



FUTURE SKILLS ASSESSMENT FOR THE TRANSPORT SECTOR

JULY 2024

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Introduction

This report has been developed to provide the Department for Transport (DfT) with an overview of the workforce in the transport sector in the UK. It examines the challenges that are facing the sector given workforce demography, sector diversity, the UK's legally binding net zero mandate and the impact of new technology and digitalisation on the sector.

The report looks principally to 2030 and considers what will influence future skills and labour across the UK transport sector, taking into account not only net zero considerations and technology improvements but also the desire to improve productivity. It also looks at the key issues facing the sector, in terms of attracting, training and recruiting its workforce, as well as the increasing importance of measuring social value.

The analysis looks at both future workforce predictions (which is more quantitative) and future skills requirements (which is more qualitative). Limitations in data availability and detail have made it difficult to be precise about the volume of future skills in numerical terms.



Executive Summary

The gross value added (GVA) of the transportation and storage sector in the United Kingdom amounted to approximately £67.8 billion in 2023. This was down slightly on the value of around £68.7 billion in the year prior, but a significant recovery from the mark of around £55.4 billion in 2020[1]. It plays a crucial role in supporting trade, tourism, and overall economic growth.

Whilst the predominance of the data has been sourced from the Office for National Statistics (ONS), there remains a challenge to encompass all activities undertaken in the Transport sector. Activities such as policy setting, strategy, design, construction and wider supply chain engagement cannot be included in their entirety because of their cross sectoral nature. Further data gathering around these specific areas would enhance the accuracy of the future predictions.

The continued and future success of the UK transport sector is contingent upon a skilled workforce capable of navigating the complexities of evolving technologies, sustainability imperatives, and global trends. However it is important to note that there is not a one size fits all approach across the sector. Each of the modes have their own nuances and specific requirements, particularly when it comes to skills and training. Adopting a singular approach would be too simplistic - for example it takes between 12 and 18 months to train a train driver whilst a bus driver can be trained in eight weeks.

Current Sector Demographics

The transport sector employs 2,517,000 people, with approximately 45,000 (current) vacancies as of June 2024[2][3]. This figure is according to ONS statistics. It is important to note that the data structure has significant limitations for the transport sector - the sector tends to have reasonably good data on operational transport roles but does not include the full range of transport professionals engaged to deliver policy, strategy, design - or the full extent of transport-related construction, as these people are captured in other ONS categories.

The sector remains male dominated at 80% to 20% female compared to a working age UK population of 49% male to 51% female[4].

There is an ageing workforce issue across most modes in the sector, particularly in those occupations in operational activities such as driving or control.

The sector broadly represents the ethnicity of the UK working population, with a proportion of 82% white compared to a working age UK population proportion of 81% white[4].

Future workforce predictions

There are challenges within the dataset available to us that have limited our ability to accurately predict future workforce levels - the majority of demographic data has been taken from the ONS, barring those modes where more mature data was available. As a result, this report focuses more upon workforce assessment rather than predictions. The skills required for the future technologies and net zero can be reasonably well defined, but it is difficult to predict the volume and scale required.

As a result of this lack of data maturity, a number of figures in this report have been generated through the combination of multiple sources, some of which differ in their geography. The figures represent an estimate from the periods of time identified within the sources, and should be treated as such.

Analysis in this report is at SOC code level. There are two main reasons for this - firstly, it allows for a greater level of specificity when making projections - future demand, particularly for replacement, is identified for specific roles within each mode. Additionally, using alternative data such as that for SIC codes could create issues as a number of SIC codes overlap between modes, making it difficult to give an individual assessment for each.

The analysis shows that we will have a shortfall of between 409,000 and 618,000 workers by 2030, as a result primarily of predicted retirement levels, the introduction of new technologies and the impact of net zero and decarbonisation on the sector.

The current data set available to us limits our ability to accurately predict the volume of key skills required in the future, but we do know that the twin impacts of new software and computing technologies as well as the initiatives driven by net zero and decarbonisation activities are already significantly shaping and will continue to shape the future skills base of our workforce.

The impacts of new technologies and net zero have largely necessitated an increase in the workforce numbers to 2030, although longer term these technologies may diminish the workforce numbers, particularly in administrative and support function roles. However, it is important to acknowledge that technology comes in unpredictable waves and the impact on demand for labour may also be unpredictable as a result.

Predictions have been made for the retirement levels within each of the modes, but it should be acknowledged that it is very difficult to point to a single figure with certainty given the possibility of employees in different roles retiring at different ages. As a result, confidence intervals for the retirement levels within each mode have been generated through the use of a normal distribution. The predicted number of retirees by 2030 has been modelled with a normal distribution for retirement age with mean 65 and standard deviation two. For the lower and upper confidence intervals, normal distributions with means 67 and 63 respectively were used, both also with standard deviation of two.

This scenario modelling allows for a more informed approach to retirement to be taken, with an understanding that there is no single retirement age that will be seen across all transport modes. The range between the upper and lower confidence intervals is comfortably less than 10% of the identified workforce, meaning that strong insight can be provided as to what to expect in the coming years with regards to retirement.

The analysis predicts just shy of 350,000 transport sector employees to have retired by 2030. The confidence interval expands this expected range to between 251,000 and 460,000 employees, potentially representing close to 20% of the workforce in the period to 2030 at the upper end of the range.

The current supply demand was reached by taking the current supply value of 2,517,000 and adding the vacancy number of 45,000[2][3] to reach 2,562,000.

New technologies will carry an additional demand of 62,000 new roles by 2030, over and above what already exists in the sector.

Research from the Green Alliance in 2022[5] suggested that the UK transport sector would need an additional 175,000 employees by 2035 as a result of newly emerging demands from net zero. This figure was adjusted to both reflect the period being covered in this report, and also that some of the new roles would be in areas such as vehicle manufacturing, which were not covered in this report. As a result, by 2030, it is estimated that 51,000 new roles will be required due to these new demands.

The lower end of the range of available supply in 2030 was reached by taking the highest retiree figure in the range (460,000) away from the current workforce size (2,517,000), and the higher value was calculated through taking the lower range of retirees (251,000) away from the current workforce.

The 2030 demand takes the current demand and adds on the additional demand for technology and net zero related roles as identified (2,562,000 + 62,000 + 51,000).

The upper end of the projected shortfall is calculated by subtracting the minimum supply available in 2030 from the projected demand (2,675,000 - 2,057,000) and the lower end is calculated through taking the maximum supply available from the projected demand (2,675,000 - 2,266,000) to give a range of 409,000 - 618,000.

Figure 1 shows the summary position across the transport sector. As outlined, the lack in depth of workforce data around the sector means that these figures are a projection of current and future demand and are merely indicative of how the situation may look at the end the period to 2030.

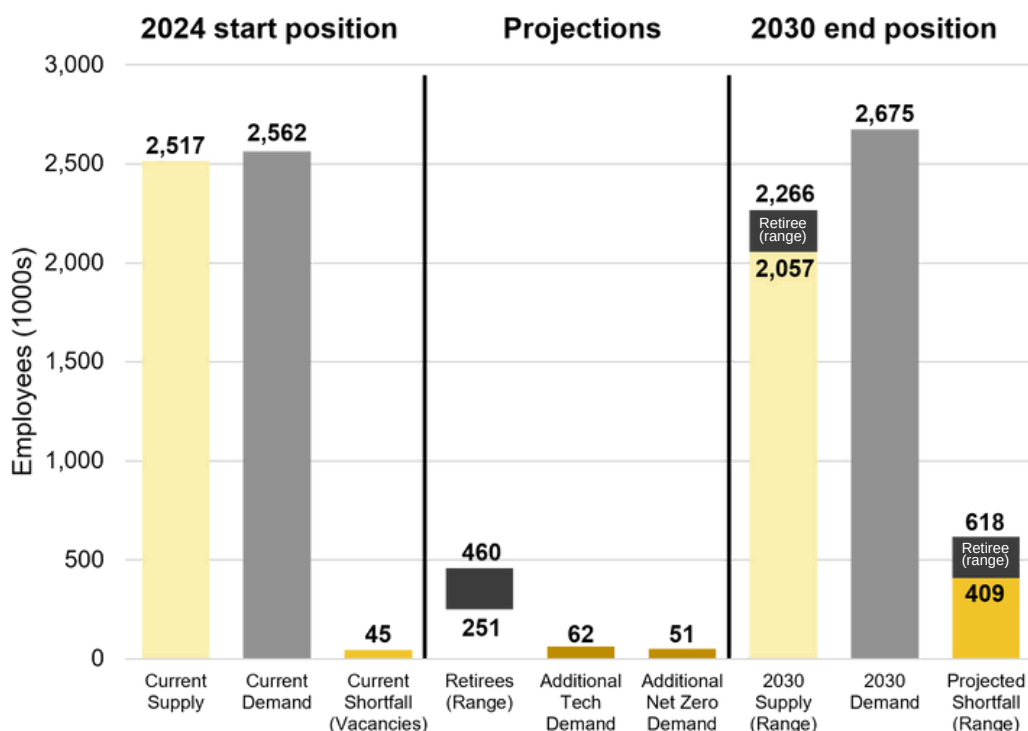


Figure 1 Prediction of workforce shortfall in 2030

Additionally, it is estimated that a further 85,000 existing transport employees currently working predominantly in maintenance areas will have to undergo either up- or re-skilling in order to continue in their roles, adapting to new demands such as changes in vehicles or fuels.

Future Skills predictions

Forecasting future skills is not the same as headcount modelling. The numerical analysis has focused on the headcount modelling whereas the forecasting of future skills is much more subjective.

By 2030, as much of the workforce demand will come from replacement of many current roles, rather than the creation of completely new roles, the real focus should be on the way the sector upskills and reskills its workforce. This will include skills associated with technological advancements in addition to those designed to support decarbonisation towards net zero, climate resilience and similar.

Many of the technology skills predicted to be required in the future are common across modes: skills in areas such as data analytics, data science, software development, AI and machine learning, predictive maintenance, cybersecurity and autonomous vehicle technologies.

A recent Decarbonising Transport [6] report suggests that the transition will affect workers in one of three ways: reskilling, where a lot of the existing workforce keep their roles but find more sustainable ways of working; legacy roles will be lost, especially in roles that rely heavily on fossil fuels, and new “green roles” will be created to enable or support green activities.

Data indicates there is a disparity between the proportion of the transport workforce that is young, female and/or from an ethnic minority background compared to the wider UK workforce. Government and industry are undertaking activities to attract the next generation of talent, showcasing the opportunities across modes and the sector's desire to recruit more people from these under-represented groups.

Data quality on the workforce, however, is variable across different transport modes and reflects the uncertainty around future workforce predictions.

Training remains very modal focused currently, often for good reasons given the specificity of the skills required particularly where there are international regulations in place (e.g. maritime). Notwithstanding this, there are common skills (such as leadership and management, commercial, procurement and project management) that are consistently required across all modes. The development and deployment of a transport wide training directory, covering key cross sector skills such as leadership, operational management, data analytics, cyber security and commercial acumen would help.

The impact of social value can support the sector with a key focus on using local labour to support recruitment requirements.

The key points of the Social Value Act 2012 mandate all UK contracting authorities (not limited to central government) to consider how procurement can improve social, environmental and economic well-being.

It requires pre-tender evaluation of these objectives. However, this obligation to consider may not yield meaningful results without stricter requirements. Notwithstanding this, the Procurement Policy Note (PPN) 06/20 launched a new model to deliver social value through government's commercial activities and makes social value a mandatory consideration in central government procurement. Social value must now be explicitly evaluated, not just considered.

In summary, PPN 06/20 strengthens the obligation to assess social value, going beyond the Social Value Act 2012's initial requirements. It emphasises meaningful impact in government contracts and will support the sector's ability to improve social, environmental and economic well-being.

Recommendations

Recognising this, we have presented six recommendations for action to improve the future skills situation in the UK Transport sector over the next five years:

✓ Upgrade sector level workforce and skills data –

The analysis in this report is limited by the available datasets that do not match the real-world boundaries of roles in the transport sector. To address this, a revised methodology should be created that takes full account of the current roles that exist within the transport sector and its relevant systems, from strategic planning and policy, through scheme construction, operation, asset management, systems enhancement, to end-of-life decommissioning.

✓ Co-ordinated, high quality sector attraction –

Designed to attract new entrants to the sector, and to share intelligence on modal opportunities such that those who express an interest in transport are not lost;

✓ More collaboration between modes –

The modes of the transport sector currently operate in a strongly siloed way, which limits whole sector effort. The rise of digital systems and the climate crisis now require an integrated approach to bring the transport modes together, including active travel, bus, rail, road, aviation and maritime.

✓ Encourage more apprenticeships –

To support key areas such as gender imbalances, ethnicity imbalances and the importance of social value in getting apprentices and other workers from disadvantaged backgrounds into gainful programmes of training and employment;

✓ Driving investment in green jobs and skills –

There needs to be strong alignment between the investment in and future demand for skills, recognising that the specific skills mix needed in each mode, including in terms of both overall volumes and skills blend, will likely continue to change as the transition to net zero gathers pace; and

✓ Promotion of digital skills –

By implementing up- and re-skilling programs to enhance digital literacy and data analytics skills for professionals across the transport sector. This includes upskilling existing workers and integrating digital skills into educational curricula. In addition, skills such as cybersecurity or predictive maintenance will be common across all modes, and again, the need is to collaborate and not compete.

