

Mixed-methods study of the 'green skills gap' in the UK and its effect on the UK's hydropower sector

MISOC POLICY FELLOWSHIP REPORT

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Abstract

This research paper explores the impacts of the UK's 'green skills gap' on the country's hydropower sector.

This mixed-methods study draws on evidence from 17 semi-structured interviews with experts from across the UK hydropower sector, as well as from national and international organisations involved in hydropower or renewable energy more broadly. Qualitative findings from these interviews are supported by quantitative analysis of 1,144 hydropower jobs postings listed in the period January to December 2023.

There is widespread recognition within academic research (i.e. from universities, consultancies, government etcetera) that there is a green skills gap in the UK across most sectors. Whilst this body of research addresses the green skills gap within the renewables sector, there is little or no mention of the impacts on the UK's hydropower sector specifically. Given hydropower's critical role in the clean energy transition – notably through energy storage provided by pumped storage hydropower – this study argues that it is critical to consider possible workforce challenges that the sector faces.

This study finds that there is a green skills gap in the UK, particularly in the field of engineering, which has implications for the hydropower sector. These implications include a reliance on international talent and a drive from the industry to increase the pipeline of young talent. This report attests to the challenges the hydropower sector faces in accessing the skilled workforce it needs to meet industry demands and calls for greater collaboration between industry and government actors to work through these issues.

Introduction

Hydropower is the largest and oldest source of renewable electricity in the world ([International Energy Agency \[IEA\], 2023](#)). According to the International Renewable Energy Agency's 1.5°C Scenario, hydropower installed capacity would need to double globally by 2050 in order to meet net zero emission targets as set out in the Paris Agreement ([IRENA, 2023](#)). Despite the important role that hydropower will have to play in the decarbonisation process, there is comparatively little focus directed towards hydropower amongst policymakers and researchers. This was captured strikingly by Fatih Birol, Executive Director of the International Energy Agency, who stated that hydropower is the 'forgotten workhorse' of renewable energy ([Reuters, 2023](#)). Taking this into account, this introduction sets out some context to the UK's hydropower sector before briefly outlining the aims and objectives of this report.

Some countries are naturally more suited to hydropower than others; for instance, Norway's geography allows the country to produce 99% of its electricity from hydropower ([IRENA, 2024](#)). Whilst the UK has more limited opportunities for hydropower generation, the country currently has over 1650 hydropower schemes, providing 2GW of total installed capacity ([BHA, 2024](#)). This constituted 1.8% of the UK's energy mix in 2023, which, as way of comparison, represented almost twice that of the contribution of coal ([National Grid ESO, 2024](#)). Moreover, in the 2022 UK Hydropower Resource Assessment, it was found that an extra 1 GW of installed capacity could be added under a 'favourable' policy environment ([Grant Wilson et al., 2022](#)). Should this 1 GW worth of hydropower schemes be built, one estimate suggests that this could add £4.8 billion to the national economy ([Biggar Economics, 2023](#)).

Hydropower brings with it not just an ability to generate energy but also to store it. Much of the current flexibility in the UK's electricity grid comes from gas or coal fired power plants brought online during peak demand to ensure there is a sufficient supply of electricity. As reservoirs act as energy stores, hydropower can be used to fill gaps in supply and demand at a lower cost than gas and coal. Indeed, estimates suggest that the use of hydropower in the UK brought down the country's wholesale electricity cost at 17:00 every day by £200,000 in the year 2022 ([Biggar Economics, 2023](#)). Pumped storage hydropower provides further flexibility by using surplus electricity to pump water from a lower reservoir to higher reservoir during periods of low energy demand. This stores energy which can be released when required. With increasing reliance on variable renewable energy sources like solar and wind, there is an expectation that the UK would need around 20-30 GW of energy storage by 2035 ([UK Parliament, 2023](#)) and upwards of 50 GW of energy storage capacity by 2050 ([National Grid Future Energy Scenarios, 2023](#)).

Given the imperative to expand energy storage capacity in the UK to facilitate the transition to net zero, it is unsurprising that there are a number of pumped storage hydropower projects in the pipeline in the UK to add to the 2.8 GW capacity supplied by four existing plants. For example, there are currently six pumped storage hydropower projects in development phases in Scotland that alone would have the potential to increase this capacity by 4.9 GW ([Biggar Economics, 2023 – 2](#)). Although the UK was a pioneer in the hydropower industry, leading the way in the 19th Century ([IEA, 2023](#)), most major hydropower projects were built in the UK in the 1950s and 1960s. As there is a significant body of research that suggests there is a green skills gap in the UK, there is justification for further scrutiny into how well-equipped the country is with the skills needed to meet future industry demands, such as delivering large-scale hydropower projects in Scotland, the like of which have not been built in the UK for decades.

The UK was the first country in the world to legislate to meet net zero by 2050 and one of the new Labour Government's five missions is to 'make Britain a clean energy superpower' ([The Labour Party, 2024](#)). Although the UK has been recognised as 'world leader in green skills' with a 'high green skill penetration across the economy relative to global competitors' ([LinkedIn, 2021](#)), as with every major economy, there are skill and labour gaps in the country's energy workforce ([IEA, 2023](#)). As the new Government's aim is to accelerate to net zero and deliver clean energy by 2030 ([The Labour Party, 2024](#)), it is crucial to consider both how all forms of renewable energy technologies will help the UK to achieve this goal, and to examine whether the UK has the capability to deliver on these targets. This report aims to:

- Draw further attention to the pressing issue of the green skills gap in the UK;
- Reveal new insights into how this impacts the hydropower sector in the UK; and
- Highlight the need for further research into this area.

