are currently 39 apprenticeship standards for legal, financial and accounting apprenticeships but only 34 for agriculture, environment and animal welfare, and of the latter, half related to animal welfare and sports pitch maintenance. This means there are three times as many standards for golf course maintenance (3) as there are for heat pump engineers (1) or wind turbine technicians (1). Indeed, there is no reference to apprenticeship standards relating to the following key green industries: carbon capture technologies, hydrogen fuel cell production, coastal and seagrass restoration, peatland and salt marsh restoration, rewilding and electric vehicle manufacturing.

In order to plug this gap, we recommend that the Government instructs the Institute for Apprenticeships and Engineering to convene a series of trailblazer groups of employers relating to key net zero industries, including heat pump installation, buildings retrofit and insulation, electric vehicle manufacture and supply chains, and hydrogen development, to develop new standards. These standards should be backed with Government funding from the £2.5 billion National Skills Fund, which was set up to “help adults to train and gain the valuable skills they need to improve their job prospects [and] to

support the immediate economic recovery and future skills needs by boosting the supply of skills that employers require”. Just £375 million of this pot was announced in the 2020 Spending Review with further funding yet to be announced.

This would ensure that there were clear and established training standards for key roles within the net zero economy at all skill levels, designed and developed by employer groups themselves. These standards would be updated over time, according to changing technology and demand. By engaging employers in predictable areas of net zero demand now, ministers can galvanise employers to consider the skills requirements of these roles before they are needed in considerable numbers, preventing a bottleneck in several years’ time.

3. Specific funding should be offered to encourage the take up of net zero apprenticeship standards by women

There is likely to be a significant gender gap in net zero industries, echoing the existing gender imbalances within carbon intensive industries and in net zero aligned qualifications. The transition to net zero represents an opportunity to encourage female participation as new industries emerge.

With up to 1.7 million net zero jobs forecast by 2030, there is a danger that the opportunities of net zero will disproportionately favour men over women. In terms of mean earnings, male employees currently average 12% higher earnings than females across net zero occupations, compared to 33% higher earnings across incumbent industries (8% higher when excluding Retail). And if the existing gender balance continues, just 300,000 out of 1.7 million jobs will go to women, with the remaining 1.4 million being taken by men. In addition, finding 1.4 million men who are able to fulfil these new roles or who are willing to retrain and upskill to do presents a challenge in and of itself.

Up to 1.3 million of these jobs are forecast to be in domestic retrofit and heating, in the construction sector. At present 98% of workers in construction, defined here as those employed within occupations classed as ‘skilled construction and building trades’, are male, while just 2% are female. Research by the Young Women’s Trust in 2018 found that for every one female apprentice in the construction sector, there were 50 men. In engineering, just 4% of apprentices are female.

The majority of female apprentices are in sectors with a low need of upskilling for net zero. 25% of all female apprentices are in Health and Social Care (just 2% of jobs in need of upskilling) and 14% are in Business Administration (14% of jobs in need of upskilling). In contrast, 30% of jobs in construction are in need of upskilling for net zero.

To address this, we do not propose binding targets or arbitrary caps, which have had only mixed success in other industries. Instead we propose that apprenticeships in heavily male-dominated sectors, such as retrofit, should attract a funding premium if they are taken up by women. The Government should also consider supporting further activity to attract women into net zero sectors, for example through the kind of campaigns that have been successful in finance and technology sectors. This would

build on previous work, including the ambition in the Nuclear Sector Deal in 2019 for a 40% share of women in Nuclear by 2030.

Similarly, Jaguar Land Rover set up the Women in Engineering Scheme to fulfil their aim of encouraging more women into their workforce. This has resulted in the female proportion of their workforce rising from 9% in 2012 to 13% in 2019.

4. Fund 2,800 net zero aligned PhDs

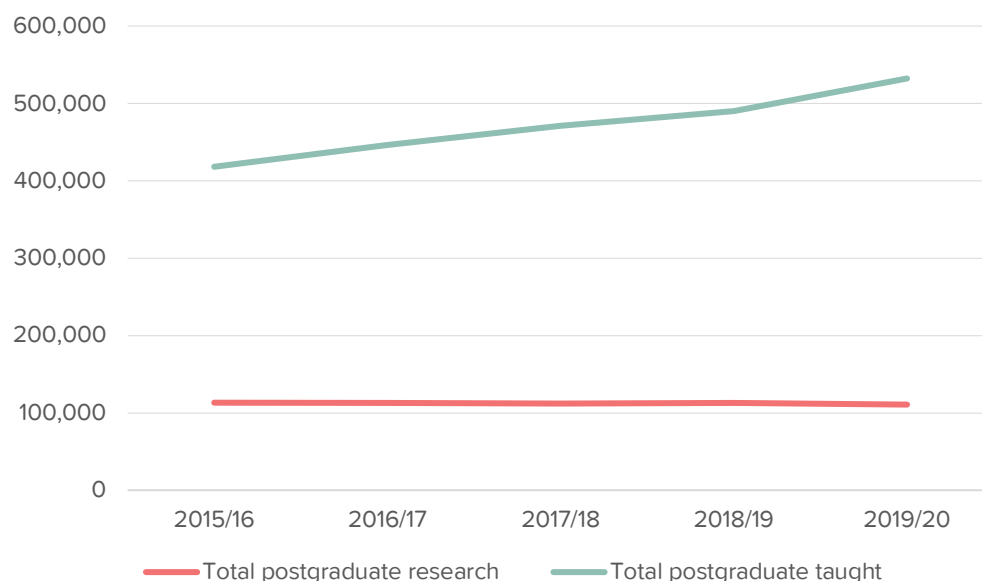
There are just five regions in the entire country - Camden & the City of London, Westminster, Wandsworth, Kensington & Chelsea and Hammersmith & Fulham, and East Surrey - which have an average skill level equal to or higher than the average needed for the transition.

The most acute gap exists in engineering, in particular at postgraduate level. As noted earlier in the report, just 39% and 43% of students in taught and research postgraduate degrees are UK domiciled and the UK ranked only 18th highest in the OECD for share of students in engineering and technology.

This puts a premium on increasing the number of PhDs in net zero adjacent disciplines. The number of students taking PhDs has increased by only 2.8% over the last five years, following the shift in tuition fees in 2011. Meanwhile, students enrolled in taught masters degrees grew by 40% over this same period. This demonstrates the relative stagnation in PhD uptake in recent years generally. The number of STEM postgraduate research students - of whom the majority (89%) are PhD students - has increased at a slightly faster rate, growing by 3.3% over the same period. STEM-based PhDs now account for 64% of all PhDs, up from 62% five years ago.

Figure 15: Higher Education student enrolments by level of study

Source: HESA



In order to counteract this trend, and boost the UK's highly skilled net zero workforce, the Government should fund a large number of PhDs in climate and engineering related disciplines. This would echo the steps taken in 2018 as part of the AI Sector Deal to fund 2,000 PhDs in artificial intelligence, supported by £100 million from the Government, match-funded by £78 million from industry and £23 million from participating universities.

As set out in the Ten-Point-Plan last year, the Government expects up to 250,000 new net zero jobs to be created by the end of the decade. Of these, Onward analysis estimates that approximately 1.12% will require PhDs. This means that around 2,800 PhDs will need to be funded to achieve their target of 250,000 new green jobs as a result of the steps laid out in the Ten Point Plan.

We believe the Government should actively target these PhDs. This should work exactly as it did for AI: the Department for Education should administer the funding mechanism and directly support the creation of a large number of PhD posts at leading universities. Based on this same funding mechanism, funding 2,800 net zero PhDs would cost the taxpayer £140 million and industry and participating universities £94 million and £28 million respectively. These are comparatively low sums in comparison to the economic potential of creating a new generation of very highly skilled engineers for the net zero transition.

5. Review the free qualifications offered within the Lifetime Skills Guarantee, to include all qualifications registered under the new PAS2035 retrofit certification

In April 2021, the Government announced a suite of fully-funded level 3 qualifications, equivalent to an advanced technical certificate or diploma, for any adult 19 years old or over not already in possession of a qualification at level 3 or higher. This offer is a part of the Lifetime Skills Guarantee announced by the Prime Minister in September 2020.