The successful execution of these recommendations will help to position the UK transport sector at the forefront of global innovation and sustainability. By prioritising skills development, fostering collaboration, and embracing emerging technologies, the sector can build a resilient and adaptable workforce prepared for the challenges and opportunities of the next five years.



The Transport Sector

Transport Today

The total amount of workers within the transport sector is 2,517,000 people. The source for each figure is listed within the modal sections of the report. Whilst the predominance of the data has been sourced from the ONS, there remains a challenge to encompass all activities undertaken in the Transport sector. Activities such as policy setting, strategy, design, construction and wider supply chain engagement cannot be included in their entirety because of their cross sectoral nature.

Mode	Workforce (rounded to nearest thousand)
Aviation	250
Bus	123
Freight & Logistics	1,377
Maritime	227
Rail	243
Road	297
Current Supply	2,517
Vacancies	45
Current Demand	2,562

Table 1 Workforce summary by mode

The workforce numbers include those directly employed within the sector, and we also recognise there may be some occupations, such as strategy development, policy setting, design and construction roles, that span transport and other sectors. Where we have relevant numbers these are included but it is likely that some occupations will not have been included because of their utilisation over multiple sectors.

The vacancy shortfall of around 45,000 was calculated from the UK's current number of people employed in Transport and Storage according to ONS Labour Market data[2] (1,952,000) and the estimated number of vacancies in the UK (35,000) according to the most recent data[3]. With these figures, a ratio of employees per vacancy (working out at approximately 56) was calculated and then applied to the current workforce size to generate a number of vacancies within the modes. Whilst it is not modal specific, it does provide an overview for the sector and can be treated as a minimum given the aforementioned data shortcomings.

The gender and ethnicity splits of the overall workforce in transport can be seen in Figure 2 and Figure 3.

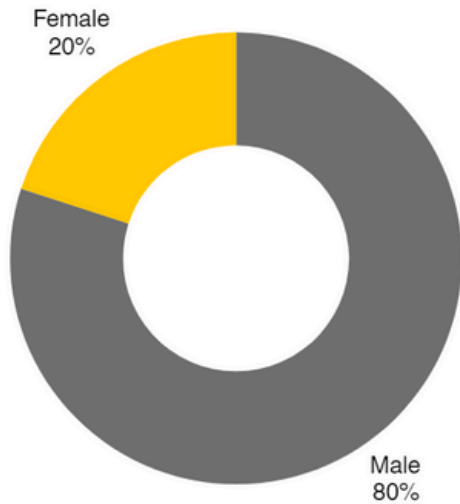


Figure 2 Workforce Gender spread

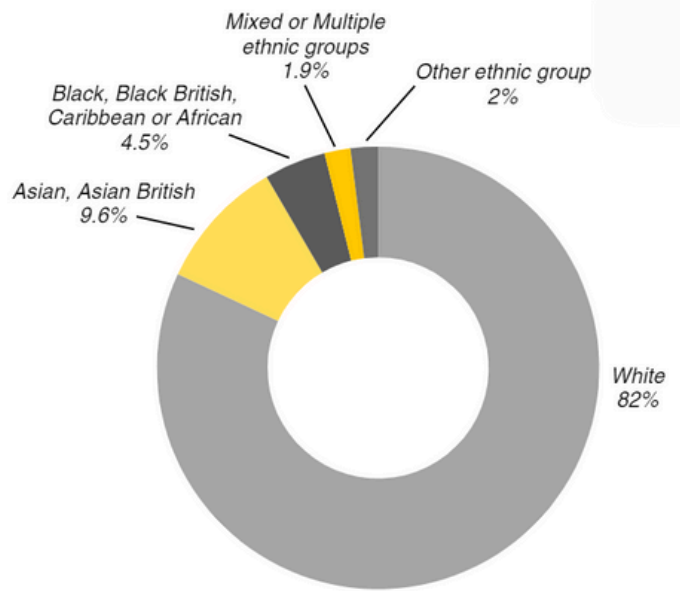


Figure 3 Workforce Ethnicity spread

The sector compares similarly against the UK working age population[4], as shown in Table 2.

	Transport sector	UK working age population
White	82%	81%
Asian, Asian British or Asian Welsh	10%	10%
Black, Black British, Black Welsh, Caribbean or African	4%	4%
Mixed or Multiple ethnic groups	2%	3%
Other ethnic group	2%	2%

Table 2 Transport Ethnicity vs overall workforce ethnicity

The regional split of the transport workforce can be seen in Figure 4.



Figure 4 Regional Workforce Spread

An observed pattern across all of the transport modes is the natural link that arises when analysing the workforce by age and gender. In each mode, the female proportion in younger sections of the workforce is significantly higher than those in age categories covering higher ages. This disparity is most pronounced in Aviation, where the female proportion in those aged 16-24 is 52.5%, whereas the female proportion in those aged 65 and over is nearly 30 percentage points lower at 23.0%. The female proportions for each of the modes by age category[7] is illustrated below in Figure 5:

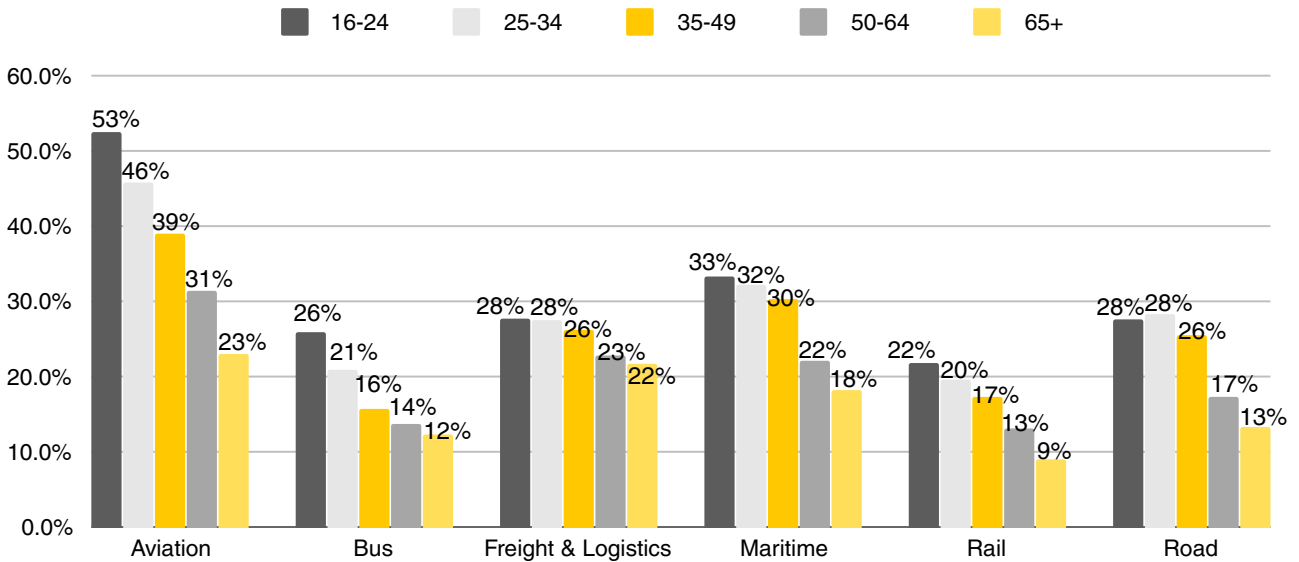


Figure 5 Female proportion by age by mode

Specific modal data including size of current workforce, gender and ethnicity demographics, age profiles and regional variations can be seen in each modal section. An overview of these demographics can be seen below:

	Average Age	Female %	Ethnic Minority Group (EMG) %
Aviation	44.8	39%	19%
Bus	42.8	16%	25%
Freight & Logistics	42.2	15%	20%
Maritime	46.6	28%	12%
Rail	43.9	16%	12%
Road	43.6	23%	14%

Table 3 Average age and ethnicity by mode

Additional data on other workforce demographics such as disability would help paint a more fulsome picture, however the lack of available and useable data prohibits this.

Predictions have been made for the retirement levels within each of the modes as can be seen in Table 4. The methodology to calculate retirement levels has been outlined previously, starting on page 4.

Mode	Today	Vacancies	Retirees (lower range)	Retirees (predicted)	Retirees (upper range)
Aviation	250	5	19	28	39
Bus	123	2	18	25	31
Freight & Logistics	1,377	25	122	167	231
Maritime	227	4	29	39	49
Rail	243	4	33	44	55
Road	297	5	30	41	55
TOTALS	2,517	45	251	344	460

Table 4 Modal position on workforce retirement predictions in 2030

Progress made in Transport

In each modal section, we document some of the many initiatives that are underway to combat some of the challenges each mode faces, whether it's an ageing workforce, diversity imbalances or a desire to recruit a younger cohort into the sector.

However, each mode has its own specific requirements and needs, based upon the role of the public and private sector, including aspects of international involvement too. Some, like rail and roads, have a strong public sector involvement in the major employers and strategic direction of the mode whereas others, such as freight and logistics and buses are more private sector driven. Aviation and maritime are more internationally focused and accordingly have further differences in approach.

There are some very good examples though of how focused regulation and public sector policy can lead to positive outcomes. One such example is in rail, where there is a requirement in the contracts for train operators to have 2.5% of their workforce on an Apprenticeship scheme at any one time, leading to an increased use of the Train Driver Apprenticeship scheme amongst others. Using public sector procurement mandates to drive positive change on skills should be applauded, encouraged and deployed.



Transport 2030

In many respects, the short term is driven primarily by the need to replace those workers retiring or leaving the sector - which could be up to 464,000 by 2030. In addition, demand for new roles could be up to 182,000 workers.

The ageing workforce issue drives current and short term future recruitment levels. Businesses and modes must continue to operate and maintain and therefore need to replace those workers leaving the sector. This is being undertaken through initiatives such as Routes into Rail, Generation Aviation and Generation Logistics to name but three.

However this is only part of the story. Building blocks for future net zero or digital technology solutions must be put in place now if we are going to succeed in five years time.

In addition to the replacement of workers into existing roles, predicting specific skills shortages in transport has proven to be very challenging, but several trends and advancements suggest that certain skills may be in demand in the coming years.

More technology roles will arise as a result of new AI, data analytics and the impact of predictive software. Deloitte[8] believe that technology roles will grow at an additional 2.2% a year, so by the time we reach 2030, nearly 5% of roles will be in technology in every sector.

Some potential areas of new skill shortages in each mode of transport will include:

-
- **Automatic Vehicle Technology;**
 - **Data Analytics and Artificial Intelligence (AI);**
 - **Cybersecurity**
 - **Predictive maintenance**
 - **Transport system decarbonisation and carbon management expertise**
 - **Climate resilience and asset management skills, in particular for places and linear transport infrastructure**
 - **Circular economy for transport systems within the built environment**
-

In addition, while some traditional roles may decline due to automation, new opportunities will arise. The roles most likely to be affected will be in administrative or 'back office' roles, although it will clearly take time to embed new systems, processes and policies in employing organisations. The transport sector must continue to focus on talent management, reskilling, and embracing technological change to thrive in the evolving landscape.

Further afield, beyond 2030, the following skillsets are likely to be more in demand, in addition to those already listed above:

-
- **Artificial Intelligence (AI) and Machine Learning;**
 - **Digital Twin Technology**
 - **Blockchain Applications;**
 - **Human-Machine Interaction; and**
 - **3D Printing and Additive Manufacturing;**
-

Apprenticeships are one of the answers to the challenge, in addition to upskilling and reskilling the existing workforce. Considering the amount of new roles that will be created to meet the skills demand, apprentices can commence their careers from a young age, and can be ready to meet the skills and experience requirements to attain such positions.

Furthermore, the transport sector should work with adjacent sectors to share knowledge, skills and ideas, while also reskilling and upskilling the existing workforce to achieve a smooth transition. Of course, apprenticeships are not just for the younger generation and can be used across all ages in the workforce.



Aviation

Aviation Today

Work from York Aviation in 2021 in conjunction with Heathrow Airport, Manchester Airport and TUI suggests that, as a conservative estimate, the aviation industry directly supports around 536,000 workers with 286,000 in the supply chain, leaving 250,000 directly employed in airlines, airports & other aviation support activities, and aerospace and maintenance, repair and overhaul activities in Great Britain [9].

Data suggests that the sector is the most gender-diverse amongst modes, with a 39% female workforce as can be seen in Figure 6 [10]. This reflects the operational nature of the data with areas such as cabin crew having significant female representation. There is a huge focus in the skills programme on increasing female representation in aviation in other roles. The data for the chart comes from the ONS SIC (Standard Industrial Classification) code, looking solely at the air transport sector rather than wider data used for the workforce numbers in the York Aviation report, as there is no directly relevant SIC code for the other elements.

The ethnicity profile of the workforce is shown in Figure 7 [11].