In Chapter 1, this report examines the existing research into the green skills gap in the UK, focusing on the under-researched area of hydropower. Chapter 2 outlines the mixed research methods utilised for this research and explains their limitations. Chapter 3 details the key findings from both the qualitative interviews and quantitative findings. Chapter 4 considers the implications of these findings and outlines some broad policy recommendations to consider.

Chapter 1 Literature review

The term ‘green skills’ is widely used in academic writing, policy reports and private sector studies. However, definitions vary greatly, with some studies categorising green skills as an ‘umbrella term’ (e.g. [IEMA, 2023](#)) and others taking a more precise definition (e.g. [Arenas-Arroyo et al., 2024](#), [LinkedIn, 2023a](#) and [Saussay et al., 2022](#)). As outlined by Cardenas Rubio et al., definitions of green skills typically belong to two ‘camps’: the ‘purist’ camp, which is more precise and often focused on specific industries, and the ‘inclusive’ camp, which is broader and less specified ([2022](#)). The definition chosen is often reflective of the aims of the research itself; i.e. whether to facilitate open discussion through qualitative research or to reveal quantitative insights about a specific industry. Skills policy is a devolved policy area in the UK and so, adding further semantic complexity, the Devolved Governments may opt for different terminology. For instance, whilst the UK Government’s Green Taskforce and the Scottish Government agency Skills Development Scotland have used the term ‘green skills’ in publications ([Simmons and Lally, 2022](#); [Cardenas Rubio et al. 2022](#)), the Welsh Government has used the term ‘net zero skills’ instead ([2023](#)) and the Northern Ireland Executive has referred simply to ‘skills’ in its Green Growth Strategy for Northern Ireland ([2023](#)). As outlined in the methodology section, this study adopts an ‘inclusive’ definition of green skills: namely, as ‘the knowledge, competencies, values and attributes needed to develop and support a sustainable, low-carbon and resource-efficient society’ ([Economist Impact, 2024](#)).

Whichever definition is used, it has been recognised that the term ‘green skills’ tends to be more widely used by policymakers than industry stakeholders ([Green Alliance, 2022](#)). Notwithstanding some questions over the utility of the term, there is significant and increasing focus on green skills – both as an academic concept and as an important topic within wider net zero discussions – in major economies across the world, including in the UK. Drawing on data from its 930 million users worldwide, LinkedIn released a Global Green Skills Report in 2022 and then again in 2023. These reports highlight clear trends internationally that jobs requiring green skills are on the rise and that there is a gap between supply and demand for these skills. Indeed, in the year 2022 to 2023, the number of workers from 48 countries considered to have green skills increased by a median of 12.3%, whereas those job listings asking for one green skill or more grew by a median of 22.4%. This is compared to the median growth in overall job listings on LinkedIn between 2022 to 2023, which was strikingly lower, at 15.2% growth ([LinkedIn, 2023a](#)). The increase in jobs requiring green skills has been confirmed in other research studies. For example, the Organisation for Economic Co-operation and Development (OECD) found that since the beginning of the COVID-19 pandemic, the demand

for jobs requiring green skills has exceeded labour market demand generally by 30 percentage points ([2023](#)).

Numerous studies demonstrate that the UK has a shortage of (skilled) workers, with Office for National Statistics (ONS) figures showing that there were 904,000 job vacancies across in the quarter March to May 2024 ([ONS, 2024](#)). The drive for net zero creates further pressures on jobs and skills, since certain jobs and skills – for example in technology and Artificial Intelligence – will be in greater demand than before ([Industrial Energy Council, 2019](#)). Research by the Grantham Institute on Climate Change and the Environment suggests that around 10% of the UK’s current workforce will need to be upskilled as we progress towards a net zero economy, and that 20% of workers will be in jobs with skills in high demand ([Robins et al., 2019](#)). The evidence highlights that the skills shortage is not uniform, with the UK experiencing a shortage of skilled workers across the fields of engineering, manufacturing and construction. The UK ranks 30 out of 38 OECD countries for its percentage share of students studying subjects related to these fields ([Christie-Miller and Luke, 2021](#)). It is therefore unsurprising that there is such high demand for workers in these fields; for instance, 25% of all job postings in the UK in 2021 were for engineering roles ([Edge Foundation, 2024](#)). In Nesta’s analysis of the existing evidence on green jobs in the UK one notable conclusion was that the ‘skill shortage is a crucial barrier to getting more people into green jobs given the overall skill shortage in the UK’ ([2023](#)). Overall, this evidence paints a difficult picture for UK industries heavily reliant on skilled workers.

As with other areas of the UK economy, the renewables sector is impacted by this skills shortage. However, this sector arguably faces more significant challenges than others since it generally requires a higher skilled workforce than other sectors ([International Energy Agency, 2023](#)). The UK’s wider energy sector has a challenging road ahead to upskill its existing workforce: in a survey of 1,000 UK energy sector workers (including non-renewables), it was found that only 33% had the skills needed for success in adapting to future demands of the industry ([City & Guilds, 2023](#)). Similar concerns extend beyond the UK context; in a survey of over 1,000 business leaders across the world, 62% agreed that lack of green skills could create bottlenecks in the transition to clean energy. In light of these concerns, companies across the world are working to – or planning to – upskill their current workforce with green skills ([Economist Impact, 2024](#)). Research by PwC has suggested that the UK’s green energy transition could in effect be constrained by a lack of workers with the necessary green skills in the country, and that a new pipeline of around 200,000 skilled workers with green skills need to be trained in order to reach net zero targets ([PwC, 2022](#)). These findings give a sense of scale of the UK’s green skills gap and provide strong

justification for policymakers to direct their attention towards addressing this challenge.