The list of qualifications open to this funding is expansive and many of the key qualifications for net zero industries are included, such as diplomas in welding, engineering and in other STEM subjects. Around one third (36%) of the 387 qualifications available through the Lifetime Skills Guarantee are useful to net zero.

But, there is a clear lack of alignment with the challenge of building retrofit. The Trustmark accreditation for buildings retrofit standard is the PAS2035, as is referred to in chapter one of this paper. Despite this accreditation predating the Lifetime Skills Guarantee, it appears that none of the qualifications - including the Level 3 Energy in Efficiency and Retrofit of Traditional Buildings - are listed under this Government scheme.

The key area of jobs growth in the years to come will come from the construction sector and specifically in building retrofit. This is exemplified in the data on upskilling, which shows 30% of construction workers are in need of upskilling for net zero. On top of that, the UK will need an influx of new - as well as existing - workers in order to fulfil the potential for jobs growth in the sector.

The Government should review the list of qualifications which are certified for funding under the Lifetime guarantee, with a view to including Level 3 Energy in Efficiency and Retrofit of Traditional Buildings qualifications. Beyond that, the department should consider including all qualifications under the PAS2035, including Levels 4 and 5, under this new funding mechanism. This change will reflect the scale of the challenge and show businesses that the Government is serious about training up the domestic workforce for the task of energy efficiency in domestic buildings.

6. Commission a review of occupation and industry data to improve the ability for departments and organisations to understand the green economy

The Standard Industrial Classification of economic activities (SIC) provides a framework for data collection which aims to encompass all businesses and industries within the UK, and to group them appropriately by economic activity. However, at present, there are no distinct classifications for LCREE activities or industries, and it is often difficult to see where emerging net zero technologies fit into the current SIC, such as CCS or fuel cells.

The Government should commission the ONS to review SIC codes, to examine the activity descriptions and classifications for each code, with the intention of updating them or creating new ones to ensure LCREE activities are better classified and can be easily identified. This will enable better tracking of jobs, skills, businesses and economic output within the green economy, ensuring accountability exists where promises of new jobs and investment into the green economy are made.

Smith and James (2016) confirm the need for this, arguing that “it is necessary to update classification systems so that they remain relevant [and]... it is even more important now, as innovative products are frequently introduced into the market, and as the modern economy starts to take on new forms”. The rate and scale of the net zero transition necessitates the transmutation of multiple markets and we are already seeing the rate at which new and innovative net zero products are being brought to market, which reinforces this need. On top of this, historically SIC codes have been updated every 10-15 years. They were last updated in 2007, which means we are overdue for a change to reflect our changing, and increasingly green, economy.

In addition, the Government should focus on increasing transparency of data in the construction sector, in particular with regard to retrofit workers. At present there are a number of qualifications listed under the PAS2035 certification, but there is little, if any, public data on the number of people completing these certifications or carrying out the jobs after certification. This is partly because of the nature of these workers, who often work freelance or in small businesses, but it is also because there haven’t been any Government-led drives to collect this data. MHCLG and BEIS need to consult with the ONS on how to collect this data, to best monitor the progress of the retrofit workforce. Without this information, the potential of between 900,000 and 1.3 million jobs in low-carbon heating and energy efficiency will fail to be realised.

Locally Targeted Policies

In addition to national policies that will benefit all areas of the economy, there is a case for ministers developing a suite of interventions that can be targeted in the areas which are most vulnerable to, or best placed for, net zero. These should include:

7. Invite applications from existing further education colleges or new providers to become prestigious Net Zero Academies

This report estimates that as many as 3 million people are in need of upskilling in the transition to net zero emissions. This will require an entirely new training infrastructure and the development of specialist institutions.

In advance of other industrial challenges, the Government has recognised its role in convening and driving skills provision. For example, when the Government announced the approval of HS2, it funded the development of the HS2 Academy with the primary focus of closing the skills gap in the UK to support the project's construction. The HS2 Academy, which has now been relaunched as the National College for Advanced Transport & Infrastructure, was announced in 2014 and aims to upskill 25,000 workers. It was the first newly incorporated Further Education College for over 20 years. The Government set up four other national colleges at the time, including one for onshore oil and gas - which never opened - and colleges for nuclear, digital skills, and creative and cultural industries.

There is a clear case for following a similar model for net zero, especially in places where specialist skills will be most critical. This is not to say that the HS2 Academy has not had its problems. In 2017/2018, it required £4.55 million from the DfE to sign off its annual accounts and went into insolvency this year, being subsumed into the University of Birmingham after it experienced limited demand from students. However this risk would be reduced in the case of net zero: one survey of 1000 people aged 18 to 34 found 50 percent wanted a job in the green economy.

We recommend that the Government commits to the establishment of a series of new Net Zero Academies in different parts of the country, to provide the institutional capacity to train workers in net zero related trades. To avoid duplication and reduce set up costs, the Government should invite existing Further Education colleges to bid to become a Net Zero Academy, with bids encouraged from consortia of colleges and local employers in the net zero economy. This would be an opportunity to reform further education for the needs of the real economy. The percentage of further education colleges judged outstanding has fallen from an already low figure of 16% in 2015 to 12% in 2020. Since the 2015 merger of further education colleges, Ofsted have reported that 35% of assessed colleges "require improvement".

There are a number of regions where new Net Zero Academies could be well placed to galvanise local industry and offer opportunities to workers. These regions, outlined in Table 6, are the most at-risk areas when it comes to their employment and skills make-up. Of the top quintile of these regions, 24.2% are in the North West and 15.2% in Wales and Yorkshire and The Humber respectively.

Table 6: At risk regions where net zero institutes would be most beneficial

Source: Onward analysis

Region	Average Skill Level	Proportion of jobs in carbon intensive industries	Unified Index of Deprivation Score	Average EPC Rating (7= A, 1 = G)	Average Gross Annual Income
Sandwell	2.23	27%	35.29	3.89	£25,916
Stoke-on-Trent	2.38	27%	32.95	3.89	£26,074
Isle of Anglesey	2.66	30%	37.58	3.58	£25,102
North and North East Lincolnshire	2.50	28%	29.23	3.85	£27,408
East Lancashire	2.31	27%	33.48	3.60	£25,125
Orkney Islands	1.71	28%	14.36	3.73	£31,432
Na h-Eileanan Siar	2.24	21%	17.48	3.10	£26,787
Greater Manchester North West	2.60	28%	27.70	3.94	£25,057
Blackpool	2.47	22%	42.49	3.54	£26,202
Greater Manchester North East	2.62	28%	30.38	3.91	£24,868

Agile National Policies (policies which can be scaled up and down by Government)

8. Release unused Apprenticeship Levy revenue for apprenticeships engaged in net zero related training.

Since 2017, employers with a wage bill over £3 million have paid an annual Apprenticeship Levy of 0.5% on their wage bill. Since its inception the Apprenticeship Levy has funded 313,000 apprenticeships across all sectors. In the year 2019/20 there were 177,400 apprenticeship starts, 113,700 of which were supported by ASA levy funds.

But the majority of the levy revenue is left unused and returned to the Treasury's general funding. Answering a parliamentary question in 2021, Gillian Keegan revealed that £1,039 billion in levy funds had expired in the nine months following May 2020. This is a 22% increase on the year before, when the expired levy value was £847 million for the period between May 2019 and April 2020. While this is helpful for the Government's balance sheet, this is not what the apprenticeship levy is levied for.

On top of that, the majority of Level 2 apprenticeships are being taken in lower value sectors and are not aligned with the net zero industries outlined in this paper. Government data shows that most apprenticeships are being taken in Business, Administration and Law, and Retail and Commercial Enterprise, with only 28% of all starts at Levels 2 and 3 in ICT, Construction and Engineering. Given the increased capacity urgently needed in the STEM and technical qualifications - such as ICT, Construction and Engineering - this trend needs to be reversed.