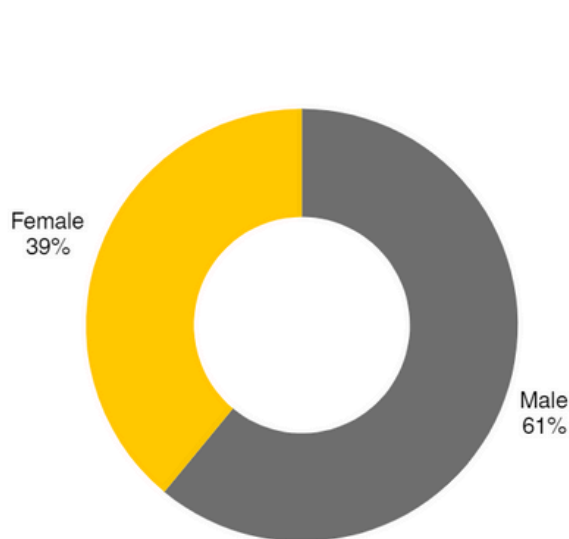


Figure 6 Aviation Gender split

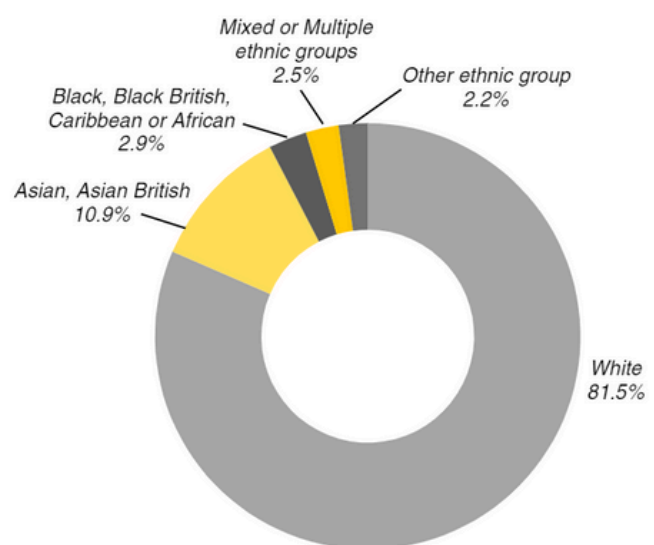


Figure 7 Aviation Ethnicity split

The regional analysis of these roles shown in Figure 8 [9] that the largest portion of the workforce is based in London and the South East, with close to 100,000 aviation employees between the two regions. It also shows the aforementioned wide spread of roles across the country, with each region having at least 2% of the workforce and at least 5,000 employees. Data was not available for Northern Ireland, and as a result this was not included in this analysis.

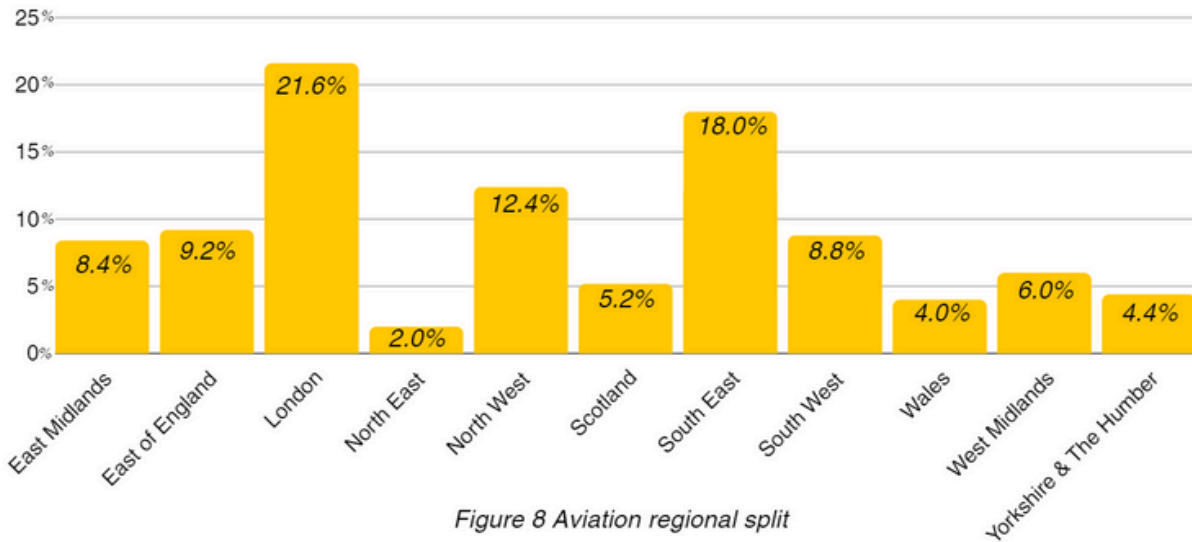
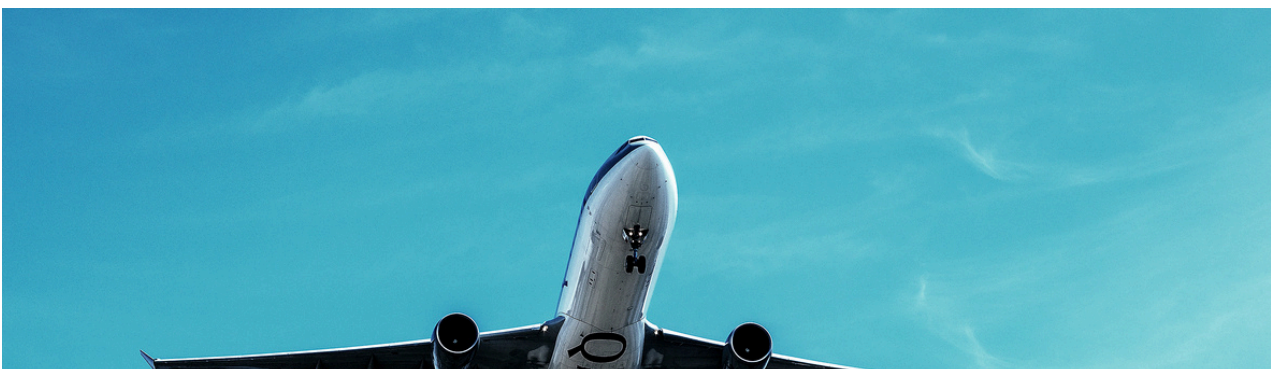


Figure 8 Aviation regional split

Using the UK’s SOC2020 classifications, occupations have been identified that match the given mode. Those occupations, their numbers and the female percentage have been taken from the Annual Population Survey data covering the time period Jan 2023 – Dec 2023[12] – as shown in Table 5. This does not cover the entire workforce of the mode.

SOC Description	Employees (thousand)	Female %
Aircraft pilots and air traffic controllers	36	#
Aircraft maintenance and related trades	35	#
Air travel assistants	41	73%
Air transport operatives	10	#

Table 5 Specific Aviation SOC analyses - by number and gender
- these figures are suppressed as statistically unreliable



Using the UK’s SOC2020 classifications, occupations have been identified that match the given mode. Those occupations, their average age and percentage over 50 have been taken from the Census data from March 2021[13] – as shown in Table 6. This does not cover the entire workforce of the mode.

SOC Description	Average Age	% Aged >=50
Aircraft pilots and air traffic controllers	43.0	33%
Aircraft maintenance and related trades	40.5	32%
Air travel assistants	38.1	21%
Air transport operatives	42.6	36%

Table 6 Specific Aviation SOC analyses - by age

Progress made in Aviation

Across the mode, many initiatives are taking place to try and attract new talent into the workforce. In 2022 the combined efforts of DfT and industry launched Generation Aviation, a campaign to encourage people to consider a career in the aviation sector, which formed part of the previous Government’s 22 point plan[14], with the aim of helping the Aviation sector recover after the pandemic, which in turn forms part of the wider “Flightpath to the future” aviation strategy[15].

One of the ways the campaign is raising awareness of the sector is through the “Reach for the Sky Challenge Fund” which funds outreach programs to attract young people from different backgrounds and showcase the opportunities in the aviation sector.

Finally, ten new “Aviation Ambassadors” was appointed in January 2024, serving as inspirational representatives of the aviation sector and its wide range of opportunities.

Reducing barriers to entry, Government working closely with industry, and pushing the attractiveness of the mode to the younger generation are seen as the way forward. While roles such as pilots and flight crew remain popular, more focus is needed on building awareness of other roles such as technicians and air traffic controllers.

The World Aviation Festival suggested that aviation is seen as a less desirable industry now with younger, more climate conscious generations more likely to avoid industries they see as polluting. However, it is possible that the activities being invested in by the DfT to support the transition to zero emissions flight would be used as a part of a campaign to counter this[16].

In 2023, a new apprenticeship standard in the aviation industry was approved: aviation flight operations coordinator. This follows the introduction of two new standards in 2021: aviation customer service operative and ground handler. These provide an entry to the aviation sector and provide key knowledge to ensure progression in the future.

In addition, over 1,000 companies have committed to “The 5% Club”[17] which pledges to have 5% of their overall UK headcount on a formalised apprentice, sponsored student and / or graduate program.



Aviation in 2030

The aviation sector in 2030 will be greener, more efficient, and technologically advanced, with a strong focus on sustainability and passenger wellbeing. Advances include:

Sustainable Aviation Fuel (SAF): SAF refers to advanced fuels obtained from sustainable feedstocks that can be easily blended with conventional jet fuel and is one of the key technologies available to decarbonise aviation. In 2023, 0.2% of global aviation fuel was SAF and this percentage is projected to increase in the years to come. The SAF industry is estimated to boost the UK economy by £1.8 billion and create over 10,000 jobs[18].

Decarbonisation targets: The global industry have adopted net zero emissions by 2050 as their long-term aspirational goal, and have agreed a target to reduce emissions from global aviation fuel by 5% by 2030[19]. This transition will accelerate as sustainable aviation fuels, carbon removal, and new low-carbon technologies (such as electric and hydrogen-powered aircraft) become mainstream.

Technological advancements: Automation, digitalisation, and data analytics will reshape aviation operations, especially showcasing innovations in ground handling, maintenance, and customer experience.

Electric and Hydrogen-Powered Aircraft: By 2030, we may well witness more electric and hydrogen-powered planes. These technologies aim to reduce emissions and enhance efficiency.

Urban Air Mobility (UAM): UAM, including air taxis and drones, will evolve. By 2030, we might see urban skies with electric vertical take-off and landing (eVTOL) vehicles.

Improved passenger experience: Technology will enhance in-flight entertainment, connectivity, and personalised services that will deliver smoother travel experiences.

Sustainable infrastructure: Airports will invest in green infrastructure, such as solar panels, energy-efficient terminals, and carbon-neutral facilities.

Resilience and crisis preparedness: The sector continues to build strong links to work as an eco-system, focussing on resilience to support passenger journeys.

For each of the roles listed above in Table 5, those employees aged 60 and over have been identified as employees whose skills will likely need to be replaced in the period between today and 2030, and thus the number of potential retirees in this period is seen in Table 7[12][13]. It should be noted that these figures are an estimate based upon data from multiple sources and do not account for profession-specific retirement behaviour.

SOC Description	Employees (thousands)	% Aged >=60	Predicted Retirees (thousands)
Aircraft pilots and air traffic controllers	36	8%	3
Aircraft maintenance and related trades	35	9%	3
Air travel assistants	41	4%	2
Air transport operatives	10	11%	1

Table 7 Specific Aviation SOC analyses - by number and gender

Further research demonstrates the need for new jobs, new skills in digitising and automation and new skills in sustainable technologies.

According to the Green Jobs Taskforce Report[20], the aviation sector will have greater reliance on digitisation and automation in industrial systems and integration. This means that the best course of action, is to upskill the workforce in digital skills, systems engineering, programme management and leadership.

The Aerospace Technology Institute estimates that, with the expected increase in investment in new technologies to decarbonise aviation and to meet the increase in global passenger demand, there will be a need for many new skills in the sector, including a proportion of specialist roles[21]. To achieve a green aviation industry, skills pertaining to the development of sustainable aviation fuels, green aerospace engineers, hydrogen electrolysis engineers and green propulsion specialists are essential. By 2030, this works out to be 16% of the aviation workforce needing to be reskilled to fit the demand.