With the opportunity for so many workers to be reskilled or upskilled in the UK, policymakers should also recognise the intersection of the green skills gap with other structural issues to ensure that the green transition is equitable. One such issue is gender equality. Globally, men are moving into green jobs at a much faster rate than women, with the majority of transitions into green jobs (66%) made by men between 2015 and 2021 ([LinkedIn, 2023b](#)). Concerningly, the Boston Consulting Group has estimated that in 2030, only 25% of new green jobs globally will be held by women ([BCG, 2021](#)). In the UK, women are under-represented in the renewables sector ([LinkedIn, 2023b](#)) and Science Technology Engineering and Mathematics (STEM) jobs more broadly – women make up just 26% of the country's STEM workforce, according to latest Census figures ([McGee, 2023](#)). Given that most of the growth in green jobs in the UK is predominantly in STEM sectors, women may miss out on opportunities to enter into the UK's green skilled workforce ([PwC, 2023](#)). Research also indicates that women are less interested than men in having a green job, which points toward potential perceptual barriers to entry into a green skilled workforce ([Nesta, 2023](#)). Addressing under-representation from women and minority groups in green jobs will be key to the success of initiatives taken to reduce the UK's green skills gap.

Research that focuses on issues of underrepresentation in the UK's hydropower sector is lacking. There is, however, research from an international perspective which yields useful insights for the UK context, such as the World Bank's 2023 report on 'Getting to Gender Equality in the Hydropower Sector' ([Energy Sector Management Assistance Program \[ESMAP\], 2023](#)). This report documents a clear gender gap in the sector internationally: in a survey with 65 corporate responses, it was found that women held just 25% of positions in hydropower companies, whilst a survey of 900 individuals from the hydropower sector showed that women are significantly underrepresented in technical positions, at 21%, compared to non-technical positions, at 79% ([ESMAP, 2023](#)). It is not possible within the scope of this study to fully investigate issues of diversity and inclusion, and more research is needed to understand these issues in a UK context. Nonetheless, existing research – such as that by the World Bank – provides a useful framework to understand structural challenges that affect the sector internationally and offers clear recommendations for policymakers and companies to reduce workforce inequalities.

Thus far, research in the UK has tended to examine the workforce and skills challenges for the renewables sector more broadly. Whilst some research on hydropower workforce challenges specifically has begun (e.g. a joint [report by Statkraft and the University of the Highlands and Islands](#) due

to be published later this year), few reports focus solely on hydropower in the UK. Where hydropower *is* mentioned in UK-focused research, the data is often lacking. For example, in an analysis of net zero workforces from 28 different reports, a jobs forecast was listed for nuclear, hydrogen, solar and wind power but not for the hydropower industry ([Engineering UK, 2022](#)). Pumped storage hydropower has garnered increased interest in policy discussions – as is reflected by the 2024 consultation on the cap and floor mechanism proposed to enable greater investment in long duration energy storage ([DESNEZ, 2024](#)) – yet energy policy papers often omit hydropower: for example, neither the [Net Zero Strategy: Build Back Greener \(2021\)](#) published under the Johnson Government nor the [Powering Up Britain Blueprint \(2023\)](#) published under the Sunak Government mention hydropower once. This report therefore aims to add to understanding by addressing the under-researched area of hydropower in the UK and spotlighting the issue of green skills in particular, since academic research indicates that skills shortage threatens to slow the UK's efforts towards achieving net zero.

Chapter 2 Data, methodology and limitations

As outlined in the literature review, there is no standard definition of the term ‘green skills’. This study opted for a more ‘inclusive’ definition used by The Economist Impact: namely, that green skills are ‘the knowledge, competencies, values and attributes needed to develop and support a sustainable, low-carbon and resource-efficient society’ (2024). Adapting Christie-Miller and Luke’s definition of a ‘skills gap’, this study takes the ‘green skills gap’ to mean the ‘gulf’ between the level of green skills across the UK and the level these skills would need to be to support a net zero society (2021). By choosing broad definitions rather than a narrow and prescriptive one, this study sought to avoid definitions acting as a limiting factor on the ability of interviewees to give full and detailed reflections on questions relating to green skills. This empowered interviewees to give their own reflections on the notion of green skills more broadly, which led to a critique of the term green skills in a number of interviews.

This study applied a mixed methods approach, combining qualitative analysis of semi-structured interviews with quantitative analysis of vacancy data for hydropower jobs postings. An exploratory sequential design was chosen for this study, with qualitative analysis – a literature review and analysis of interviews – informing the direction of the quantitative analysis. The literature review examined existing research on green skills and hydropower in the UK from a range of sources, including government (UK Government, Scottish Government, Welsh Government and Northern Ireland Executive), international organisations (e.g. IRENA, IEA, OECD), trade associations (e.g. British Hydropower Association), NGOs (e.g. Green Alliance), consulting reports (e.g. Biggar Economics) and academic reports (e.g. University of Birmingham).

