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MIDLANDS
NET ZERO HUB

Midlands Nuclear

Building Nuclear Capability: A Midlands Workforce Analysis and Strategy

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1. Executive Summary

The Opportunity

The Midlands stands at the epicentre of the UK's nuclear future, uniquely positioned to lead the transformation of Britain's energy landscape through:

- **Rolls-Royce's pioneering Small Modular Reactor programme**
- **The STEP fusion programme** selected for the West Burton site in Nottinghamshire
- **A thriving nuclear supply chain** leveraging the region's industrial heritage and manufacturing excellence
- **Advanced nuclear technologies** offering greater deployment flexibility than traditional coastal power stations

The convergence of SMR manufacturing, fusion development, and the potential for Advanced Modular Reactor deployment positions the Midlands as a testbed for next-generation nuclear technologies that could reshape global energy production whilst creating thousands of high-skilled jobs across the supply chain.

Current State and Scale of Challenge

The Midlands nuclear sector faces a **workforce challenge** despite its current strength:

- **Current workforce:** 8,600 people across 57 companies, with **8,800 new employees required by 2030**—equivalent to 102% of the existing workforce
- **Growth drivers:** 43% sector expansion, 39% of workforce over 50, 1,030 unfilled positions, and accelerating retirements creating compound recruitment pressures
- **Immediate shortfall:** Around 1-in-8 roles are currently unfilled, which is already constraining operations across the region's supply chain
- **Demographic pressure:** The comparatively low attrition rate is expected to accelerate significantly as the ageing workforce reaches retirement age, risking valuable skills and knowledge being lost from the sector

Regional Strengths and Advantages

The Midlands demonstrates **exceptional capabilities**, providing a robust foundation for workforce development. Its comparative advantages in welding trades (31.4% of UK employment), mechanical engineering (24.7%), and quality assurance reflect the region's manufacturing heritage and established "nuclear culture" of precision and

safety. This industrial strength is supported by a **vast talent pool of 1.16 million workers** in occupations that could support nuclear development across the region, creating an environment conducive to high-integrity operations and innovation essential for advanced nuclear technologies.

Critical Skills Gaps and Risks

Critical skills challenges threaten the region's nuclear ambitions and require immediate intervention:

- **Digital capabilities shortage:** Programmers, cybersecurity professionals, and data analysts are significantly under-represented as increasing automation demands are intensifying requirements
- **Process engineering and physical science deficits:** Process engineering and physical science capabilities are insufficient for advanced nuclear technologies like STEP fusion and modular reactors
- **Specialist construction trades:** Pipe fitters and steel erectors showing negligible regional employment, creating potential construction bottlenecks
- **Sector competition:** Rapid growth in the health sector, management consultancy, and house building is intensifying recruitment challenges for nuclear-relevant skills

Key Stakeholder Insights

Nuclear supply chain companies reported interconnected challenges constraining workforce development: declining apprenticeship programmes, persistent misalignment between educational provision and industry needs, and regulatory documentation requirements diverting skilled staff from technical work. Early-career retention emerged as a critical issue, with professionals frequently leaving within two years due to limited progression pathways. Meanwhile, fragmented collaboration across the sector prevents shared solutions from being able to address common workforce challenges.

Strategic Recommendations

Immediate Actions (2025-2026):

- Fully engage with the established Midlands Regional Hub to coordinate skills demand and training provision
- Launch targeted transition programmes from declining sectors to capture skills the nuclear sector needs
- Create nuclear-specific training modules, building on fusion and energy sector initiatives

Regional Collaborative Initiatives (2026-2028):

- Implement a collective apprenticeship programme, establishing shared training to better enable smaller supply chain companies to participate in talent development
- Develop cross-sector skills recognition frameworks that facilitate workforce mobility from other sectors
- Establish an Advanced Nuclear Skills Academy offering flexible nuclear-specific training for experienced professionals, career changers, and senior-level upskilling
- Launch systematic STEM outreach programmes embedding nuclear career awareness in all levels of the region's education system

Strategic Advocacy and Policy Alignment (2025-2030):

- Advocate for a Nuclear Skills Investment Fund, recognising nuclear workforce development as critical to net-zero objectives
- Promote the development of national digital and process engineering standards addressing critical regional skills gaps through industry collaboration
- Strengthen regional supply chain coordination, improving visibility of future skills requirements and enabling better workforce planning
- Integrate nuclear priorities into regional economic strategy, aligning local skills policies with nuclear workforce needs

Call to Action

The Midlands possesses the industrial heritage, technical capabilities, and strategic positioning to lead the UK's nuclear future. However, success depends on immediate and sustained commitment to workforce development. **The next critical years will determine whether the Midlands becomes a global leader in next-generation nuclear technology or struggles to realise its considerable potential**, making coordinated regional action on nuclear workforce development an economic imperative that cannot be delayed.