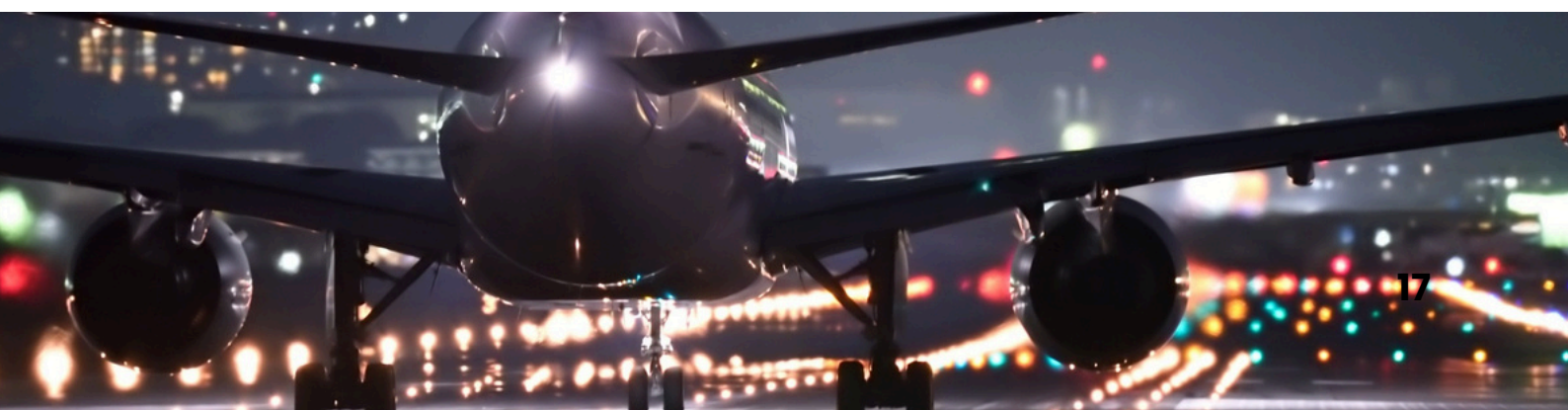
In terms of additional, future skills required, the following skills are also likely to be in demand in the next five years, in addition to those already mentioned above and in the wider transport context[16]:

Modifications to Ground handling roles as a result of a mix of Sustainable Aviation Fuel (SAF), hydrogen, battery aircraft and conventional fuel, each supplied to serve a distinct aircraft, route or geography. Hydrogen fuelling in particular will require licencing or certification and responsibilities. Ammonia and other hydrogen derivatives are likely to be closer to SAF in terms of skills requirements for refuelling and maintenance.

Modifications to maintenance roles as a result of the development of hydrogen and electric flight is leading to distinct aircraft types which in turn is creating distinct skill requirements for aircraft maintenance. These roles are likely to become more highly skilled and diversified to maintain the diversity of aircraft, fuel and communications systems. Aircraft maintenance training will need to change as a more system-based approach is taken by future aircraft. This will also require more system architects.

Modifications to flight crew roles as a result of the number of automated systems onboard aircraft is set to increase. Pilot training will need to adapt as more systems require supervision rather than direct control. There will still be a need for pilots to take direct control if required, so ensuring that this skillset is trained and tested adequately will be important. New propulsion systems may lead to different licencing requirements and standard operating procedures for pilots.

Air traffic controllers are likely to be needed for at least the next 20-30 years, especially for vocal control of aircraft. Once the technology and systems have developed and matured, the controller is likely to be taken out of the loop and will only manage by exception. In this case air traffic controllers may require different skills to occupy the time that they are not managing the airspace. Safety management of electric and conventional aircraft on the ground is going to be increasingly important. Air traffic controllers also need to understand the different needs and priorities of electric aircraft.





Buses

Buses today

As of 2023, ONS data[22] states that local bus operators employed approximately 123,000 members of the workforce. The female proportion of the workforce is 16% as seen in Figure 9[23], amongst the lowest female proportion of the transport modes. The ethnicity profile of the workforce is shown in Figure 10[24].

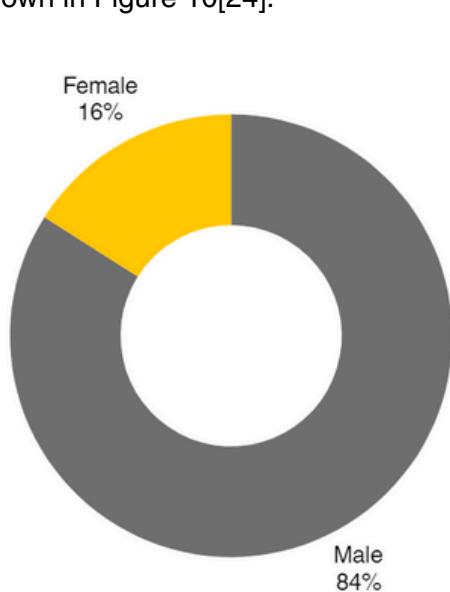


Figure 9 Buses Gender split

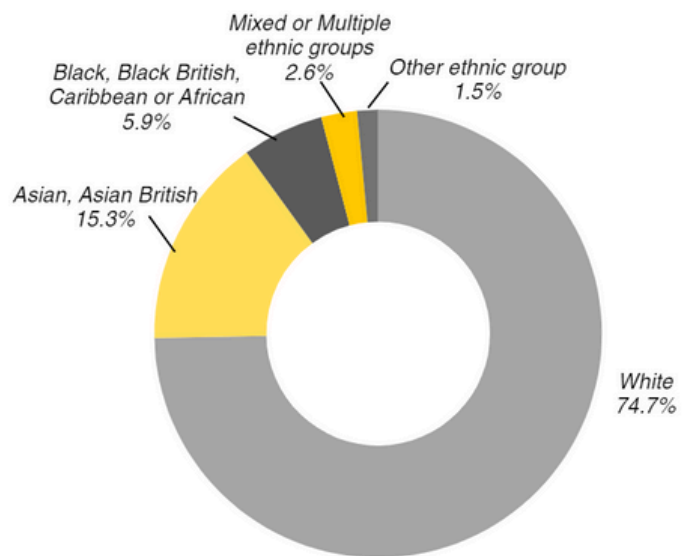


Figure 10 Buses Ethnicity split

The regional breakdown of employees under the bus and coach driver SOC code in the UK is shown in Figure 11 [25]:

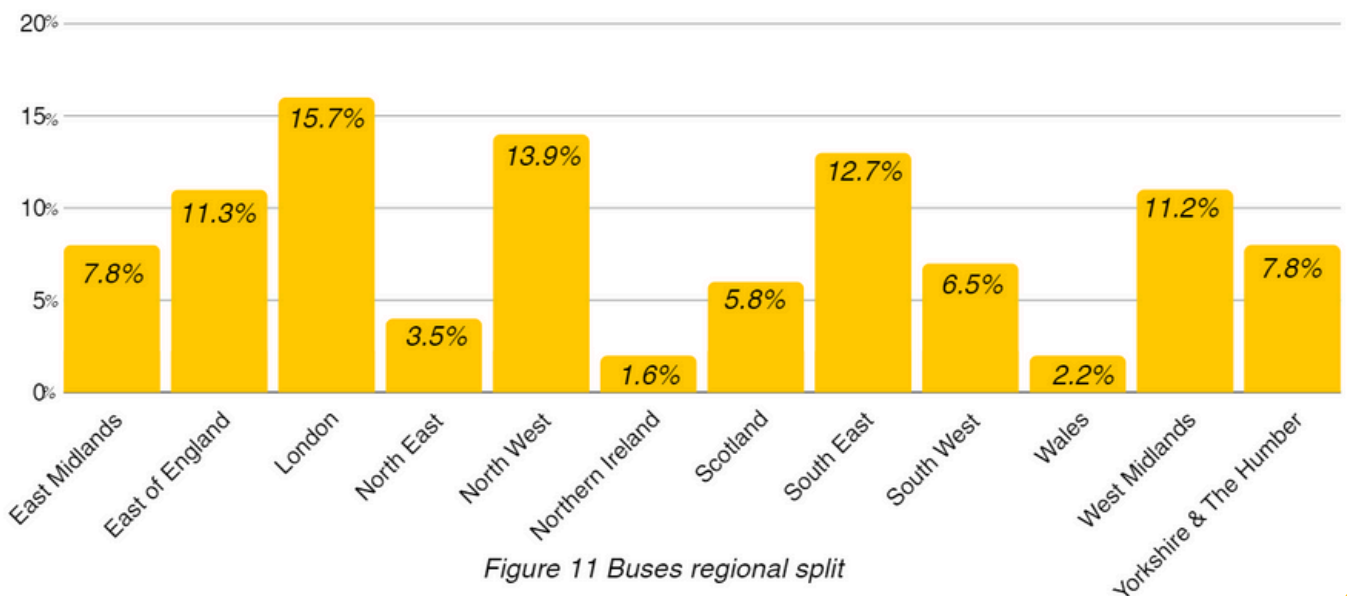


Figure 11 Buses regional split

The aforementioned ONS data has followed the volume of staff employed by local bus operators since 2005, and this data has demonstrated the decline in workforce over this time period of close to 20 years. The number of employees in 2023 has declined by over 20% compared to 2005, and by over 25% by comparison to the peak of around 167,000 in 2008. Additionally, between 2008 and 2023 there has been a reduction of over 27% in the number of passenger journeys by bus[26].

Driver and onboard staff occupy around two thirds of the workforce, with around 82,000 employed in 2023, well down from a peak of 105,000 in 2008/2009. The remaining third of the workforce is spread between maintenance & cleaning and administration roles, with the rest filled by those in other roles.

Using the UK's SOC2020 classifications, an occupation has been identified that matches the given mode. This occupation and its demographics is listed in Table 8[12] and Table 9[13]:

SOC Description	Employees (thousand)	Female %
Bus and coach drivers	98	14%

Table 8 Buses specific ONS occupations Gender split

SOC Description	Average Age	% Age >=50
Bus and coach drivers	49.4	55%

Table 9 Buses specific ONS occupations age profile

Progress made in Buses

The Women in Bus and Coach initiative[27] is tackling both the under-representation of women in not just the bus mode, but in transport as a whole, while also trying to attract new talent. Led by the Bus Centre of Excellence, the initiative is trying to break the barriers faced by women entering the sector by creating a safe and inclusive space for new joiners and existing workers. Made up of industry leaders, the scheme creates a forum where companies can come together and share expertise, and has already been endorsed and joined by multiple companies such as Abellio, Arriva, Volvo and First Bus.

A further initiative attracting new talent is the graduate scheme put in place by companies such as Go-Ahead which is changing the way people join. With fast progression, it offers exposure to the different sides of the mode, from commercial to engineering to operations, which encourages young university or college leavers to think about the breadth of opportunities that the sector has to offer.

In addition, bus and coach drivers currently require a Driver Certificate of Professional Competence (DCPC), which requires 35 hours of training every five years and costs around £500, which has raised concerns on its high costs and low flexibility, making it difficult to attract and retain a new bus and coach workforce. Proposed test reforms are under discussion to bring in new talent, by introducing a pass / fail test and an alternative, parallel option to the periodic training so drivers have more flexibility in their training and development.



Buses in 2030

By 2030, the UK bus sector is set to undergo significant change. Some of those key developments are:

Zero-Emission Buses: The UK government is committed to funding almost 1,000 green buses at a cost of a £143 million[28]. Sixteen areas, including Greater Manchester and Portsmouth, will receive grants to deliver electric or hydrogen-powered buses along with charging and fuelling infrastructure.

Decarbonisation and Emission Reduction: By 2030, the UK could increase bus journeys by 2.7 billion, equivalent to taking 900,000 cars off the road. This would result in an 18% reduction in emissions from both cars and buses[29].

National Bus Strategy: The previous government’s National Bus Strategy allocates £3 billion to support the bus sector[30]. It includes proposals for priority lanes, lower fares, integrated ticketing, and higher bus frequencies.

Electric Bus Market Growth: The UK electric bus market is expected to grow at a Compound Annual Growth Rate of around 13.81% during the forecast period (2023-2030)[31].

Technological Advancements: Automation, data analytics, and digitalization will enhance bus operations, improving efficiency and passenger experience.

For the occupation listed in Table 9, those employees aged 60 and over have been identified as employees whose skills will likely need to be replaced in the period between today and 2030, and thus the number of potential retirees in this period is seen in Table 10[12][13]. It should be noted that these figures are an estimate based upon data from multiple sources and do not account for profession-specific retirement behaviour.

SOC Description	Employees (thousand)	% Aged >=60	Predicted Retirees (thousand)
Bus and coach drivers	98	23%	23

Table 10 Buses specific SOC retirees

It should be noted that the 23,000 bus and coach drivers predicted to retire by 2030 would create a significant skills shortage that is only likely to be exacerbated further in the following years due to the age profile of the workforce and occupation.

The move to greener technology has been happening over a number of years and has successfully implemented thousands of electric buses on our roads. As these have been slowly deployed into our transport system, the demand for skills in this area is modest. There also isn’t a need for major change in the sector, apart from having specialised technicians and engineers to maintain the EVs. However, the current shortages of drivers, engineers and vehicle technicians (including maintenance) must be carefully considered. In terms of the effect on the workforce, 9% will need to be reskilled to meet the demand of the new sustainable technologies.

In terms of additional future skills required, the following are likely to be in demand in the next five years, in addition to those already mentioned in the wider transport context:

Electric Vehicle (EV) and Hydrogen Vehicle (HV) Maintenance - With the growing shift toward electric and Hydrogen buses, there will continue to be a demand for technicians skilled in maintaining and repairing different propulsion systems;

Autonomous Vehicle Technology - As autonomous bus technology advances, there will be a need for professionals with expertise in autonomous vehicle operation, maintenance, and monitoring;

Multimodal Integration - Skills related to integrating buses into broader multimodal transportation systems for seamless connectivity; and

Community Engagement - Skills in engaging with local communities, understanding their transportation needs, and building positive relationships.



Freight & Logistics

Freight & Logistics Today

There is no single definition of the ‘Freight & Logistics’ sector. The Department for Transport, through its People & Skills Delivery Group, has worked with industry trade bodies to develop an agreed definition of the sector using SIC codes, focusing on the transport component of logistics moving goods across a multi-modal global network. DfT has also developed a list of Standard Occupational Classification (SOC) codes that are relevant to the freight and logistics sector to enable data deep dives into specific roles. NSAR have used the SOC core list in this report with the removal of occupations which are duplicated from other modal sections in this report. These occupations and their demographics are shown in Table 11[12] and Table 12[13].