Following a thorough review of the existing literature, a number of themes were identified which helped inform the framing of the interview questions. A semi-structured approach was used during interviews: six questions were prepared in advance and follow up questions were asked. Interviewees were encouraged to draw on their experience and share examples or relevant case studies. Interviews averaging 45 minutes were held with 17 individuals representing 12 organisations. There was representation from a range of professions, expertise, and experience levels. Collectively, the interviewees brought many decades of experience working in the British hydropower sector and/or the (international) energy sector more broadly. Further detail on interviewees can be seen in the table below:

Organisation	Role title
British Hydropower Association	CEO
Drax Hydro	Hydropower Engineering Manager
Drax Hydro	Senior HR Business Partner
Hydropower Sustainability Alliance	Senior Sustainability Specialist
Intelligent Land Investment Group Energy	CEO
International Energy Agency	Energy Analyst and Modeller
International Hydropower Association	CEO
International Hydropower Association	Senior Energy Policy Manager
International Hydropower Association	Senior Energy Policy Manager
Long Duration Energy Storage Council	Director of Policy and Partnerships
National Trust	Hydropower Energy Specialist
Riverswan Energy Advisory	Director
SSE Renewables	Project Manager
SSE Renewables	Hydropower Development Manager
Stantec UK	Director, Waterpower and Dams
Statkraft	Country Manager UK
Statkraft	Vice President Operation and Maintenance for UK and Ireland

Findings from interviews were shared with the researchers from the University of Essex to help direct their attention to key themes for quantitative analysis, including 1) the skills called for within advertised hydropower jobs, 2) the experience level of jobs and 3) other skills required. Quantitative analysis was then conducted on 1144 job postings (source: [Adzuna](#)) that are listed within the hydropower job category posted from January to December 2023. This analysis examined 1) the profession categories within which hydropower jobs were listed, 2) the experience level required by these jobs and 3) the additional skills that were asked for. Together, the qualitative and quantitative evidence was analysed to draw out the key findings for this report.

There are a few limitations to consider with respect to the study’s findings. These are as follows:

- The lack of an industry-standard definition for green skills led to some uncertainty amongst interviewees. This was mitigated to a certain extent by the interviewer providing a standard definition at the start of each interview.
- The majority of those interviewees working in the UK hydropower sector were focused on large-scale hydropower, which means that findings may be less applicable to the small-scale hydropower context. This was mitigated to a certain extent by focusing on small-scale hydropower in two interviews.
- A greater number and breadth of interviewees would naturally result in greater certainty in the validity of results. This was mitigated to a certain extent by the narrow focus of the interviews on green skills in the UK context, and by the length of each interview, which allowed for in-depth discussions.
- The Adzuna dataset had some limitations. It was not possible to distinguish between ‘direct’ hydropower jobs (e.g. mechanical engineer in a hydropower company) and ‘indirect’ jobs (e.g. external services offered to hydropower companies without being directly linked to these), so analysis of trends *within* these categories was not conducted. Further limitations include the fact that there were few data points for Northern Ireland and Wales, which therefore limited the inferences that could be made across the four nations of the UK.

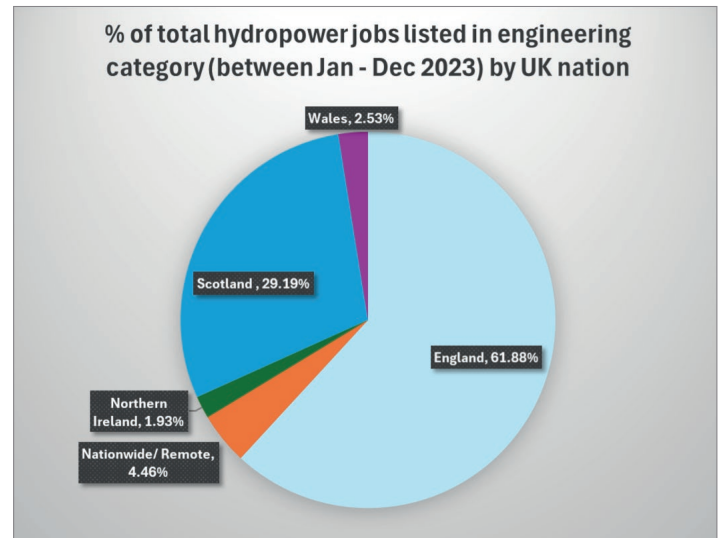
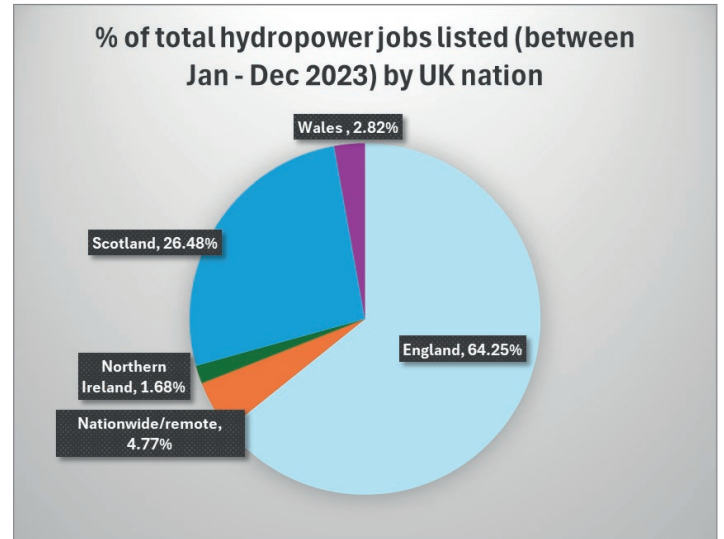
Chapter 3 Key findings