The Government should ringfence £1 billion of the annual unused Apprenticeship Levy revenue and use it to fund specifically STEM and engineering related apprenticeships, up to and including degree apprenticeships. These should include the new apprenticeship standards as set out in recommendation 2. This pot should also be used for existing apprenticeship standards including but not limited to: Environmental Practitioner (ST0778); Dual Fuel Smart Meter Installer (ST0158); Electrical, Electronic Product Service and Installation Engineer (ST0150) Nuclear Welding Inspection Technician (ST0292); Maritime Mechanical and Electrical Mechanic (ST0276).

This funding could be deployed as a "top-up" on companies' existing apprenticeship pots, or given to smaller firms who have a wage bill of less than £3 million, but want to train people up in net zero aligned roles. This extra capital coming into firms allowances for apprentices would make companies think about what skills are going to be needed for the future of their business in a net zero economy, and encourage them to train people from the bottom up with the skills they need to take up these new jobs.

9. Make financial support packages related to decarbonisation conditional on employers retraining their workers

As we outlined in the Greening the Giants report, just twelve industries are responsible for 62% of the UK's emissions. Many of these industries - such as the Steel sector - operate on a low-margin and will not be able to transition to a net zero business model without Government support.

The Industrial Strategy Sector Deals have shown that these collaborations between industry and government can build momentum within industries to evolve and innovate. For example, the Nuclear Sector deal has a suite of targets to meet by 2030 in order to make the industry cheaper and more diverse. This is an opportunity for the government to use its support packages to drive out greater investment in training and skills.

We recommend that the Government puts a condition on any company accessing funding or regulatory support related to net zero that they complement that support with sustained action to retrain or upskill affected workers. This would require companies to

guarantee that they would retrain a share of their workforce in exchange for support. As Table 7 shows, there are certain industries like Construction, Mining, Motor Trades and Transport that have a significantly higher proportion of jobs needing upskilling for the green economy.

This would reflect wider conditionality in the Government's sector deals. In the Offshore Wind Sector Deal, a target was set to achieve a total lifetime UK content of 60 per cent for projects commissioning from 2030 onwards. In the Nuclear Sector Deal, there was a 40% target for women in Nuclear by 2030. These targets are not legally binding, but that is in part because it is difficult to quantify future progression until the target date is reached. If the Government were to implement a percentage investment requirement in human capital for any net zero deals, this could be quantified in annual accounts and fines could be issued to firms which do not comply with the requirement.

Table 7: Industries by proportion of jobs requiring upskilling

Area	% of jobs requiring upskilling
Construction	30%
Mining, quarrying & utilities	26%
Motor trades	26%
Transport & storage (inc postal)	26%
Property	19%
Wholesale	18%
Manufacturing	17%
Business administration & support services	14%
Professional, scientific & technical	14%
Financial & insurance	9%
Information & communication	8%
Public administration & defence	8%
Agriculture, forestry & fishing	6%
Arts, entertainment, recreation & other services	5%
Retail	5%
Education	2%
Health	2%

Conclusion



The UK's workforce is chronically ill-equipped for the transition to a green economy. If we are to hit the net zero target, we need many more scientists, mathematicians, engineers, technicians and retrofit installers than are currently available.

These skills gaps are most acute in areas which the Government is targeting as a part of their Levelling Up agenda, such as some areas within the Midlands, North and Scotland, and have disproportionately high levels of deprivation, low wages and poor housing. To put this in perspective, the only regions in the UK which have a sufficient skill level for net zero are in London and Surrey.

Without a profound and concerted effort to build up the human capital in all four corners of this country, the mission of net zero will fail. We need a bold and practical skills policy package to correct our course. If we get this right, it will not just put us on track for net zero by the year 2050, but it will provide new, quality, well-paid jobs for people all across the UK.

Annex



Table 5: Correlation coefficients between average skill level and other variables

Variables	Correlation Coefficient	Relationship
Average skill level and proportion of jobs in carbon intensive industries.	-0.33	Negative correlation. Regions with a low average skill level are likely to have a higher proportion of jobs in carbon intensive industries. Regions with a high average skill level are likely to have fewer jobs in these industries.
Average skill level and unified index of deprivation	-0.42	Negative correlation. Regions with a low average skill level are likely to be more deprived, with a higher unified index of deprivation score. Regions with a high average skill level are likely to be less deprived.
Average skill level and average EPC rating	0.45	Positive correlation. Regions with a low average skill level are likely to have a lower average domestic EPC rating. Regions with a high average skill level are likely to have a higher average domestic EPC rating.
Average skill level and annual gross income	0.54	Positive correlation. Regions with a low average skill level are likely to have a lower average annual gross income. Regions with a high average skill level are likely to have a higher average annual gross income.

Skills Gap Methodology

The ONS classifies each occupation listed under the Standard Occupational Classification (SOC) into one of four skill levels. Occupations in Level 1 are the lowest skilled, and equate “with the competence associated with a general education” while occupations in Level 4 are the highest skilled which “normally require a degree or equivalent period of relevant work experience”.

The 2019 Annual Population Survey provides estimations of employment in each SOC code by various factors, such as Age, Highest Qualification, Sex, NUTS3 region and industry. Using the skill level assigned to each SOC code, we used this dataset to calculate the average skill level by NUTS3 region. Note that this first calculation encompasses the entire workforce in a region, across all industries.

We then used the dataset providing SOC employment estimates by industry, and calculated the average skill level for net zero and carbon intensive industries, by only selecting SOC data from the Standard Industrial Classification (SIC) codes relating to these industries.

The occupation by region dataset from the Annual Population Survey is only available at NUTS3 regional level, and not by parliamentary constituency. Therefore, we combined parliamentary constituencies into NUTS3 regions to allow for comparison and ensure it

was possible to average and map out variables which were originally at parliamentary constituency level. There is no direct lookup for this process, and some constituencies do overlap between NUTS3 regions, so some judgement calls were required as to which region to classify certain constituencies into. The full lookup used will be published alongside the data used in this report.

We then cross referenced each of the variables in the report with our skills gap analysis, and mapped out the results. Grey areas in the maps are where no data is available due to constituency to NUTS3 mapping.

Qualifications Gap Methodology

Qualifications gaps can be identified by calculating the average qualification level of employees within an industry. This is done by assigning each qualification a numerical level as follows:

6 - Degree or Equivalent (Bachelors, Masters and Doctorates, Level 6/7/8 NVQs/SVQs, Level 6/7/8 Diplomas)

5 - Higher Education (Certificates of Higher Education, Diplomas of Higher Education, foundation degrees, NVQs/SVQs at Levels 4 and 5, Diplomas at levels 4 and 5)

4 - GCE A-Level or Equivalent (advanced apprenticeships, Level 3 NVQs/SVQs, Level 3 Diplomas)

3 - 4 GCSE Grades A* - C or 9 - 4, or Equivalent (intermediate apprenticeships, Level 2 NVQs/SVQs, Level 2 Diplomas)

2 - Other qualification (GCSEs below grades A* - C or 9 - 4, Level 1 NVQs/SVQs, entry level diplomas etc)

1 - No qualification

The Annual Population Survey provides estimations of employment by 4 digit Standard Occupational Classification (SOC) code and highest qualification level achieved. For example, the survey estimates that of those employed in the occupation “Design and Development Engineers”, there are 50,366 who possess a degree or equivalent, and 12,418 with a higher education qualification, and so on. It is therefore possible to calculate an average qualification level for each SOC code, and for all SOC codes combined.

In order to calculate who the average qualification level varied by industry, we looked at only those SOC codes which featured within the selected SIC codes we defined by industry. For example, for net zero industries, 135 of the 369 total occupations featured within our selected net zero SIC codes, and so we only examined these occupations when calculating the average qualification level of net zero industries. We then estimated the proportion of employees under each SOC code who work in that industry, to then estimate the number of people employed within it. This was done to ensure occupations were weighted appropriately, by the number of people doing that occupation in each industry. Finally, we then calculated the average qualification level of these industries in the same way as outlined above.