SOC Description	Employees (thousand)	Female %
Directors in logistics, warehousing and transport	23	21%
Managers in transport and distribution	102	27%
Managers in storage and warehousing	72	15%
Managers in logistics	52	20%
Importers and exporters	7	#
Transport and distribution clerks and assistants	71	44%
Large goods vehicle drivers	272	1%
Delivery drivers and couriers	265	9%
Fork-lift truck drivers	75	#
Elementary storage supervisors	30	20%
Warehouse operatives	370	22%
Delivery operatives	22	#
Elementary storage occupations	17	#
TOTALS	1,377	15%

Table 11 Freight & Logistics specific ONS occupations Gender split
- these figures are suppressed as statistically unreliable

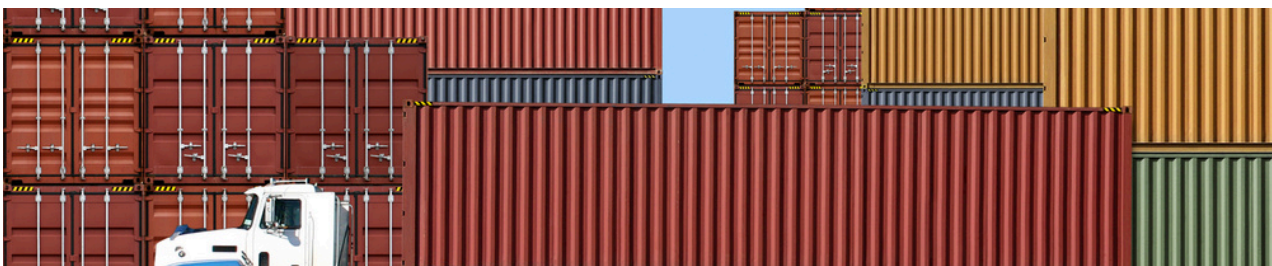
DfT developed both a core and incidental list of occupations for the freight & logistics sector. Only the core list has been used here (removing duplicates from other modal sections in this report). Core occupations are those deemed to be critical to the day-to-day running of the sector and/or the majority of individuals under each SOC code work solely in freight and logistics. Incidental occupations are those which support the functioning of the sector and/or are ones where only a small proportion of workers in each SOC code work solely within freight & logistics.

SOC Description	Average Age	% Aged >=50
Directors in logistics, warehousing and transport	48.5	50%
Managers in transport and distribution	45.5	41%
Managers in storage and warehousing	42.9	33%
Managers in logistics	43.1	32%
Importers and exporters	41.5	29%
Transport and distribution clerks and assistants	40.7	30%
Large goods vehicle drivers	48.3	53%
Delivery drivers and couriers	43.4	39%
Fork-lift truck drivers	43.9	38%
Elementary storage supervisors	41.2	28%
Warehouse operatives	38.5	26%
Delivery operatives	39.4	28%
Elementary storage occupations	40.8	33%

Table 12 Freight & Logistics specific ONS occupations Age profile

Though DfT primarily uses SIC code data, this report utilises SOC data to generate workforce numbers and model both age and gender demographics. There are a number of reasons for this - firstly, the SOC code data is more granular than SIC code, allowing for analysis to focus upon specific roles of which there are 13 covered. The SIC definition of the sector covers 14 SIC codes but eight of these would be mapped to another mode, leaving analysis more generic. Additionally, data for Freight & Logistics under the SIC codes is more generic - age bands are wider, preventing further analysis being conducted, and ethnicity data only has two classifications, whereas five classes would be available through other sources.

This workforce of 1,377,000 has a female proportion of 15% as can be seen in Figure 12 [32]. The ethnicity profile of the workforce can be seen in Figure 13 [33]:



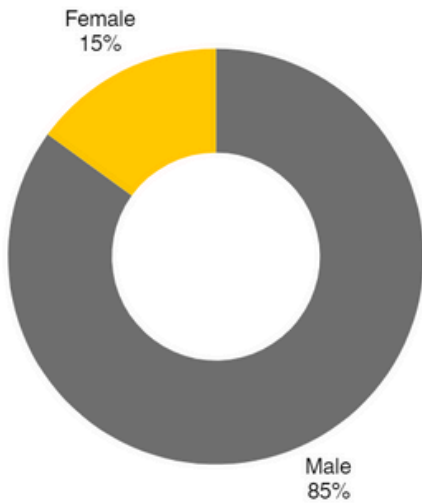


Figure 12 Freight & Logistics Gender split

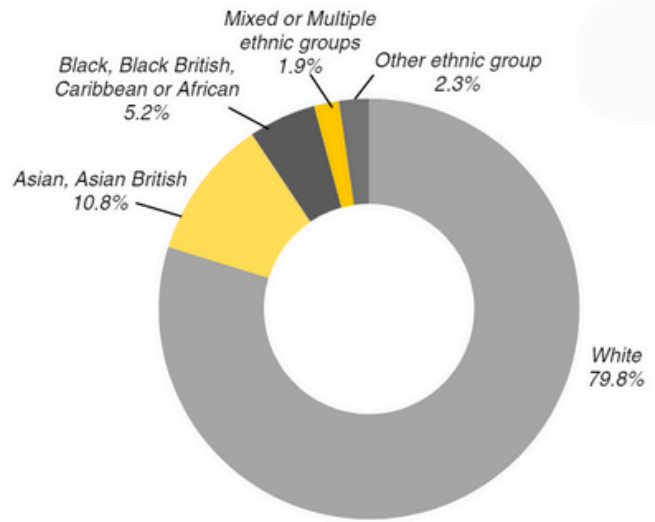


Figure 13 Freight & Logistics Ethnicity split

The regional breakdown of the Freight & Logistics workforce can be seen in Figure 14[34] according to Logistics UK’s Skills Review 2023:

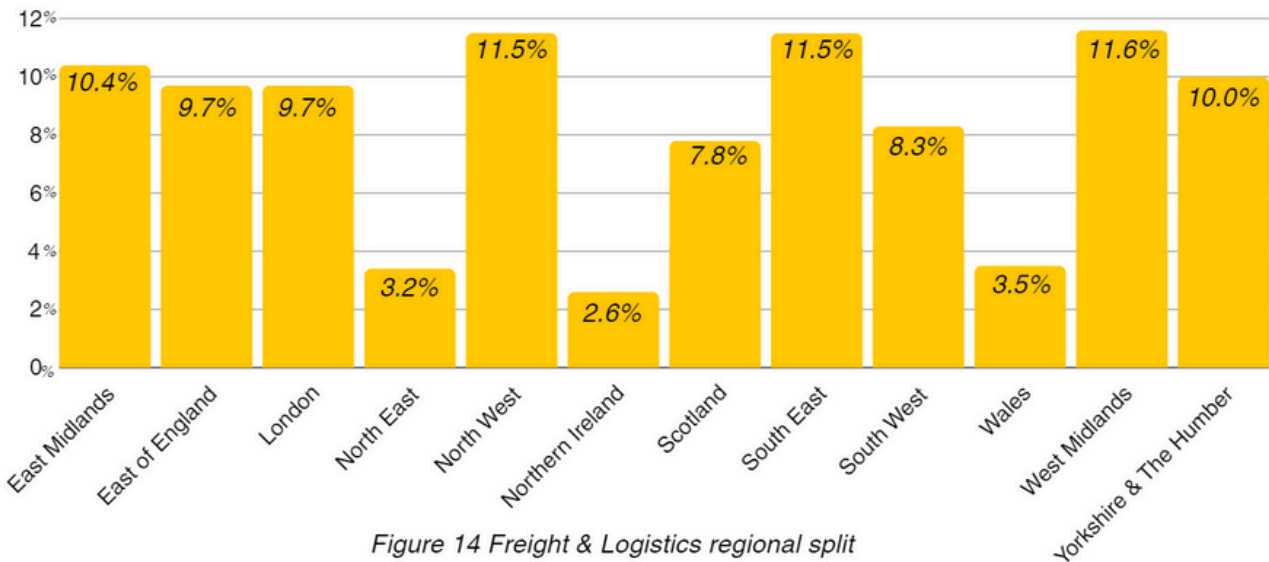


Figure 14 Freight & Logistics regional split

Progress made in Freight & Logistics

The Department for Transport has established a People & Skills Delivery Group, bringing together industry trade bodies and cross-government officials, to address barriers to recruitment and retention in the freight & logistics sector. DfT officials have conducted a workforce assessment, covering quantitative and qualitative data to identify key trends, challenges and shortages. A work programme has been agreed by the group, with workstreams covering activities to map current and future skills needs and ensure training provision is accessible and meets those needs, boost diversity through encouraging a culture change in the sector, monitor labour shortages, and consider labour market wide impacts to the sector.

Generation Logistics, the government-backed campaign led by CILT(UK) and Logistics UK, is delivering targeted messaging and educational materials to increase awareness and improve perception of the sector and its career pathways. Social media and print campaigns, careers fairs, virtual work experiences, case studies, and more have been deployed to attract the next generation of talent to the sector.

Year one of the campaign achieved 3.7 million direct social media engagements and 789,000 visits to the Generation Logistics online hub[35], and established an Ambassador Network to spread the word of the campaign and promote the opportunities and benefits of working in the sector. The second year of the campaign, which launched in October 2023, has been gaining further social media traction and created an Education Hub with materials for teachers and careers advisors to boost understanding of the sector amongst 13-18 year olds.

Freight & Logistics in 2030

The UK freight and logistics sector is poised for significant changes by 2030. Some of the key developments include:

Economic growth: The UK freight and logistics market is estimated to reach £131 billion by 2030, growing at a Compound Annual Growth Rate (CAGR) of 2.91%, up from £110.3 billion in 2024[36]. This growth reflects increased demand for efficient transport and supply chain solutions.

Decarbonisation and efficiency: The sector aims to reduce emissions and enhance efficiency. Investments are being, and will continue to be made in green infrastructure, electric vehicles, and alternative fuels.

Technological advancements: Automation, data analytics, and smart logistics will optimise operations as well as innovations in last-mile delivery, warehouse management, and tracking systems.

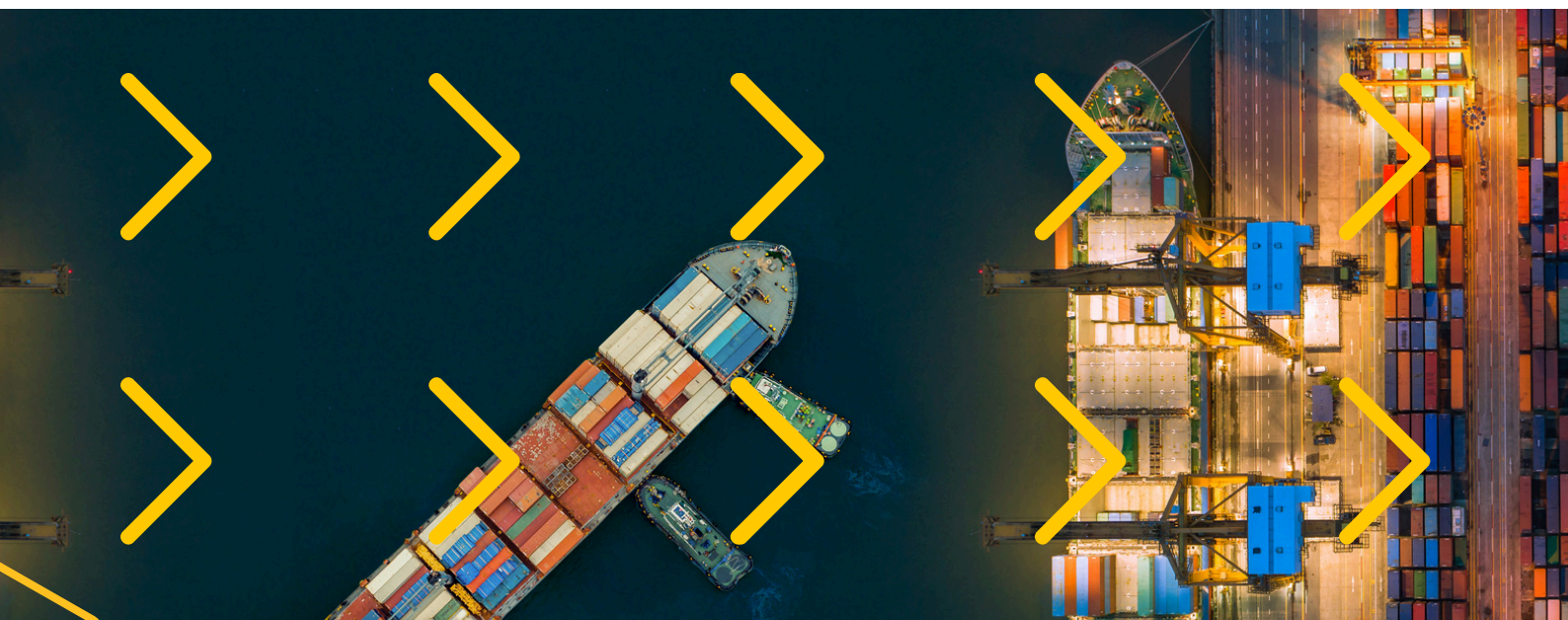
Urban logistics and e-commerce: This will drive demand for efficient last-mile delivery, and hence electric vans and micro-hubs will become more common, as well as cargo bikes and deliveries made by privately owned vehicles.