Finding 1 Strong recognition of a green skills gap in the UK which impacts the UK's hydropower sector

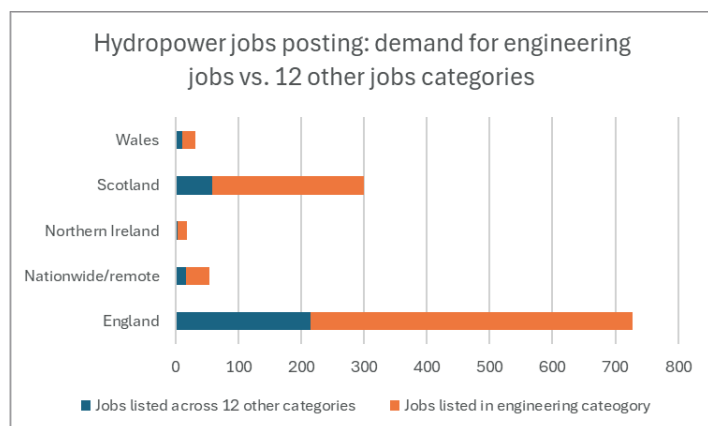
- The majority of interviewees with expertise in the UK market recognised that **there is a skills gap in the UK which impacts the British hydropower sector** (one interviewee was unsure).
- Where interviewees had greater expertise in hydropower markets outside the UK, there was a strong agreement that green skills shortages impact the sector internationally.

Finding 2 The most significant skills gap identified is in engineering and construction, and this is the case across the UK

- The skills gap is not uniform across the professions involved in the UK's hydropower sector: interviewees highlighted that some fields, such as legal and finance, are well provisioned in the UK.
- Most interviewees indicated that **the skills gap in the UK is largely within engineering**: electrical, mechanical and civil engineering. There are also skill gaps in other specialist areas; for example, in ecology, tunnelling and geology.
- This qualitative finding is supported by quantitative analysis: **73.7%** of the jobs postings from the 1,144 hydropower jobs postings analysed from January to December 2023 were listed within the '**Engineering jobs**' category. This highlights a clear demand from employers within this sector for engineering skills.
- The pie charts below indicate that the demand for engineers within the hydropower sector broadly aligns with the distribution of hydropower jobs in the UK, indicating a fairly even demand in engineering skills within the hydropower sector across the UK.



The number of hydropower jobs listed in 12 other jobs categories is also far lower than that for engineering across the UK's nations, as is demonstrated in the bar chart below:



Several interviewees explained the skills gap in the (large-scale) hydropower sector is driven partly by the fact that the UK has not built large-scale projects since the 1970s. One interviewee suggested that the skills needed to deliver such projects largely exist in the UK, but not in the volume required to meet projected demands of those pumped storage hydropower projects currently in the pipeline. Interviewees highlighted that as most large-scale hydropower projects are located in remote areas, there may be challenges in attracting the required skilled workers from urban areas.

One interviewee with knowledge of the hydropower sector outside of the UK outlined that, since hydropower projects are bespoke and site specific, there is a need for a lot of up-front engineering work at the start of the project. This differs from some other renewable technologies, such as solar, where the parts themselves can be largely bought 'off the shelf' and where it is likely that less large-scale civil engineering is required. The shortage in skilled engineers therefore creates bottlenecks in hydropower development, since the projects cannot progress past initial stages without extensive engineering expertise and input.

Several interviewees stressed the need for skills and knowledge in ecology, environmental impact and climate change resilience to ensure that projects developed minimise disruption to natural environments and are more futureproof against the impacts of climate change. These skills were acknowledged as important by interviewees with experience in both small-scale and large-scale hydropower.

Finding 3 Engineering skills are important, but there is a strong demand for other skills by companies recruiting in the UK hydropower sector.

- Interviewees highlighted that the most sought-after skills for major hydropower projects is **engineering – civil, electrical and mechanical**. This qualitative finding is supported by the quantitative analysis: 93% of hydropower jobs postings required engineering skills as an additional skill (referred to in the dataset as 'other skill').
- Interviewees also emphasised the need for other important 'hard' skills, including **project management, commercial, legal, financial, cybersecurity and climate change**. This is reflected by the quantitative analysis, which shows the demand for a number of these additional skill areas as listed on jobs postings (outlined in the table below):

Other skills required	% of jobs posted (of 1,144 jobs)
Engineering (civil, electrical and mechanical)	93.2%
Project management	75.4%
Communication	56.2%
Renewable energy	35.1%
.Net framework (software development platform)	12.8%
Stakeholder engagement	5.6%
Commercial	5.2%
Financial	4.2%
Climate change	3.9%
Python, data, R	2.2%
Legal support	0.2%

- The **dynamics for skills requirements are also evolving**. Changing geopolitical climates may increase the need for cybersecurity and security skills. Following Russian attacks on Ukrainian energy infrastructure and, in particular, the suspected Russian attack on the Kakhovka Dam in Ukraine in 2023, one interviewee explained that governments across the world are increasingly viewing hydropower plants as 'strategic assets', which is driving the need for cybersecurity and security skills. Several interviewees also stressed the importance of skills and experience related to climate change to enable the UK's hydropower sector to remain resilient to a changing climate and pressures on water resources, as well as ecology, in order to better assess and reduce the impact of existing and future hydropower projects on ecosystems.