Endnotes



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- ¹ Greening the Giants, Onward
- ² BEIS, 2021, Press Release <https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035>
- ³ <https://www.gov.uk/government/groups/green-jobs-taskforce>
- ⁴ Onward, 2021, Greening the Giants
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Skills Economy & Growth 22 nd November 2021 Item 6 – Minutes & Matters Arising	Item No 6
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OUTLINE

Attached are the draft minutes of the meeting of the Skills Economy & Growth commission held on 18th October 2021.

ACTION

Members are asked to agree the minutes and note the matters arising.

London Borough of Hackney
Skills Economy & Growth Scrutiny
Commission Municipal Year: 2021/22
Date of Meeting: Monday 18th Oct 2021

Minutes of the proceedings of
the Skills Economy and growth
Scrutiny Commission held
from Hackney Town Hall, Mare
Street, London E8 1EA

Chair	Cllr Clare Potter
Councillors in Attendance	Cllr Steve Race, Cllr Richard Lufkin, Cllr Patrick Spence, Cllr Vincent Stops, Cllr Nick Sharman
Officers in Attendance	Suzanne Johnson (Head of Area Regeneration), Natalie Broughton (Head of Planning), Katie Glasgow (Deputy Manager, Planning & Regulatory Services)
Other People in Attendance	Alex Russell (Executive Chair, Hackney Wick Development Trust)
Members of the Public	None
YouTube link	The meeting can be viewed at https://www.youtube.com/watch?v=g-43y2trGmk
Officer Contact:	Timothy Upton 020 8356 1872 timothy.upton@hackney.gov.uk

Councillor Clare Potter in the Chair

- 1 Apologies for Absence
 - 1.1 Note: Cllr Sam Pallis & Cllr Gilbert Smyth attended the meeting virtually.
 - 1.2 Chair Polly Billington sent apologies, vice chair Cllr Potter announced that they would be chairing this meeting. Page 285

2 Urgent Items / Order of Business

- 2.1 There were no urgent items of business.

3 Declarations of Interest

- 3.1 There were no declarations of interest.

4 Skills Economy & Growth Work Programme 2021/2022

- 4.1 The chair opened the meeting up to comments on the work programme, noting that February and March are yet to be fully developed.
- 4.2 Cllr Steve Race suggested that a second item on regeneration would be useful, focusing instead on economic implications of regeneration.
- 4.3 Cllr Nick Sharman echoed the need for this.

5 Community Involvement in Planning & Area Regeneration

- 5.1 The chair introduced the item noting that as Hackney emerges from coronavirus, and looks to rebuild better, cleaner, and greener, area regeneration will be a crucial element of rejuvenating our local spaces, both economically and in terms of their vibrancy in as fair a way as possible, and in a way that supports the councils wider inclusive economy objectives.
- 5.2 It was highlighted that it is important that the plans not only reflect the views and wishes of local residents, but that they communicate to the community that they've been directly involved in the quality area regeneration that's happening around them.
- 5.3 Cllr Potter invited the head of area regeneration to begin presenting.
- 5.4 The head of area regeneration advised that the planning element will go first and therefore the head of planning would begin.
- 5.5 The head of planning opened the joint presentation between planning & area regeneration and handed over to the deputy manager.
- 5.6 It was advised that areas for growth & investment include Hackney Central and Surrounds, Stamford Hill, Enhanced Corridors, Hackney Wick, Clapton and Lea Bridge Roundabout, ditch and Hoxton, Manor House & Homerton and moved to outlines of area-based plans.
- 5.7 The area-based plans for Shoreditch and Stamford Hill comprise of Detailed policy guidance (land use, design, building heights, public realm etc.) area based guidance, and site specific guidance (site allocations).
- 5.8 It was advised that the [Local Plan for 2033](#) (LP33) contains 33 key strategic development sites (mix of private/ public/council ownership), site-specific development guidance and allocate particular uses for those sites, and plans around the delivery of new homes, jobs, shops, community spaces and public realm development.

- 5.9 To contextualise the content of the presentation, it was advised that Hackney's population is estimated to reach around 320,000 by 2033, a growth of 45,000 since 2016. 26,250 additional homes is a requirement, as well as 23,000 new jobs.
- 5.10 The deputy manager advised that in terms of community engagement in the planning process that, nationally, relevant literature includes a National Planning Policy Framework that is adhered to as well as a set of Town and Country Planning Regulations. Locally, there is a statement of community involvement that contains strategic planning (planning policies) & development management (planning application).
- 5.11 In terms of strategic planning and consultation, it was advised that front loaded community engagement is vital, and key stages of plan making processes must be outlined. It was noted that feedback informs each stage of plan preparation, and the comments gathered are published in consultation reports.
- 5.12 The deputy manager outlined methodology for consultation: Online platforms (Commonplace, social media, email notifications), printed media; (leaflets, questionnaires, newsletters), a range of face-to-face methods (meetings, pop ups, drop-ins, walking tours, workshops, ward forums), virtual meetings & community panels.
- 5.13 It was advised that the role and purpose of community panels includes engaging with a wide cross-section of the community (residents, businesses, local organisations, Cllrs), working with the council to develop effective consultation methods, and to ensure a range of voices and views of local people are taken into account in the plan making process.
- 5.14 It was noted that panels have been established for Stamford Hill, Dalston, Shoreditch, and Hackney Central.
- 5.15 In reference to community engagement with development management, it was noted that early engagement ahead of a planning application is encouraged.
- 5.16 The Council is committed to publicising and consulting widely on all planning proposals via a range of methods & tools including site notices, press notice, public, notification/ letters to neighbours, public/ meetings & exhibitions.
- 5.17 All comments that raise 'material considerations' are considered by Council in determining the application.
- 5.18 The deputy manager advised that there is a coordinated approach to planning and area regeneration. There is a goal to work collaboratively to develop planning policy and development guidance for Hackney's key growth areas that reflect local community needs and aspirations.
- 5.19 It was advised that area-based planning documents (AAPs and SPDs) set out both a planning and regeneration strategy, embedding other corporate strategies including the Sustainable Community Strategy, and Inclusive Economy Strategy.

- 5.20 Regeneration plans and strategies (without planning status) can be prepared in addition to, or instead of, area-based planning documents to guide and deliver growth and regeneration.
- 5.21 The services have distinct roles in the implementation and delivery of the planning policies, growth, area guidance and projects and work with key stakeholders to facilitate the delivery of sites.
- 5.22 The deputy manager handed over to the head of area regeneration to continue the presentation, speaking on the area regeneration strand (as distinct from planning).
- 5.23 Hackney Central was advised to be a major town centre and the civic and cultural heart of the borough with a busy high street, heritage assets and evening economy.
- 5.24 It is a relatively deprived area of the borough, and London (employment, education, health, income, crime, living environment, barriers to housing)
- 5.25 It was noted that there are several underutilised Council owned sites allocated for development of new homes and jobs in the Council's Local Plan.
- 5.26 The head of area regeneration advised that there is Opportunity to link regeneration with a fair recovery and a more inclusive economy via the creation of new affordable homes, workspace, jobs, transport improvements, community infrastructure and facilities, improved public realm etc.
- 5.27 It was noted that a Town Centre Strategy will set out how the Council and its partners will address the identified challenges and act on the opportunities and strategy is being co-designed with residents and stakeholders.
- 5.28 It was advised that a clear delivery plan for Hackney Central identifying projects and proposals to be taken forward is required and monitoring the impact and outcomes for the area and its residents and businesses will factor.
- 5.29 The head of area regeneration moved onto the Hackney Central Conversation that ran between 2019 – 2021.
- 5.30 There were 2,000+ of responses; via online portal, 121 conversations and drop-in sessions as well as public events.
- 5.31 The responses highlighted issues and challenges in Hackney Central (inc. local economy, community safety and transport)
- 5.32 While the dialogue under the 'Conversation' title has ended, the Conversation is continuing via the Town Centre Strategy to deepen our understanding of the challenges faced in the area and develop shared solutions.