Supply chain resilience: The pandemic highlighted the importance of resilient supply chains, and thus companies will focus on diversification, risk management, and agile logistics.

Skills development: The workforce will require upskilling to handle digital tools, automation, and sustainable practices.

Innovation hubs and research: Expect growth in research centres focusing on logistics, sustainability, and supply chain optimisation.

For the occupations listed in Table 11, those employees aged 60 and over have been identified as employees whose skills will likely need to be replaced in the period between today and 2030, and thus the number of potential retirees in this period is seen in Table 13[12][13]. It should be noted that these figures are an estimate based upon data from multiple sources and do not account for profession-specific retirement behaviour.



SOC Description	Employees (thousand)	% Aged >=60	Potential retirees (thousands)
Directors in logistics, warehousing and transport	23	18%	4
Managers in transport and distribution	102	12%	12
Manager in storage and warehousing	72	8%	6
Managers in logistics	52	7%	4
Importers and exporters	7	10%	1
Transport and distribution clerks and assistants	71	8%	6
Large goods vehicle drivers	272	18%	49
Delivery drivers and couriers	265	15%	40
Fork-lift truck drivers	75	12%	9
Elementary storage supervisors	30	6%	2
Warehouse operatives	370	8%	30
Delivery operatives	22	10%	2
Elementary storage occupations	17	11%	2

Table 13 Freight & Logistics SOC data

Roles in logistics will evolve as the industry transitions to net zero, while advances in technology such as automation, robotics and digitisation will dramatically change the skills needed across the sector. Even now, vehicles, machinery and supporting information systems are all rapidly developing and the sector will need suitably qualified staff to operate, fix and maintain innovative technologies. Without these skills, the industry will fail to capitalise on the productivity and efficiency benefits of new technologies.

The transition to net zero is well underway across the mode, with operators focussed on developing plans and embracing new technologies to reduce their emissions today and in the long-term. This is demonstrated by the uptake of battery electric vans and trials of zero tailpipe emission HGVs, the adoption of low carbon fuels across all modes of logistics transport and industry support of innovative technology development to achieve net zero transport emissions. However, where zero tailpipe emission road vehicles are being adopted, logistics operators are already struggling to find suitably qualified engineers and mechanics who can maintain and fix these new vehicles, whether battery electric or alternatively fuelled. As traditional combustion engines become less common on our roads, colleges and universities are starting to anticipate future skills requirements by adapting training programmes for electric vehicles.

Increasing uses of technology will continue to play a major role in logistics, from the use of automated systems to improve efficiency, tracking, and accuracy to the use of artificial intelligence and machine learning to enable better decision-making. Technologies such as the Internet of Things, blockchain, and robotics will be used to enable better tracking, inventory management, and order fulfilment. Autonomous vehicles and drones will also be utilised to make freight transportation faster and more efficient. Additionally, augmented reality and virtual reality will be used to improve training and customer service. All of these changes will require new skill sets and appropriate change management programmes for the people involved.



Maritime

Maritime Today

The maritime sector consists of the individual shipping, ports, leisure marine, marine engineering and maritime business services industries, each of which comprises a diverse array of activities. The Maritime UK’s “State of the Maritime Nation” report [37] for 2022 details the roles directly contributed to by the maritime sector as of 2019 (227,000 employees). Data places the female proportion in the industry at 27.8%, comfortably over one in four sector employees. The overall gender split can be seen in Figure 15[38]. The ethnicity profile of the workforce is shown in Figure 16 [39]:

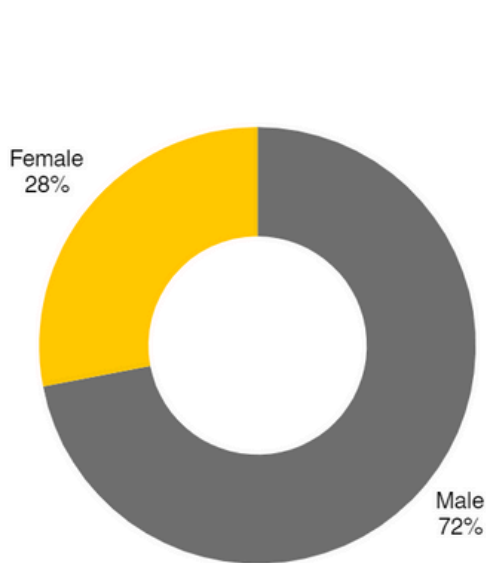


Figure 15 Maritime Gender split

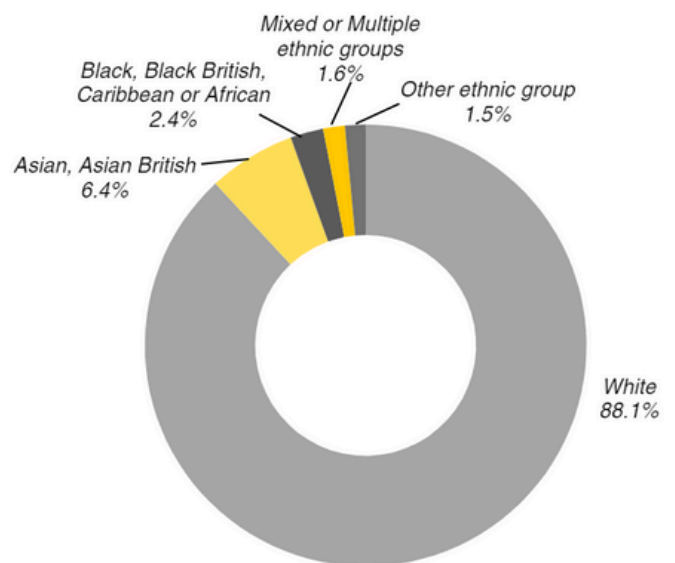


Figure 16 Maritime Ethnicity split

The regional breakdown is shown below. Employment in London and the South East accounts for around 40% of the maritime workforce, with another significant portion in Scotland, as can be seen in Figure 17[37].

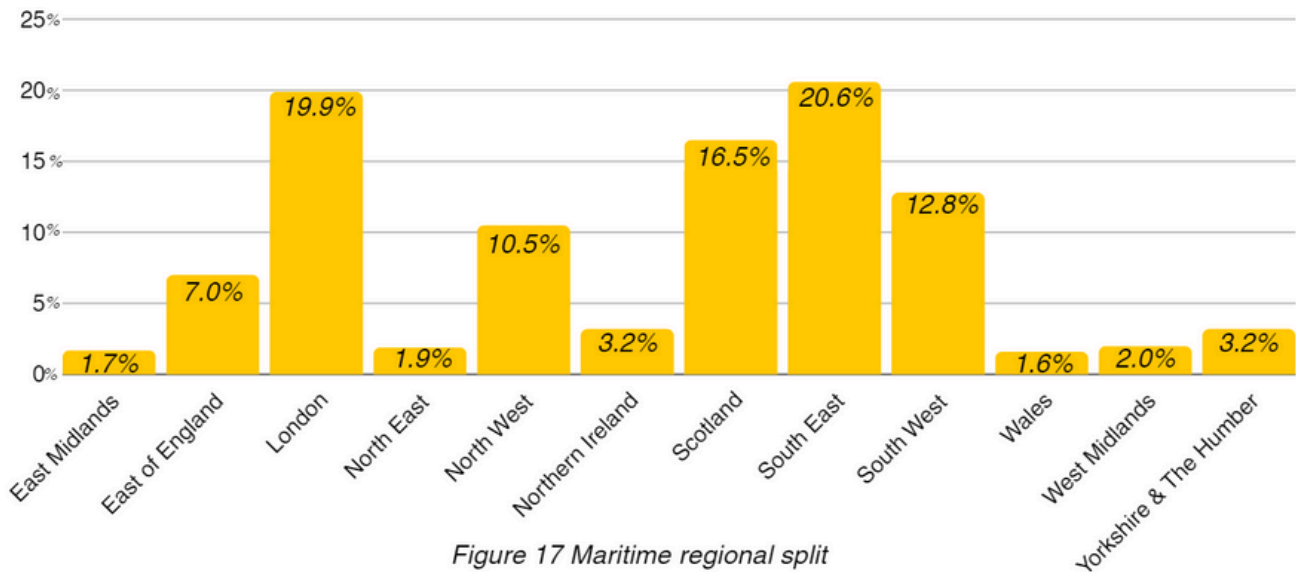


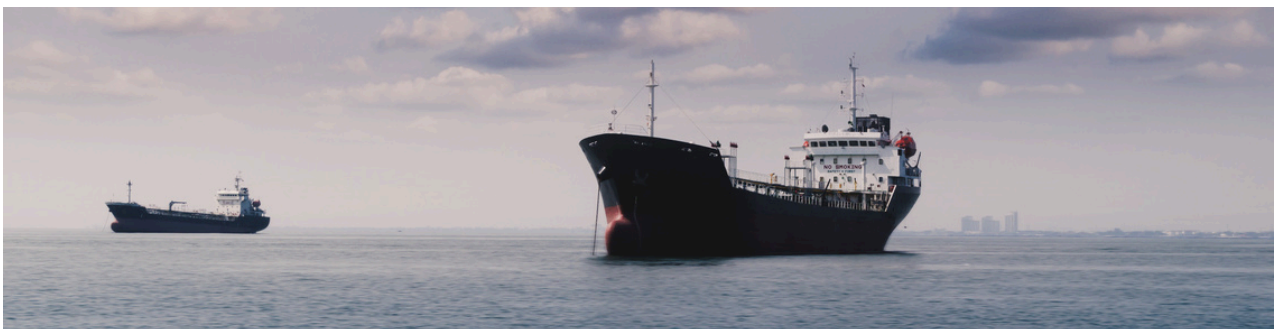
Figure 17 Maritime regional split

Using the UK’s SOC2020 classifications, occupations have been identified that match the given mode. Those occupations and their age demographics are listed in Table 14 [13]. The number of female employees is very low, rendering the data statistically unreliable. For this reason, data on female representation in these three occupations has not been included.

SOC Description	Average Age	% Age >=50
Ship and hovercraft officers	42.7	35%
Boat and ship builders and repairers	41.6	35%
Marine and waterways transport operatives	43.1	40%

Table 14 Maritime SOC Age profile

Government statistics on the demographics of seafarers currently working in the UK shipping industry suggests that this role is also one lacking in diversity. The majority of UK seafarers active at sea and working for companies within the membership of the UK Chamber of Shipping were male, at 84%. Seafarers performing deck or engine officer roles on commercial vessels are required to hold a Certificate of Competency (CoC), and the extremely large majority of deck and engine officers in 2023 were male (96%)[40].



Progress made in Maritime

Under Maritime UK, the Maritime Skills Commission have undertaken a number of different workstreams looking at topics such as labour market intelligence, careers in maritime ashore, seafarer cadet review, digital learning, exporting maritime education and training, future ports workforce, review into unnecessary barriers for recruiting UK ratings, skills for green jobs and people, behaviours and soft skills[41].

In addition, the “inspiring the future” foundation has been supporting the sector by launching a campaign aimed at children and young people, by showcasing the range of different opportunities through volunteers and school outreach programs. This follows the Maritime UK Careers and Outreach Programme Impact Report, which highlighted the positive impact of the past and ongoing initiatives in the Maritime sectors.

In addition, Maritime UK held Roadshows throughout 2023-2024 to inspire girls to think about the maritime sector when choosing careers, with an emphasis on STEM subjects.

Maritime in 2030

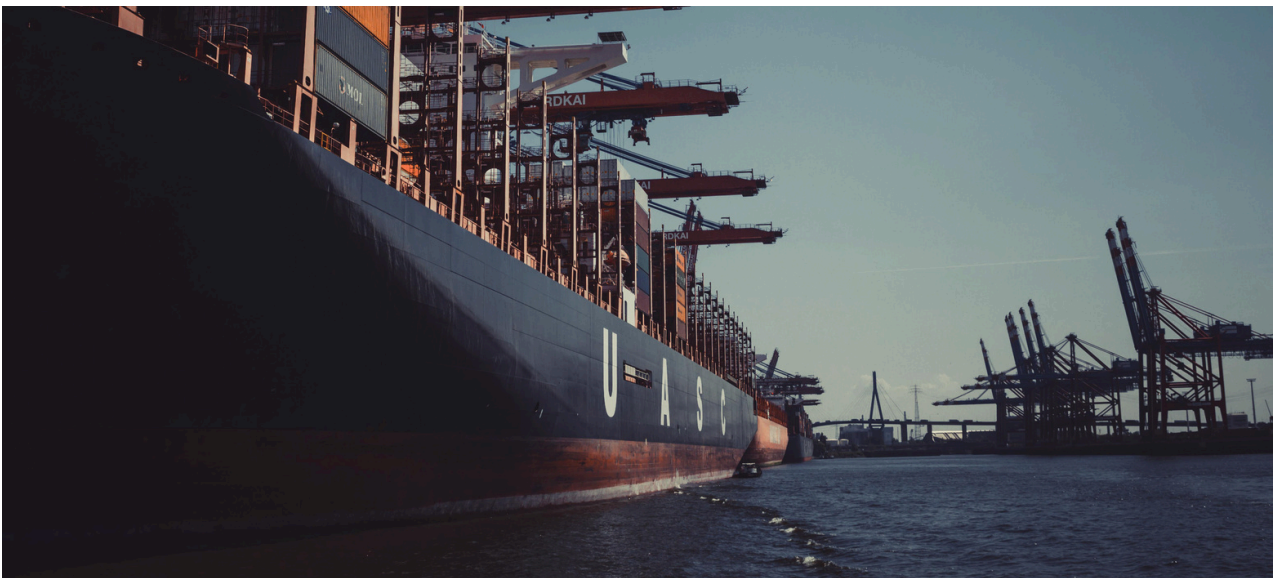
The maritime sector is set to undergo significant changes:

Greenhouse gas (GHG) reduction strategy: The International Maritime Organization (IMO) has adopted a revised strategy to reduce greenhouse gas emissions from ships. The goal is to reach net zero GHG emissions from international shipping by or around 2050. This will require an uptake of zero and near-zero fuels by 2023[42].