- Interviewees also emphasised **the importance of ‘soft’ skills within the hydropower sector, with stakeholder engagement and communication skills viewed as particularly valued**. To illustrate the value of communication, one interviewee stated that: “Hydropower needs good communicators. There is a very limited understanding of what hydropower does within the UK. [...] Where hydropower does very well is when the community feels like they have a voice, they have been listened to, and they have been provided with an asset that leaves them much better than they were before.”
- Interviewees also highlighted the importance of building green skills beyond hydropower developers, operators, maintainers etc. The push to build major renewable energy infrastructure in the UK requires an entire ‘ecosystem’ to be upskilled at the same time: not just those directly employed by renewable energy companies, but also planning and regulation specialists, as well as policymakers. As the UK has not built major hydropower projects in several decades, several interviewees identified a skill gap amongst planning authorities, which risks can slow progress in hydropower development.

Finding 4 There are opportunities for oil and gas sector workers to undergo reskilling as the UK transitions to net zero

- Several interviewees suggested that there are and will continue to be **opportunities for highly skilled oil and gas sector workers to move across into renewable energy, including into the hydropower sector**. Although reskilling would be necessary, interviewees explained that the skills that oil and gas workers have are transferable into a hydropower context to a certain extent. Interviewees indicated that this is not necessarily a straightforward task: the hydropower sector cannot compete with the high salaries of oil and gas companies, so must advocate for the other benefits it may provide, such as a long-term career or the stability of working on one site for a long period of time.
- The quantitative analysis supports the qualitative finding that the hydropower sector is open to hiring workers from the oil and gas sector. Indeed, **8.30% of the 1144 hydropower jobs postings between January and December 2023 were listed in the ‘oil and gas’ category, making this the second-most sought-after job category after ‘engineering’**.
- Oil and gas workers were sought for hydropower roles in the highest numbers in England; 72 of the 89 jobs

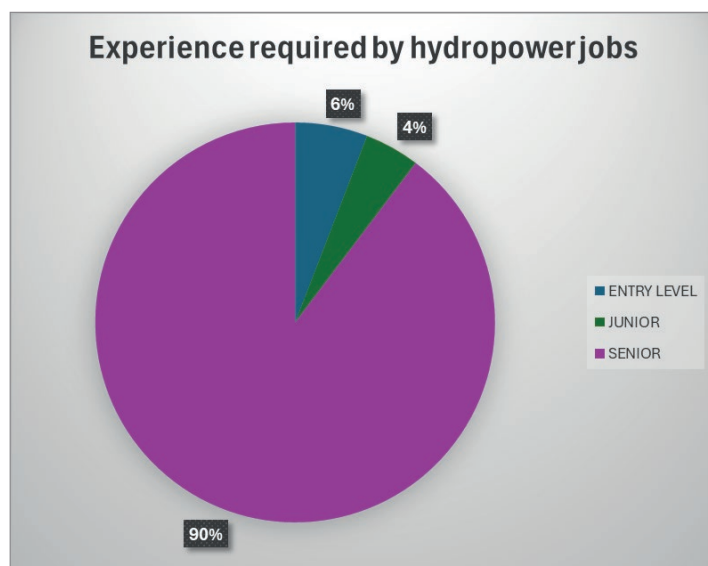
listed in the ‘oil and gas’ category were postings for jobs in England (13 were for jobs in Scotland, 2 for Northern Ireland, 0 for Wales and 2 nationwide or ‘remote’).

Finding 5 The UK hydropower sector is reliant on international expertise, particularly for specialist roles

- Whilst a mix of foreign/domestic workers is common on most major projects, several interviewees suggested that the **UK was heavily reliant on international talent** for developing hydropower projects. As one interviewee explained: the green skills gap “makes things slower... we’re looking for resources, and the only way you can satisfy this is by looking [outside the UK].”
- In cases where **specialist roles are sought, some interviewees felt that the necessary skills might be so scarce in the UK that companies rely exclusively on the international skills market**. One interviewee illustrated this point with the example that all of the geologists working on their project were from continental Europe. Another interviewee gave a striking example: when recruiting for a specialist Supervisory Control and Data Acquisition engineer, the company received 75 applications. Of these, **10 were based in the UK and not a single applicant was a British citizen**.
- Given the additional challenges of hiring European Union workers since Brexit, and visa restrictions in recent years, several interviewees highlighted that hiring international workers has become more challenging and the process is significantly slower than it used to be. This in turn can delay project development.
- Despite the current reliance on international talent, several interviewees argued that the **huge investment – billions of pounds worth – that is possible in the hydropower sector in the coming years could be leveraged as an opportunity to develop skills domestically**. These interviewees suggested that there is an economic risk if the UK does not develop the necessary green skills domestically, since it would lead to (over)reliance on imported skills and would reduce value-add to the national and local economies. Developing domestic skills in hydropower would better enable UK firms and talent to compete for hydropower-related contracts internationally. It would also build a domestic workforce with skills that may be transferable to other major energy infrastructure projects that are likely to take place in the UK in the coming years.

Finding 6 Companies are taking active measures to attract more young talent into the sector, but most jobs require specialist skills and experience

- Most interviewees with expertise in the UK market emphasised the importance of attracting young or new talent to the sector (one interviewee did not mention this). Several of these interviewees indicated that there was a renewed focus on graduate schemes, degree apprentices, apprentices and work experience year-in-industry placement students to bring in a new pipeline of talent. Included in this new pipeline of talent are more women and individuals from minority backgrounds, and several interviewees referenced initiatives to attract a more diverse population into the sector.
- Equally, several interviewees stressed the fact that jobs within the hydropower sector require specialist skills and knowledge that can take years to develop. It is therefore unsurprising that, in the quantitative analysis of the 1144 hydropower jobs postings analysed from January to December 2023, **only 6% required entry-level experience and 4% required junior-level experience**. The other 90% of jobs required senior-level experience, as can be seen in the pie chart below. These figures indicate that there are relatively limited opportunities for young talent to break into the UK's hydropower sector.