- 5.33 It was observed that issues highlighted in the Conversation will form the

basis for direct actions drawn out in the TCS.

- 5.34 There is a Hackney Community Panel featuring diverse membership guides the Council's engagement work in Hackney Central, designed to disseminate information and lessons learned to a wider audience, and ensure there is a space for new ideas and initiatives to be considered.
- 5.35 The head of area regeneration outlined current projects and sites:
- Hackney Central Masterplan (SPD) update
 - Town Centre Strategy
 - Hackney Central Station – unlocking sustainable travel, investment and growth
 - Council Owned Sites
 - Community Greenspace – empowering local communities to develop skills and healthy lifestyles
 - 55 Morning Lane – opportunity for new affordable homes, town centre uses, workspace and jobs
 - Hackney Walk – working with the site owner to reinvent its contribution to the town centre
 - Ongoing stakeholder liaison and engagement – incl. M&S, London College of Fashion, Arch Co. – to champion a more inclusive economy and sustainable investment in the local area.
- 5.36 The head of area regeneration moved onto the Dalston Area Regeneration plan, stating that it sets out a vision and objectives for the future of Dalston town centre, providing guidance on where and how the growth set out in the Local Plan should take place.
- 5.37 It was advised that it is a major town centre which will accommodate new homes, employment and retail space leisure, community, and arts and cultural facilities to meet the future needs of the borough.
- 5.38 The head of area regeneration identified 10 opportunity sites identified which can accommodate over 600 new homes, 700 sqm community space, and 14,000 sqm of commercial space.
- 5.39 Area Regeneration: shape the plan preparation, support engagement on the plan, and deliver the objectives of the plan
- 5.40 Developing and leading on priorities and projects identified in the plan e.g Ridley Road and Ashwin Street scheme
- 5.41 The plan includes taking forward Council owned opportunity sites and is an opportunity to engage with landowners and developers on non-Council owned sites to shape and influence development and support local businesses.
- 5.42 The head of area regeneration moved on to talk about the Dalston Conversation which ran from September 2018 to inform the development of the aforementioned Dalston Plan.
- 5.43 It was noted that around 5000 people took part in the Dalston Conversation.

- 5.44 The Dalston Panel established is made up of a range of local stakeholders and the full report is available on the Hackney website.
- 5.45 The presentation included an overview of key issues raised by local stakeholders:
- Ensuring Ridley Road market is protected and existing traders are supported
 - The need to protect popular places such as CLR James Library and the Dalston Eastern Curve Garden
 - Better walking and cycling routes and public transport
 - Tackling anti-social behaviour and littering, especially in Gillett Square
 - Give every part of the community a voice in the future of Dalston
- 5.46 The head of area regeneration moved onto the Ridley Road and Ashwin Street Good Growth Fund Project, stating that it is an objective from the draft Dalston SPD.
- 5.47 It was noted that there is investment from LB Hackney and Mayor of London into Ridley Road, the market and Ashwin Street.
- 5.48 The project involves public realm, improved greening and improved layout and facilities for the market and contains 11 co- design and consultation events with market traders and Ashwin Street businesses
- 5.49 Various Dalston Plan consultation events highlighting public realm interventions, citizen space, walking tours, virtual and face to face meetings and common place took place, and Dalston Panel members were consulted. Ultimately, a final engagement exercise on final designs was carried out.
- 5.50 It was advised that works have now started on site and will complete in 2022.
- 5.51 The head of area regeneration moved onto the Hackney Wick Area Regeneration, stating that the vision was to protect, embed and scale what the council already has in Hackney Wick, recognising the broad social and economic value our creative economy creates. This will support not only growth, but also innovation and greater inclusion.
- 5.52 The objectives were outlined:
- Support businesses to stay in the area as rents rise by delivering, negotiating and championing affordable workspace.
 - Ensure residents benefit from development and investment in the area through local employment, skills development and training opportunities.
 - Improve public spaces and local facilities.
- 5.53 It was advised that Young Hackney Eastway was co-designed with young people and responds directly to the recommendation for safe sports facilities for young people in the [Hackney Wick Through Young Eyes report](#).

- 5.54 There is also a Creative Enterprise Zone programme that aims to support, retain and grow creative businesses in the area and better link them with local residents and other businesses via supply chain, jobs, training, educational opportunities and access to affordable space.
- 5.55 There is a strong consortium of local stakeholders (businesses and residents) engaged and represented through a governance structure, 10,000 sq ft of enhanced commercial space for affordable creative space, 200 businesses benefitting through CEZ activities, and the project will ultimately support over 60 local people to benefit from training related to the creative sector.
- 5.56 The head of area regeneration finished the presentation with a section in Gainsborough Bridge stating that the objective of the work was to open Gainsborough Bridge for public access for pedestrians and cyclists following planning approval for bridge
- 5.57 It was advised that a community engagement exercise carried out to gauge local views, and a total of 149 responses were received
- 5.58 The head of area regeneration observed that 116 (81%) respondents were in favour of the opening of Gainsborough Bridge for public use, and support among parents for the proposals to open the bridge to public access was 80.8% (38) while 19% (9) disagreed/disagreed a lot.
- 5.59 It was noted that there were some concerns around anti-social behaviour as a result of Gainsborough Bridge being opened to the public which have been addressed as part of the Council's Public Access Strategy.
- 5.60 LLDC Planning approved the opening of Gainsborough Bridge in 2021 following submission of engagement report and Public Access Strategy and Wayfinding Strategy.
- 5.61 Chair thanked the speakers for the presentation and invited THE EXECUTIVE CHAIR to present.
- 5.62 The executive chair advised that the Hackney Wick & Fish Island Community Development Trust was birthed from Creative Sector but now has broader representation, is community-led and non-profit.
- 5.63 It is focused on Focused on place, determination over place and space, seeks to achieve structural, systemic and sustainable change, facilitates asset holding for the benefit of the community.
- 5.64 It was explained that the group is a start-up, is 3 years old, employs one part-time officer, and acts as an ethical landlord for the long term as opposed to an operator.

- 5.65 It was explained that the group engages for reasons of validity, insight and relevance, and belonging.
- 5.66 The executive chair advised there are various methods of engagement. Purpose and outcome is carefully considered, as is the audience impacted, who can help, what the needs are, time and resources, and what existing information is available.
- 5.67 The engagement comes in the form of 1-2-1 workshops, tours, tech, storytelling, music and theatre, and other networks.
- 5.68 Presently, the organisation has no formal success measurement, but partner and resident feedback and continual engagement is maintained. Building a database, developing structures, and achieving funding goals are all areas of success measurement.
- 5.69 The executive chair explained that thus far the lessons learned are:
- Residents, community groups & business more sophisticated than we think
 - Willingness to engage but not to be used or side-lined
 - Opportunity to build community:
 - capacity
 - wealth and local economy
 - responsibility
 - Build partnerships and share value
- 5.70 The executive chair explained that their model is moving away from passive beneficiaries, limited agency thinking, short-term results, and instead moving toward increased partnership working, devolving power, responsibility and accountability, long-term capacity building, and wealth creation.
- 5.71 The executive chair explained that the group can add value, and noted the requirements. There can be added value in enabling, coordinating and supporting local groups and residents to be more involved, but this requires resources to support outreach and arrangements.
- 5.72 Value can also be found in supporting a neighborhood forum & planning activities, this requires development resources.
- 5.73 To act as a provocateur and lend strength to the community voice in legacy discussions, presence in discussions is required.
- 5.74 The chair thanked the executive chair for their presentation and opened the floor to questions, first asking whether there are any demographics that are under-represented in engagement responses and, further, what is being done to engage those residents.