Technological advancements: Automation, digitalisation, and smart shipping will help optimise operations. We can expect to see innovations in autonomous vessels, energy-efficient propulsion, and real-time monitoring.

Decarbonisation Targets: The maritime industry aims to reduce emissions significantly. Accordingly investments in green technologies, electrification, and hydrogen-based fuels will accelerate.

Sustainable Shipping Practices: The sector will focus on energy-efficient designs, slow steaming, and emission reduction technologies.

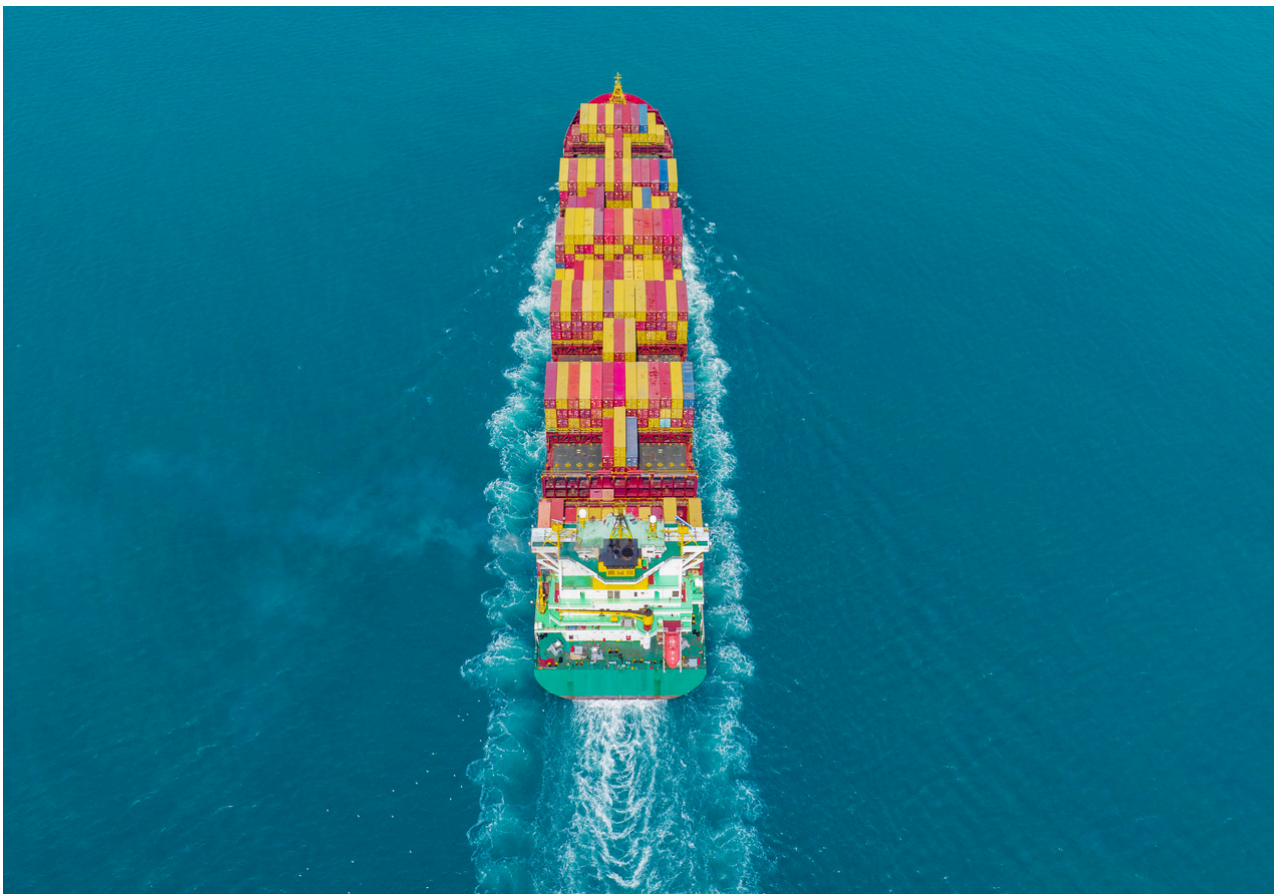


For the occupations listed in Table 14, those employees aged 60 and over have been identified as employees whose skills will likely need to be replaced in the period between today and 2030, and thus the number of potential retirees in this period is seen in Table 15[12][13]. It should be noted that these figures are an estimate based upon data from multiple sources and do not account for profession-specific retirement behaviour:

SOC Description	Employees (thousand)	% Aged >=60	Predicted Retirees (thousand)
Ship and hovercraft officers	19	14%	3
Boat and ship builders and repairers	11	14%	2
Marine and waterway transport operatives	11	16%	2

Table 15 Maritime SOC retirees

For maritime, the skills needed to meet the demand of new technologies are changing fast. The focus on training needs to shift as a result of the development of greener ship propulsion systems, resulting in the reskilling of maritime engineers. This also highlights the importance of STEM subjects, as jobs become more data driven in response to new technology, stressing the importance of qualified seafarers being able to operate advanced fuel systems, both at junior rating and senior engineering levels.





Rail

Rail Today

NSAR’s Rail Workforce Survey of 2023[43] accounts for around 243,000 employees in the sector. 16% of the workforce is female, around one in six employees, progressing from around one in nine when NSAR began collecting data in 2016. This can be seen in Figure 18. The ethnicity profile of the workforce is shown in Figure 19:

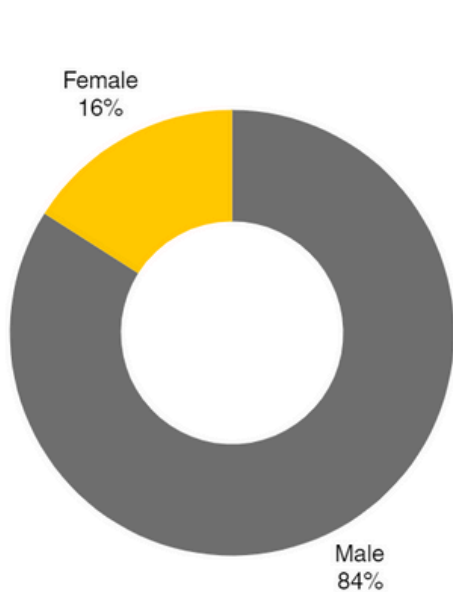


Figure 18 Rail Gender split

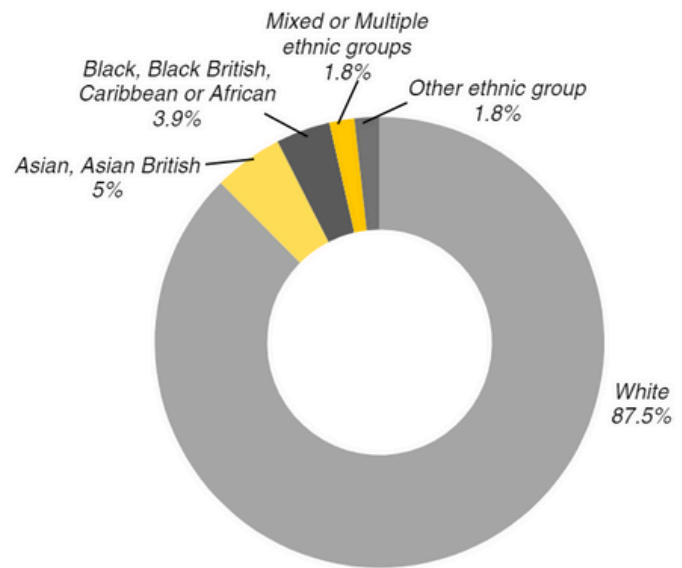


Figure 19 Rail Ethnicity split

The regional breakdown is shown below. Employment in London and the South East accounts for close to half of the rail workforce and well over 100,000 employees, with another significant portion in the North West, as can be seen in Figure 20. The known workforce in Northern Ireland makes up a tiny proportion of the workforce and thus does not appear here.

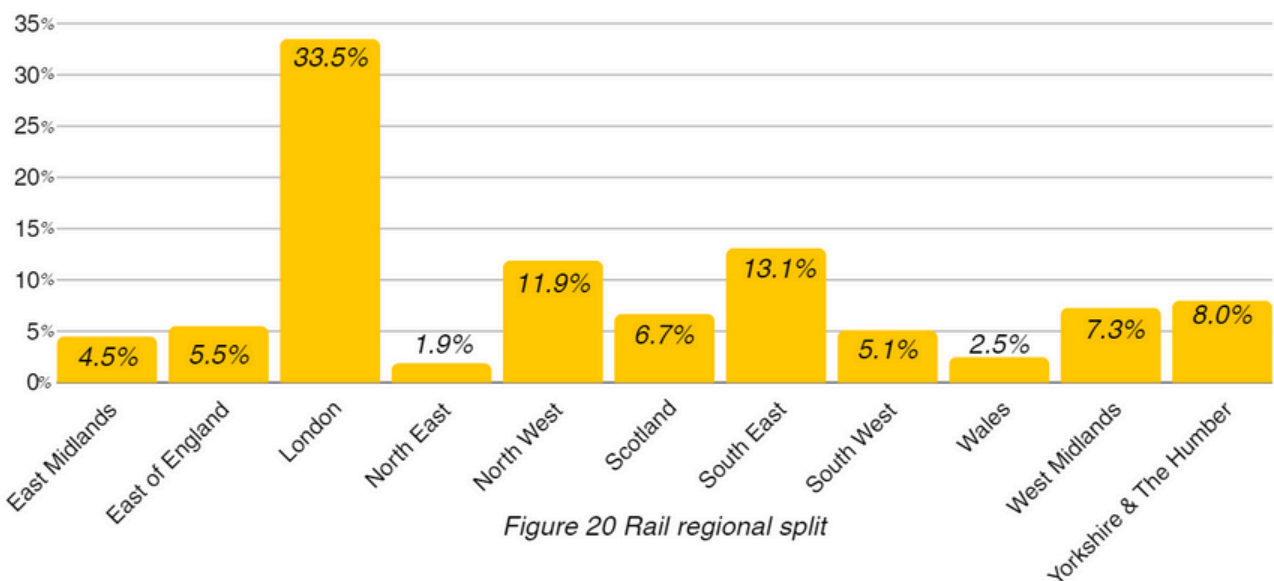


Figure 20 Rail regional split

NSAR uses a standardised set of job roles to define the work being carried out by the industry. A selection of these roles as well as their demographics are illustrated in Table 16:

Job Role	Employees (thousand)	Female %	Average Age	% Age >=50
Engineer	17	8%	44.5	31%
Signaller	5	10%	46.7	47%
Train Driver	24	8%	47.2	47%

Table 16 key occupation data for rail

The demographics of the selected roles paint a concerning picture - the gender diversity in each is significantly worse than in the industry as a whole. The roles of signaller and driver, large sections involved in the operation of the railway, both have average ages that are significantly higher than that for the entire industry (45), and close to half of the employees in these roles are aged at 50 and over.

For each of the roles listed above, those employees aged 60 and over have been identified as employees whose skills will likely need to be replaced in the period between today and 2030, and thus the number of potential retirees in this period is seen in Table 17:

Job Role	Employees (thousand)	% Aged >=60	Potential Retirees (thousands)
Engineer	17	10%	2
Signaller	5	14%	1
Train Driver	24	13%	3

Table 17 key occupation retiree data

Progress made in Rail

The rail sector has had a persistent problem with its ageing workforce and attracting new talent into the sector. Initiatives to try and alleviate this problem include 'Routes into Rail'. This is a service by NSAR which connects young people to employers in the sector, as well as educating them on potential opportunities available. This can lead to careers in communications and digital roles, which highlight the importance of the changing landscape across industries, to finance and business roles as well as the other more commonly known roles like train drivers and engineers. As well as this, NSAR have recently begun their Apprenticeship Agency, where they directly employ apprentices on behalf of employers, as well as help them to take control of their levy fund and utilise it in the best way possible.