Finding 7 Other challenges faced by the hydropower sector exacerbate the existing green skills gap

- The majority of interviewees highlighted that hydropower faces an **awareness gap** – the general public and young professionals are not as aware of hydropower as a potential career (or even that the UK has any hydropower). Several interviewees suggested that this makes it harder for the industry to attract talent.
- Several interviewees mentioned a **generational skills gap** in the UK's hydropower sector and an exodus of skills approaching, as a cohort of highly skilled and experienced engineers retire, taking with them a valuable body of knowledge. Interviewees with experience of the hydropower sector outside the UK observed that this is consistent with trends internationally in the hydropower sector.
- Where interviewees had greater expertise in hydropower markets outside the UK, there was a strong acknowledgement of the challenges the sector faces internationally in attracting young talent. Reasons referenced for this were: a lack of awareness of the sector (e.g. few university courses in UK and abroad teach about hydropower); a preference for other, newer renewable energy technologies like hydrogen or solar; negative perceptions about the environmental impact of large-scale hydropower dams and trepidation about joining an industry with an older and predominantly male workforce.
- The lack of hydropower projects built in recent years also creates issues for green skills shortages. For example, one interviewee stated that small hydro is **not currently financially viable** in the UK. Without small hydro projects going ahead, the interviewee stated that it is hard to maintain and build skills in this field.
- There is also uncertainty over large-scale hydropower plants in part due to the uncertainty in whether they will receive planning consent or the required investment. One interviewee explained that the industry can only invest so much in developing a future domestic workforce (e.g. by partnerships with local universities and colleges) if there is a high degree of certainty that projects will actually go ahead.

Finding 8 There are limitations to the definition of ‘green skills’: this term is widely used in research but is not always the term of choice for industry members

- Some interviewees queried the term ‘green skills’ since it is not precise or consistently defined. In a broader sense, several interviewees acknowledged that there is a **skills gap within the renewables sector** and, in the UK more generally, a shortage of technically skilled and experienced individuals. Several interviewees spoke about the need to be **more precise in policy definitions of ‘green skills’**. Several interviewees felt that the term ‘green skills’ is more useful as a political tool or research definition to promote policy initiatives and draw public and private sector interest to the development of the green energy workforce.
- One interviewee explained that using a catch-all term like ‘green skills’ helps to frame the narrative around the need for specialised skills in new and emerging sectors, such as pumped storage hydropower. This is because the majority of skills required by large-scale hydropower projects are not unique to hydropower, but rather may be transferable to other renewable energy contexts; industries such as hydropower, wind, and solar all require core technical skills like those of mechanics and electricians. The underlying challenge – namely, to attract skilled workers to these sectors – remains whatever term is used.
- Another interviewee argued that the idea of ‘skills gap’ more generally is a philosophical one, in that even if the skills needed to sustain the UK’s hydropower sector do not exist in the necessary volume in the UK – especially if planned pumped storage hydropower projects proceed – these skills *do* exist internationally. If the demand is there, the workers will be brought across to the UK. However, this does raise questions around project delays (e.g. caused by foreign workers facing delays getting visas approved) and the increased project costs associated with relocating workers.

Chapter 4 Conclusion and policy recommendations

This study supports the wider research suggesting that there is a green skills gap in the UK. As has been argued in research into other renewable energy technologies, this green skills gap also has implications for the UK's hydropower sector. Whilst further research is necessary to fully understand these implications, this study highlights key findings and policy recommendations for consideration by policymakers and industry leaders.

Recommendation 1 Stakeholders acting in the hydropower sector should support further research into the green skills gap

As outlined in the literature review, there is a lack of research into the UK green skills gap and how it impacts the UK's hydropower sector. Interviewees acknowledged the skills shortage faced by the sector in the UK and internationally, but collecting and analysing more workforce and skills data is crucial for better understanding the current landscape and making predictions on future needs. Accurate data and further research would help identify pressing gaps in skills, forecast retirement and recruitment trends, and develop targeted strategies to address these skills gap issues. A particular research focus should be given to issues of underrepresentation by women and individuals from minority backgrounds in the UK's hydropower sector, as this appears absent from research, but widely acknowledged by interviewees as a problem. Without this data, efforts to attract and retain skilled and more diverse talent may be misguided. Additionally, further research in this area would draw greater attention to this issue and enable policymakers to make more informed policy decisions. As suggested by several interviewees, trade associations, industry leaders and local, devolved or national Governments could act as convening forces to promote a more joined up approach to tackling the green skills gap.

Recommendation 2 Collaboration between industry, government and other stakeholders is crucial to tackle the green skills gap

Several interviewees expressed that neither industry nor government could work in isolation to tackle the issue of a green skills shortage in the UK, since this is a system-wide issue that will necessitate efforts from educational institutions, industry members, trade associations etcetera, as well as local, devolved and national governments. Whilst lessons can be learned and shared between renewable energy technologies, one interviewee stressed that customised approaches

to skills development should be taken for these different technologies, in recognition of the fact that any one-size-fits-all policy initiative may not effectively address the diverse skill requirements of different sectors within the renewable energy industry. As skills policy is devolved in the UK and there will be a different supply and demand of green skills across the country, initiatives should be tailored to specific needs of the UK nation or region in which they are implemented. Regardless of the location of potential initiatives, special effort should be made to attract a more diverse pool of workers into the hydropower sector, including more women and individuals from minority backgrounds.