- 5.75 The executive chair responded by saying that total engagement isn't feasible, and that efforts to engage a wider base are ongoing. It was noted that for some groups experiencing social strife, engaging with things like regeneration consultation will be far from a priority.
- 5.76 The head of planning added that one of the key demographics targeted for better engagement are children and young people, particularly around some of the area-based work around child friendly places.
- 5.77 The deputy manager noted that they undertook a series of workshops with Hackney youth parliament, in helping to sort of develop the child friendly principles and the design guidance that is now being adopted.
- 5.78 Cllr Pallis asked how community panels are ensured to be representative and what the process around that is.
- 5.79 The head of planning advised that enduring diversity on the panels isn't a significant challenge because they can control who they invite, but the challenge comes with who responds to consultation, how that's monitored, and how the feedback is derived.
- 5.80 The head of area regeneration added that they invite a diverse group, but ultimately it's down to who is interesting in participating. Offering consultation mediums like online and in libraries helps widen the participants reached but plans to further engage a wider group are always ongoing.
- 5.81 Cllr Pallis advised that Australia has 'citizen's juries' to contribute to consultation, and wondered whether the council has considered a similar approach for area action plans and whether census data could assist.
- 5.82 The head of planning advised this could be looked at, but the panels are normally between 10 and 15, sometimes larger, and that membership of panels could be reexamined, but noted that the census approach may not provide the diversity needed but that it was another idea to explore.
- 5.83 Cllr Stops observed that 45% of residents own their home, and 15% own outright, and whether this is representative of Hackney Central, or whether this group are likely to be more engaged and more forthcoming in their views than tenants.
- 5.84 Cllr Sharman noted that the current models seem to largely revolve around the creative space, but Hackney Wick is at least 2/3rds not in that zone adding that the residential property market is driving land values locally and asked whether such an overwhelming and vocal force can be challenged.
- 5.85 The head of area regeneration advised that longer term resident engagement may be useful and more inroads to those communities would be too.
- 5.86 Cllr Smyth observed that around 89 languages are spoken in Hackney and that the conversations so far around potential barriers to engagement are useful, but wants to know what can be done to tap into ESL groups further.

- 5.87 The executive chair advised that with the available networks and local contacts, that HWDT can help to design programmes to better engage these groups and would advocate for a further discussion with the council on this issue.
- 5.88 The head of area regeneration added that their team wants to make sure we work with local partners, local stakeholders, because ultimately, they know the area probably better than we do, and they've got people in the area that we just can link up with, to make it more meaningful and to just directly speak to the people that are most interested.
- 5.89 Cllr Spencer asked about the cost of community involvement and what the resources required look like financially.
- 5.90 The head of planning advised that the budgets and consultation processes dictate what can be spend, but the main costs are around officer time and the publication of documents but using a community panel to innovate and getting creative with that approach will improve value for money.
- 5.91 Cllr Sharman asked what part to play the private sector has, and what is driving regeneration and asked how the economic dimension of regeneration will be managed with people's needs and expectation.
- 5.92 The head of planning advised that "Council show if I've picked up on on the point that you wanted me to respond on"
- 5.93 Cllr Race asked about the expectation gap between things like the Shoreditch Future Action Plan noting that residents get very excited about development and asking whether there is an 'after-care' with residents to gauge their satisfaction.
- 5.94 The Chair drew the item to a close.

6 Minutes of the Previous Meeting

- 6.1 The minutes were agreed and noted.

7 Any Other Business

- 7.1 There was no other business.



**London Borough of Hackney
Skills Economy & Growth
Scrutiny**

**Commission Municipal Year:
2021/22 Date of Meeting: Monday
22nd November 2021**

Minutes of the proceedings of
the Skills Economy and growth
Scrutiny Commission held from
Hackney Town Hall, Mare
Street, London E8 1EA

Chair	Cllr Clare Potter
Councillors in Attendance	Cllr Steve Race, Cllr Richard Lufkin, Cllr Patrick Spence, Cllr Nick Sharman, Cllr Mete Coban (Cabinet Member for Energy, Waste, Transport and Public Realm), Cllr Carole Williams (Cabinet Member for Employment, Skills and Human Resources)
Officers in Attendance	Andrew Munk, Head of Employment, Skills & Adult Learning; Simone van Elk, Strategic Delivery Manager, London Borough of Hackney; Lucja Paulinska, Head of Operations – Hackney Light and Power;
Other People in Attendance	Alison Arnaud, Principal: Hackney and Tower Hamlets Colleges, New City College Group; Jamie Stevenson, Group Executive Director: Apprenticeships & Business Development, New City College;
Members of the Public	None
YouTube link	The meeting can be viewed at https://www.youtube.com/watch?v=PfZubKzLsSw&t=1033s
Officer Contact:	Timothy Upton 020 8356 1872 timothy.upton@hackney.gov.uk

Councillor Claire Potter in the Chair

1.1 Cllr Polly Billington & Cllr Vincent Stops sent apologies.

2 Urgent Items / Order of Business

- 2.1 There were no urgent items of business.

3 Declarations of Interest

- 3.1 There were no declarations of interest.

4 Skills Economy & Growth Work Programme 2021/2022

- 4.1 Cllr Lufkin requested a future item on electric vehicle charging points. This was later noted to be within Living in Hackney's remit, not Skills Economy and Growth's.
- 4.2 The Work Programme was noted.

5 Transport for a Cleaner Greener Hackney

- 5.1 The chair introduced the item, stating that the session is to learn more about the demand for Net Zero skills, the creation of net zero jobs, and what the responsibility of the council is on that front. The session will particularly explore the construction, transport and energy sectors when discussing future skills, requirements and opportunities for residents as we move forward from the pandemic and aims to build back better and create quality opportunities for residents in the in the process.
- 5.2 Chair introduced the Head of Employment, Skills & Adult learning & the Strategic Delivery Manager to Present.
- 5.3 It was advised that there are 8 primary areas for net-zero focus:
- 5.4 Homes and buildings: Including retrofit, building new energy-efficient homes, heat pumps, smart devices and controls, heat networks and hydrogen boilers.
- 5.5 Low carbon transport: Including low or zero emission vehicles, aviation and maritime, rail, public transport and walking or cycling.
- 5.6 Power: Including renewables (such as wind, solar and hydropower), nuclear power, grid infrastructure, energy storage and smart systems technology.
- 5.7 Industrial decarbonisation, hydrogen and carbon capture and storage: Including hydrogen production and industrial use, carbon capture, utilisation & storage (CCUS) and industrial decarbonisation.
- 5.8 Green Finance: The concentration of financial activity in Central London means that in Hackney's context, Green Finance could be a key area to identify separately.

- 5.9 Climate change research & development: Including private sector, academic and public research.
- 5.10 Climate change strategy, policy, monitoring and planning: Including public, private and NGO sector strategy and policy, outreach to citizens, environmental monitoring and use of planning system to achieve net zero.
- 5.11 Climate adaptation: Including flood defences, retrofitting of buildings to be resilient to extreme climate events, nature-based solutions to reduce climate impacts and civil and mechanical engineering for infrastructure adaptation.
- 5.12 It was noted that broader environmental goals include:
- 5.13 Reducing localised pollution: Including air pollution, water pollution and noise; London has ambitious goals across all three of these areas.
- 5.14 Reduce, reuse, recycle: Including waste management and circular economy.
- 5.15 Green infrastructure: Within a London context this will focus on urban green infrastructure, and include activity aimed at increasing biodiversity directly or through offsetting.
- 5.16 It was noted that the term “green job” is directly related to policies aiming to deliver environmental goals, so we define green jobs as those jobs that facilitate meeting net zero and broader environmental goals.
- 5.17 Hackney estimates there were some 234,300 green jobs in the capital in 2020, 4.4% of total employment. The largest sectors were Power (83,000 jobs), Homes and Buildings (58,200) and Green Finance (50,700)
- 5.18 Green jobs in London are predominantly high-level managerial, professional and associate professional/technical roles. There is also an over-representation in skilled craft jobs (19%, compared with 6% of all jobs in London)
- 5.19 The green workforce is male dominated (66% as compared to 54% of all workers in London are men) and there is a lower proportion of workers from Black, Asian and Minority Ethnic backgrounds in comparison with all sectors in London (30% as compared with 36% of all workers).
- 5.20 The green workforce is highly qualified, and two thirds have first degrees or equivalent or higher qualifications. Among those with vocational qualifications the most common subject areas are building and civil engineering, and electricity and energy.