In addition, organisations like the Young Rail Professionals (YRP) groups are doing a lot to reach out to more young professionals within the industry and help them progress. They are also doing a lot of external outreach and careers fairs to utilise their partnerships and resources to provide support to aspiring rail professionals.

Rail in 2030

NSAR's report in 2023, 'Navigating the Skills Shortage'[43] identifies that the rail workforce continues to age year-on-year and is facing a critical loss of experience and knowledge through the number of people leaving through retirement and other forms of attrition.

While proportions are improving, rail remains a male-dominated industry with lower numbers of people from ethnic minority backgrounds than national averages.

The drive for a more sustainable future will bring new demands and technologies, as the country tries to move away from the traditional and into the sustainable modern day. Diesel trains will slowly be phased out in favour of battery trains and more electrification will be required to meet Decarbonisation targets[44].

In terms of greenhouse gas emissions, rail has historically been one of the most carbon efficient means of transporting passengers and cargo over long distances. With the emergence of new rail technologies around the world, new skills will need to be considered pertaining to the development of electric vehicles, signalling engineers to fit new systems and predictive asset monitoring equipment. It is estimated that 12% of the workforce will need to be reskilled in areas such as:

Electric and Alternative Propulsion Systems - Knowledge of electric and alternative propulsion systems, including battery-electric and hybrid-powered trains.

Predictive Maintenance and Condition Monitoring - Skills in implementing predictive maintenance practices using data analytics and condition monitoring tools.

Human Factors and Customer Service - Understanding of human factors in rail operations and strong customer service skills for passenger-centric services.

Digital Signalling – eventually replacing many human-based signalling roles with capacity increasing signalling systems.



Roads

Roads Today

Data on roads was sourced from a benchmarking dataset for the supply chain in the industry. There are many different road users, from active transport to bicycle delivery, but for the purposes of this analysis, the focus is on supply chain. This data presents a workforce size of 297,000, with a female proportion of just under a quarter, at 23%, as can be seen in Figure 21. The male contingent of the workforce poses a significant concern with its age profile - an average age of 43.7 and close to 35% of male employees aged over 50, by comparison to figures of 40.3 and 23% in the same metrics for the female workforce.

Insight from the industry suggests that there is a failure to attract and retain young people, with data tracked over six years showing no significant shift towards the younger workforce - instead, what has transpired is a slight reduction in those in the workforce aged under 25, and a slight increase in those aged over 50. The age profile of the male workforce is skewed towards those aged over 50, whereas the female workforce sees the age peak at around 35 and declines subsequently. The Ethnicity profile of the workforce can be seen in Figure 22:

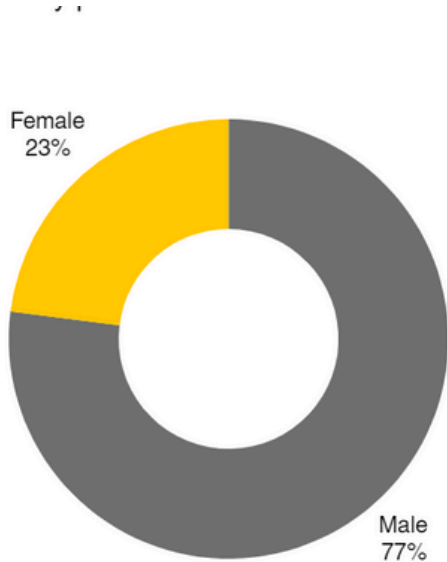


Figure 21 Roads Gender split

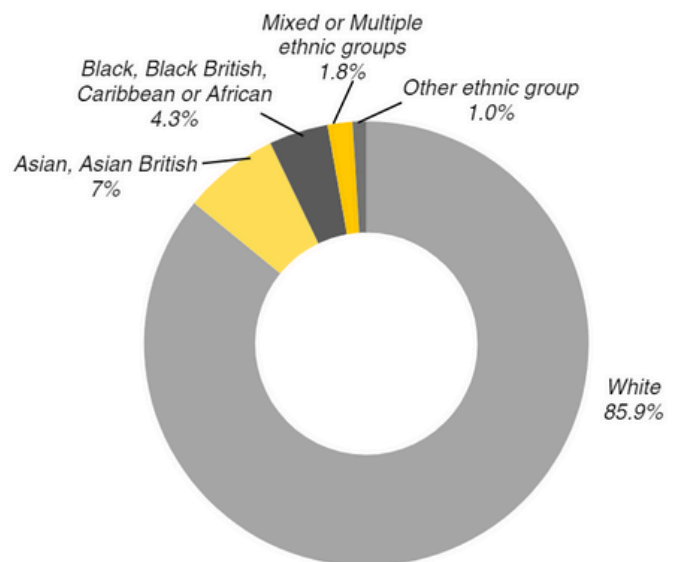


Figure 22 Roads Ethnicity split

The regional breakdown of employees[45] can be seen in Figure 23:

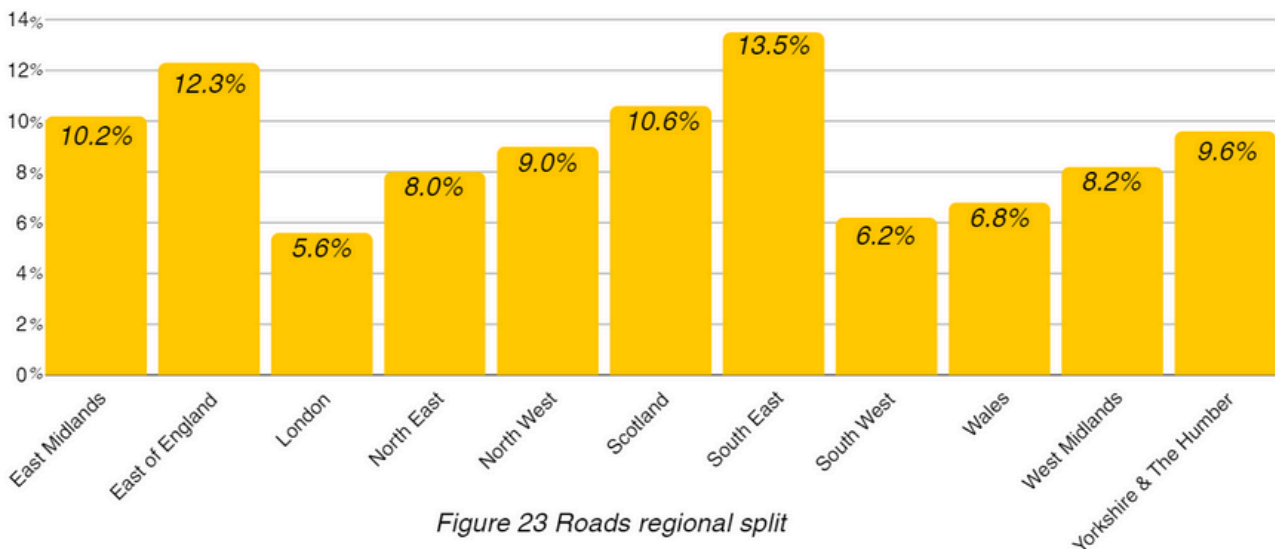


Figure 23 Roads regional split

Using the UK's SOC2020 classifications, an occupation has been identified that matches the given mode. This occupation and its demographics are listed in Table 18[12] and Table 19[13]:

SOC Description	Employees (thousand)	Female %
Road construction operative	18	#

*Table 18 roads SOC Gender split
- these figures are suppressed as statistically unreliable*

SOC Description	Average Age	% Age >=50
Road construction operative	41.1	32%

Table 19 roads SOC Age profile

Progress made in Roads

A successful programme in the roads and highways mode is the Local Council Roads Innovation Group (LCRIG) Innovation Festival which specifically focuses on the challenges of attracting new talent into the Highways sector. The programme showcases products, solutions and new innovations, and techniques are displayed and demonstrated over a range of live demonstration sessions. Additionally young professionals were invited to give their opinion on what more the industry could be doing. A common theme across industries is apprentices, and the festival also showcased apprentices within the sector, who spoke about the opportunity for progression, as well as how they enjoy making a difference in their communities and their contribution in a social value sense.

The Chartered Institution of Highways & Transportation (CIHT) are attracting and retaining new talent by creating employee forums that allow their employees to have their say and directly report back to people within the company that have the power to make a change, and tackling what other perceive as barriers to progression with an emphasis on the minority ethnic groups who might not otherwise have access to opportunities elsewhere.

Roads in 2030

The UK roads sector will undergo changes, aligning with sustainability, efficiency, and economic growth:

Net Zero Highways: The National Highways plan[46] aims for net zero carbon travel on roads by 2050. Key commitments include:

- Zero emissions for maintenance & construction by 2040.
- Net zero carbon travel powered by renewable electricity, hydrogen, and biofuels.
- Immediate and sustained action to achieve these goals.

Digital Transformation: Smart technology, real-time information, and maintenance innovations will enhance road efficiency and safety.

Decarbonisation: Investments in green infrastructure, electric vehicles, and alternative fuels will reduce road emissions.

Electric vehicle charging points: Analysis has suggested that, by 2030, EV sales could account for more than two thirds of market share[47].

In addition, many roles within the sector are associated with planning, designing and maintaining local networks and control centres, and these will be affected by a different range of uses (for example cycling, walking etc). These roles are not included in the data in this report.

For the occupations listed in Table 18, those employees aged 60 and over have been identified as employees whose skills will likely need to be replaced in the period between today and 2030, and thus the number of potential retirees in this period is seen in Table 20[12][13]. It should be noted that these figures are an estimate based upon data from multiple sources and do not account for profession-specific retirement behaviour:

SOC Description	Employees (thousand)	% aged >=60	potential retirees (thousands)
Road construction operative	18	10%	2

Table 20 roads SOC retirees

As the sector wrestles with the challenge of engaging the younger workforce in order to try and alleviate concerns around an ageing workforce facing a significant retirement risk, innovation and digitisation presents an opportunity to dynamise its roles and attract the younger demographic into the industry.

Solutions such as traffic management plans and critical road event data being submitted rapidly will allow for the reduction of constant monitoring of traffic. In turn, automated alerts can be given to drivers for any issue arising on the roads. This can also prevent the need to send engineering teams out, in vehicles that may further pollute, in order to assess what are routine concerns. Instead, assessments can be made automatic using powerful data sources, allowing employees to focus on the bigger operational issues.

Furthermore, in terms of additional, future skills required, an insight from Safer Highways [48] suggested that the digital transformation of roads and highways will require the mode to grow and embrace a whole new skill set. From data science to blockchain to artificial intelligence and beyond; these skills are rare, hard to recruit and even harder to retain in an industry that prides itself on tradition. These new skills are disruptive of themselves, but disruption doubles when these new skills are held by the next generation, with a whole new set of expectations and set of beliefs about the world.



Summary of Insights

The most fundamental insight drawn from this report is the absence of both breadth and quality of available data for the sector. The complexity of the transport sector, with its significant variation in workforce types including many roles not focused on transport-specific activities, makes it difficult to clearly define. In addition, the varying quality of existing data sources, such as a lack of detailed and granular workforce data in some modes, means it is challenging to draw rigorous conclusions about the size of the sector and the workforces and demographics within it. Better quality and more complete input data from across the sector would support the development of more refined outputs and conclusions and provide a stronger basis for making predictions about future workforce gaps and skills needs.

As the analysis has shown, there is a need to replace a large number of the existing workforce over the next five years, exhibited through the way we have predicted retirement levels. By reducing our attrition rate however, we can ease the burden on finding new starters in the sector. Retention of many of the existing workforce is a credible strategy for an employer to adopt, and as such should not be discounted.

Even with strengthened retention efforts, the need to replace and augment many of the existing workforce between now and 2030 provides an opportunity to create more apprenticeships across the transport sector. Apprenticeships combine real work with training and study for a specific role, learning new skills, gaining experience and earning a salary.

Government reform to boost apprenticeships, as announced in March 2024^[49], provides an additional £60m of funding for 2024/25. Specifically this reduces the cost of apprenticeship training for small businesses employing individuals aged 21 and under. This increases the funding that employers paying the apprenticeship levy can transfer to other businesses which could lead to 20,000 more apprenticeships being created.

However, it is recognised that the apprenticeship model is not perfect and the standards for each mode need continual and sustained review and edit to ensure that the needs of the mode are being met. Whilst they are important in the sector, they are not the only solution.

Recent government consultations have been undertaken to reduce the age of train^[50] and bus^[51] drivers. This would help alleviate the predicted shortfall in these occupations.

The evidence in this report demonstrates that the transport sector has a lack of diversity in its workforce, particularly for gender with only a 20% female proportion. The sector would benefit from increasing this ratio to take advantage of boosting creativity, strengthening employee engagement, attracting talent, driving more innovation and promoting social responsibility.

The importance of social value was building before the outbreak of COVID-19. However, the pandemic has thrown its importance into sharp relief. Digging a little deeper into the workforce aspect of social value we discover that by providing meaningful education, training and employment in the transport sector can generate huge social value rewards. We know the sector is facing significant workforce challenges over the next five years. If we can get economically inactive workers and those from disadvantaged backgrounds, back into education, training and employment we will generate huge benefits, not only for the sector but also for society as a whole.

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