Interviewees suggested a number of possible initiatives led by industry, government, or both, including:

- **Assisting highly skilled oil and gas workers looking to move out of this industry and into renewable energy sectors, such as hydropower.** This would involve more clearly signposting of jobs and pathways to reskill, as well as supporting workers or companies with reskilling (e.g. financial incentives to reskill or accelerated reskilling pathways). Facilitating this movement of skilled workers between sectors would result in a more just green transition that protects domestic jobs.
- **Ensuring pathways for careers in hydropower are more clearly signposted, so that young workers looking for careers in this sector are aware of the possible career opportunities.** The United States Department of Energy ([Water Power Technologies Office, 2024](#)) has developed a career pathway tool that clearly sets out the various routes into the hydropower sector, including the qualifications required and the possible roles available. Although the UK market is much smaller than the US market, a similar tool could be developed for the UK context.
- **Strengthening ties between industry and educational institutions.** With a small number of exceptions, hydropower is not taught in UK university courses. As awareness of hydropower in the UK is already low (according to interviewees), this further minimises the number of young people who are engaged in this sector. Developing more university courses that focus on hydropower (e.g. such as the University of Aberdeen's Geothermal and Hydro Energy course [[2024](#)]) and increasing research collaboration between universities and companies (e.g. through partnerships such as that between Statkraft and the University of the Highlands and Islands [[UHI, 2023](#)]), represent valuable opportunities to strengthen these ties. Equally, work could be done to raise awareness of the sector prior to university, for example, by boosting partnerships with technical colleges to provide work experience placements and developing knowledge of hydropower in

local schools (e.g. such as Drax Group's partnership with the Glasgow Science Centre to develop STEM programmes for primary and secondary schools [Ingram, 2023]). These early interventions offer companies an outreach opportunity to engage women and individuals from minority backgrounds at an early stage of their education or career.

Further work would be needed to flesh out these high-level ideas (or to seek other avenues to build green skill capability) and to determine which stakeholders are best placed to lead these initiatives.

Recommendation 3 Action is needed to ensure that the domestic workforce benefits from the UK hydropower sector's demand for green skills

As previously addressed, companies active within the UK hydropower sector are heavily reliant on international skilled workers, a current trend which several interviewees predicted will continue into the future. According to several interviewees, this reliance on international skilled workers creates additional pressures when mobilising a workforce for a project.

Heightened visa requirements – especially for EU nationals – requires companies to invest more time and resource into filling out paperwork and can lead to delays in skilled workers starting their jobs. In a broader sense, interviewees stressed that failing to develop skills domestically could mean that the UK does not fully capitalise on the benefits that significant investment in the hydropower sector will bring to the country. Namely, the UK's domestic workforce will have more limited access to the opportunities to develop green skills within the hydropower sector. Equally, interviewees flagged that there are no quick fixes to the UK's skills shortage. The skills the hydropower sector needs are often specialist, technical and may take a long time to develop. Thus, any initiatives to bolster green skills in the UK's domestic workforce or to prioritise recruiting UK workers over international specialists must be balanced with the immediate needs of the project.

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The Open Innovation Team is a cross-government unit that works with experts to generate analysis and ideas for policy. [The fellowship](#) enables officials to access support using quantitative social science data and analysis to answer a specific policy question. Fellows propose a question they would like to research, and they receive guidance and mentorship from world-leading quantitative social scientists based at MiSoC.

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Please note, this research paper does not reflect official UK Government policy.

MiSoC Policy Fellows scheme

MiSoC policy fellowships – bringing government researchers into work alongside MiSoC's experts to investigate key evidence gaps to support better policy making – were established after a successful pilot programme in partnership with HM Government Open Innovation Team. The first three policy fellowships were:

- Vasileios Antonopoulos, an Economic Advisor in the Race Disparity Unit worked with Professor Renee Luthra and MiSoC Research Assistant Jonas Kaufman to research a number of action points detailed in *Inclusive Britain*, the government's response to the Commission on Race and Ethnic Disparities. His [analysis summary](#), was published in April 2023 as part of a package of [updates](#), a year after the publication of *Inclusive Britain*.
- Peter Jelfs, Head of Tax, Investment Directorate, Department for Business and Trade, worked with Dr Angus Holford to investigate labour market contributions of UK and foreign-born PhD holders, and the implications for visa, immigration and tax policy, Read our MiSoC Explainer summarising their findings [here](#).
- Sam Denson, Health Economist with the UK Health Security Agency has worked with Dr Paul Fisher, supported by ISER PhD student Steven Haworth, to look at existing evidence about the impact of the cost of living crisis on mental and physical health inequalities with a view to informing a White Paper on Health Inequalities which is in preparation.

The MiSoC Policy Fellow scheme was devised as a mechanism to share MiSoC's expertise in policy-relevant research and analysis of large data sets, with individual government researchers working in a similar area. MiSoC partnered with the UK Government's Open Innovation Team to identify and match researchers in government departments with academics.

The MiSoC Policy Fellow Scheme provides academic mentoring and research assistance and MiSoC plans to extend its support to other non-government organisations with researchers looking at policy issues, such as thinktanks and the third sector.