- 5.21 In terms of skills supply considerations, it was noted that Green sectors tend

to draw staff from other sectors, rather than straight from education: around 1% of the workforce enter straight from full-time education each year, compared with 3% across all sectors.

- 5.22 It was also noted that there is a substantial pool of relevant skills in other sectors, but this is lowest for homes and buildings and the associated skilled-craft occupations
- 5.23 In terms of Green Jobs in the future, it was noted that Hackney's central projection finds a potential for green jobs to increase to 505,000 by 2030 and over 1 million in 2050 in London if a net zero pathway is followed. Green jobs would increase by 8% per year this decade, which is double the rate of the fast-growing Information and Communication sector in the decade preceding the pandemic
- 5.24 There is substantial uncertainty in projecting green jobs; projections made in the report present a range of 0.6 to 1.8 million green jobs.
- 5.25 These are not net jobs as existing jobs may be lost and replaced with green jobs. However, Hackney finds that net jobs in London could increase by around 50,000 in 2030 due to positive macroeconomic impacts.
- 5.26 The central projection implies an increase of around 140% in skilled craft workers by 2030 (including electricians, gardeners and landscape gardeners, and plumbers and heating & ventilation engineers). Nationally, there are currently skills shortages for many of these occupations – electricians, plumbers, and production managers in construction, In particular. We also project an increase of around 120% in managerial and professional employment; however, there is currently a greater pool of people with relevant skills in non-green jobs.
- 5.27 To ensure a sufficient supply for these new jobs, there is an urgent need to increase education provision in relevant subjects and courses, increase the proportion of those taking relevant courses who progress to green employment, and increase the flows from other, non-green, sectors into green sectors, including through re-skilling training. This is most urgent in skilled craft occupations.
- 5.28 In terms of jobs in carbon intensive sectors, it was noted that: The research finds that London has 390,000 jobs (7% of London employment) in carbon intensive sectors that will need to change substantially due to the transition. Construction, land transport and aviation account for the majority of these jobs.
- 5.29 38% of people in these sectors identify as non-White versus 11% nationally. However, this is in line with London employment more broadly, where 36% of employees identify as non-White. The research also finds that these sectors are likely to be male-dominated with female workers accounting for only 18% of the

employees in these sectors nationally.

- 5.30 While this research is useful, it was noted that data gaps exist, including: Existing green businesses in Hackney, Impact of transition to net zero for businesses in Hackney, Need to distinguish between opportunities in green economy across London, and those in and near Hackney
- 5.31 In terms of the GLA and London Council's priorities, it was noted that the GLA Green New Deal recovery mission is designed to Tackle the climate and ecological emergencies and improve air quality by doubling the size of London's green economy by 2030 to accelerate job creation for all.
- 5.32 This will address inequalities by creating good quality jobs and targeting those most in need to tackle the inequality in society highlighted by the pandemic, and offer Green skills and training available to all Londoners, particularly the most vulnerable. This includes launching a London 'green skills academy'.
- 5.33 In terms of Hackney's own approach to green economy, risks and potential limitations were observed, including: Skills gaps in labour force could delay/disturb growth in green economy.
- 5.34 At the same, skills providers may be reluctant to invest in 'green' skills degrees and courses without some more certainty about demand in labour market.
- 5.35 Growth in green economy could exacerbate existing inequalities given industries where growth will be concentrated.
- 5.36 Government support for transition of SMEs may be limited/lacking.
- 5.37 Physical space and other market conditions will restrict types of green businesses that can operate in borough.
- 5.38 The next part of the presentation was concerned with Adult Education and skills. It was noted that: Since September 2020, the Council's Adult Learning Service has been fully integrated with the Council's wider employment & skills service - enabling delivery of a more joined up and holistic offer for our most disadvantaged residents
- 5.39 The Council has 3 key areas of strategic focus for Adult Learning delivery in Hackney, aligned to our Inclusive Economy aspirations - which now frame all decision making around course delivery by the Council as well as providing a focus for partnership working and future funding decisions:

- i) Training with a direct link to employment opportunities.

ii) Building general and transferable skills.

iii) Supporting our resident's wellbeing and positive mental health

5.40 The service has now adopted an outcomes-based approach aligned to the GLA's strategic aims (funder for Adult Learning) and Ofsted requirement.

5.41 The set of outcomes adopted include not only progression into employment and higher-level training; but also increased levels of confidence and improved mental wellbeing.

5.42 The Council's Adult Education provision (budget of £2.2 million) is a cog in a far wider local adult education eco-system. Eg: New City College has a significantly larger budget for its Adult Education provision in Hackney.

5.43 Alongside direct and commissioned delivery, the Council has played a key leadership role, establishing and bringing together providers based around 3 working groups:

- Vocational skills
- Functional skills (Maths; English)
- ESOL and community learning

5.44 Work is underway with key local education partners to develop a shared borough-wide:

- evidence base;
- approach to curriculum planning;
- set of outcomes measures

5.45 With the aim of a delivering a borough wide adult education offer which responds to local needs, challenges and shared priorities - including around green skills.

5.46 In terms of procurement and planning, it was observed that Employment and Skills Plans (ESPs) are part of S106 obligations, estate regeneration programmes and new procurements.

5.47 Targets set by developers and contractors include commitment to promote roles in the green economy and ~~Page 30~~ the recovery.

- 5.48 Ensure the impacts of procurement activities benefit the local economy and contribute to green recovery:
- Engagement with local suppliers and businesses to aid green recovery.
 - Identifying roles in the green economy e.g. using renewable energy or sustainable technologies.
 - Pay the London Living Wage (LLW) to employees and apprentices.
- 5.49 In terms of Area Regeneration & Economic Development, it was noted that: Area based approach to regeneration encompassing physical, social and economic regeneration and interventions on an area basis in consultation with local residents, businesses, community groups and other stakeholders.
- 5.50 Working in partnership to maximise opportunities for the boroughs residents, businesses and places by ensuring regeneration and economic development is inclusive and delivers social value.
- 5.51 Developing and delivering regeneration plans for areas in partnership with local communities and stakeholders such as the Dalston Plan and Hackney Central Town Centre Strategy) and delivering on the priorities set out in these plans.
- 5.52 Working with relevant teams across the Council to ensure that Council land and property assets generate wider social value for the borough via capital receipts from disposals and via building social value requirements into property leases.
- 5.53 Unlocking sites for redevelopment (both Council-owned and privately owned) and ensuring the development of sites offers benefits for the borough (e.g. more homes, affordable housing, workspace, new jobs). Where feasible will ensure the redevelopment of sites supports the growth of green jobs and skills.
- 5.54 Business communications and engagement: Working collaboratively with local businesses to encourage them to deliver social value outputs via their business operations in the borough, connecting businesses with the Employment and Skills team/Hackney Works and other relevant internal to maximise social value opportunities.
- 5.55 New Economic Development function: Ensuring the borough's economic evidence base is up to date and devising an economic development strategy, working strategically with businesses to deliver social value for the borough, encouraging inward investment, protecting and delivering new workspace.

- 5.56 The Net Zero Energy Strategy Initiatives were also provided:
- 5.57 Decarbonisation through energy efficiency, retrofitting and replacement of fossil fuel technologies in our buildings.
- 5.58 Deployment of low carbon technology and infrastructure for our existing buildings, future developments and our fleet replacement.
- 5.59 Decarbonisation of fleet through EV technology
- 5.60 Reducing embodied carbon of our developments.
- 5.61 Encourage and support borough wide engagement in the net zero agenda and promote benefits of engaging and investing in energy efficiency and low carbon energy production and utilization.
- 5.62 It was advised that Implementation of the Net Zero Energy Strategy will provide opportunities in the green economy.
- 5.63 Across these initiatives, jobs will be created and skills required within the Green Economy to reach zero carbon targets.
- 5.64 Development of courses is needed across the value chain to respond to emerging technologies.
- 5.65 It was noted that collaboration will be needed to support green jobs:
- 5.66 Planning now for the skills demand of young people who are yet to enter the labour market.
- 5.67 Supporting existing workers at risk of job losses to move into new employment in a zero-carbon economy in the future.
- 5.68 Supporting workers already in the labour market with skills valuable in a zero carbon economy but who will need to upskill.
- 5.69 The chair thanked the speakers for their presentation and invited the Principal of Hackney and Tower Hamlets Colleges & the Group Executive Director for Apprenticeships & Business Development to present.
- 5.70 The presentation opened with some facts about why New City College (NCC) should be interested in skills.
- 5.71 It was noted that 16-34 year old demographic are the most worried about climate change, 28/32 London boroughs have declared a climate emergency, and The majority of young people's working lives will be impacted by FNZ strategy- or failure to meet it.

- 5.72 NCC has a Green Strategy, which was launched in January 2021. It is aligned with the UK climate roadmap that was developed specifically to help colleges become greener.
- 5.73 To help make sure NCC does what we said it would in its strategy, and it has a Green Committee. Student Environmental Officers are part of the Green Committee.
- 5.74 They help NCC decide on the next steps to take and promote the work on environmental sustainability at NCC.
- 5.75 Involved in employer boards and hold us to account.
- 5.76 NCC also needs to reduce the college's carbon footprint.
- 5.77 They own 10 buildings in total and most of them need work to make them more environmentally sustainable.
- 5.78 Arbour Square for instance is heated by gas boilers and as it's an old building, it is not well insulated, so a lot of heat is lost through the walls, roof and windows. This makes Arbour Square inefficient in its energy use and increases its carbon footprint,
- 5.79 NCC can change this in two ways: By reducing the amount of energy they use: they can all help by closing windows if the radiators are on or switching the lights off when we leave an empty room & by changing the way they heat the building and improving its insulation. This will take a long time and is expensive, but they have started work on this.
- 5.80 NCC works with hundreds of organisations every year.
- 5.81 They have power to influence their work to make sure it becomes greener.
- 5.82 They have already started this work
- 5.83 For instance, their food offer at the college is provided by a company called Aramark. From the start of this academic year, they have made sure every Monday is a Meat Free Monday to make increase their offer of environmentally sustainable food options for students.
- 5.84 They have also recently signed three contracts for 100% renewable energy for some of their campuses. Over time, they want all the their electricity contracts to be based on 100% renewable energy.
- 5.85 In terms of why employers should work with NCC, it was observed that Customers will be looking at their supply chain to make sure they are

working with responsible partners - otherwise it effects their own efforts to reach net zero.

- 5.86 Not showing commitment can affect their ability to borrow from banks.
- 5.87 Staff and clients want to work with a responsible company.
- 5.88 Reducing Carbon emission should be part of their CSR and ESG policy.
- 5.89 European competitors are in all likelihood already on the FNZ path
- 5.90 You can no longer bid for government contracts over £5m without a demonstrable carbon reduction roadmap - getting started with carbon reporting will help.
- 5.91 There are entrances from other sectors to the green sector, which makes up about 6% of the workforce, and the labour and skills that are going into green, a lot of them are coming from the manufacturing sectors as those areas sort of decarbonize that said, they don't have a huge pool of those within Hackney.
- 5.92 If you look at the Further Education (FE) sector, just over 20,000 learners are in relevant courses in FE currently, this has been relatively stable over about the last three years, but there has been a large increase in numbers in building construction courses. New City College has exceeded their target numbers for building and construction by somewhere between 20 and 32%, depending on the campus, it's a real growth industry.
- 5.93 NCC outlined the aims and actions for 21/22:
- 5.94 Professionalize perceptions of some SSAs (e.g. Construction).
- 5.95 Honestly address gender and racial disparity in applications, opportunities and ambition.
- 5.96 Engender ownership and consequences (reduced access to copying, clear budget choices for students and staff.)
- 5.97 Explore FE opportunities and internal HE progression into expanding sectors.
- 5.98 Hold partners and employers to account as we already do about LLW or DDA.
- 5.99 Work in collaboration with councils and others to provide a more cohesive approach.

- 5.100 Chair thanked NCC for their presentation and opened the floor to questions.
- 5.101 Cllr Nick Sharman asked, considering that this is a climate emergency, are we (the council) still taking this step by step as though we have a lot of time.
- 5.102 Cllr Coban responded saying this council is doing everything it can to tackle the climate emergency; it has set out an air quality action plan, setting out 47 ways in which we can tackle toxic air pollution. 2,500 street trees with 11,000 more in our parks and green spaces have been introduced, and we've installed 15 low traffic neighbourhood schemes. We switched our council energy supply to 100% renewable energy, and we've just recently actually got voted as the third greenest borough in the UK.
- 5.103 The Head of Employment, Skills & Adult Learning added that they feel we've really moved that pace here during a pandemic where we have aligned what adult education in the council and boroughs do with corporate priorities.
- 5.104 It was noted that this wasn't the case 18 months ago. Cllr Williams reported on that over the summer cabinet so that when we do have a situation of great complexity, like the climate emergency, we've got everything arranged to say we are going to focus on Council priorities and Council resources on tackling this corporate priority.
- 5.105 Cllr Race asked what is needed from Cllrs.
- 5.106 The Principal of Hackney and Tower Hamlets colleges responded saying that there is always communication that goes out to schools, because the borough has a legal obligation and oversight of schools. It's good when the college included in those conversations.
- 5.107 The Group Executive Director for Apprenticeships & Business Development added that they absolutely do believe they (the NCC) are leading and paving the way. They think the big piece of work that's needed now is about working with employers; 95% of employers that have a business plan and letting them know what skills they can need to stay tomorrow and moving forwards. This is still that piece of work of trying to articulate what are the immediate needs, around skills needs.
- 5.108 Cllr Smyth asked whether leadership skills are needed to drive cultural change for a green economy and whether NCC is doing anything along those lines.
- 5.109 The Principal of Hackney and Tower Hamlets colleges advised that they run a digital curriculum that starts at level one and goes through to level three, level three being the equivalent of a level and then progress is on to work posts, level three, so the undergraduate level and then graduate level and for their adults, they run something called Essential digital skills. It was a

new qualification the government rolled out in 2020. They are one of the highest providers in the country and Entry Level and Level One were results last year about 92% less than for level two, that has to do with people's capacity to stay online and finish during the pandemic.

5.110 The Group Executive Director for Apprenticeships & Business Development added that over the pandemic, they supported 1,200 unemployed individuals. They also supported over 200 people to actually achieve the level free Teaching Award, which 97% achieved. From that, if they passed, they then had a guaranteed interview to then take them on directly.

5.111 Cllr Potter asked what they think needs to change with these mentioned sectors, to enable young people to feel much more inspired to work in them.

5.112 The Principal of Hackney and Tower Hamlets Colleges advised that when we look at young people today, they think one of the things we need to do culturally is move away from a very linear view of what education is. What they're trying to do is reconcile the parity of esteem between vocational and academic courses. It is also about expansion of horizons. If you think of something like construction, and you look at the advocacy and the marketing for it, it seems we still live in a situation where 90% of those adverts will involve a hardhat, or trowel. It was advised that that's not representative of the industry, the industry is at least 50% sitting in offices doing jobs that do not require PPE and are not based on some of these physical build at all.

5.113 The Head of Employment, Skills & Adult Learning advised that they agree with a lot of what was just said. They advised that careers advice is incredibly important. This is an area where the council isn't necessarily getting things quite right yet.

5.114 It was advised that there is work behind the scenes going on around green economy which provides a really useful "rocket booster" to moving ahead with some of that much needed focus on career advice.

5.115 It was advised that the best approach is building that change gradually, and the best way of getting people into apprenticeships, is to get other apprentices talking about it.

5.116 The chair thanked all speakers and closed the meeting.

6 Minutes of the previous meeting.

6.1 The minutes were approved.

7 Any Other Business

- 7.1 Cllr Sharman expressed an interest in having another formal meeting with Stephen Haynes and his team.