2. Introduction and Context

This report offers a data-driven analysis of the nuclear-relevant workforce in the Midlands, focusing on the critical skills needed to support current operations and future developments in the sector. This research was commissioned by the Midlands Net Zero Hub, funded by the Department for Energy Security and Net Zero. It examines 46 nuclear-relevant occupations, each directly linked to the core competencies required across the nuclear industry and its supply chain.

Using a robust methodology, the research maps key skills—identified through national studies and input from regional stakeholders—onto Standard Occupational Classification (SOC) codes. This allows the findings to be aligned with official workforce and employment data from the Office for National Statistics (ONS), ensuring consistency with national reporting frameworks.

Geographically, the analysis spans both the West and East Midlands (see figure 1), taking in major industrial centres such as Birmingham, Derby, Nottingham, Leicester, Stoke-on-Trent, and Coventry. This broad regional scope enables a more nuanced understanding of how nuclear-relevant skills are distributed across the Midlands' varied economic landscape.

Figure 1 The geographic region covered by the report

The nuclear sector represents a significant and growing strategic opportunity for the Midlands. This potential is underpinned by the region's strong foundation in advanced manufacturing, research, and innovation. Although the Midlands does not currently host nuclear power generation facilities, it has made substantial contributions to the UK's broader nuclear ecosystem, particularly through high-value engineering and manufacturing expertise.

A key strength of this analysis lies in its dual focus on large organisations and the wider supply chain that underpins the nuclear sector. This includes a specific emphasis on small and medium-sized enterprises (SMEs), which often deliver highly specialised capabilities and innovations essential to the success of larger firms. By explicitly including these supply chain businesses—many of which might otherwise be overlooked in broader sectoral assessments—the report sheds light on skills challenges that may remain hidden in studies centred solely on major industry players. This inclusive approach supports the development of workforce strategies that recognise the distinct recruitment processes and skills needs of different business types across the nuclear value chain, whilst also identifying opportunities for overlap and collaboration where these can be mutually beneficial.

The importance of nuclear skills development has grown markedly in recent years. The launch of the National Nuclear Strategic Plan for Skills (NNSPS) in early 2024, led by the Nuclear Skills Strategy Group and a dedicated Taskforce, clearly recognises workforce development as a national priority. However, national assessments often lack the regional focus to reflect local strengths, capabilities, and challenges.

This report seeks to bridge that gap by combining national data with regional stakeholder insights, resulting in a comprehensive picture of skills needs across both large firms and the wider supply chain in the Midlands. Ultimately, the findings aim to inform strategic decision-making across the region, helping stakeholders identify priority areas for intervention, respond to current and emerging skills gaps, and better prepare for future opportunities and risks within the nuclear sector.

3. Nuclear Industry Context in the Midlands

3.1 Historical Development of the Nuclear Sector in the Midlands

Although the Midlands has not traditionally hosted nuclear power generation—primarily due to coastal siting requirements for cooling water—it has played a longstanding and valuable role in the UK's broader nuclear ecosystem. This contribution has primarily come through its high-value manufacturing and advanced engineering expertise.

Rolls-Royce's facility in Derby is a central pillar of this legacy. Since the 1960s, it has produced nuclear reactors for the Royal Navy's submarine fleet. While initially defence-focused, this work laid the foundations for technical expertise increasingly supporting civil nuclear applications.

Rather than hosting power stations, the Midlands has developed strengths in component manufacturing, systems engineering, and research and development. These specialisms have enabled the growth of a technically capable and resilient nuclear supply chain, supporting national ambitions in existing and emerging nuclear technologies.

3.2 Current Profile of the Nuclear Industry

Today, the Midlands is home to many of the UK's nuclear and nuclear-supporting enterprises. The region has emerged as one of the country's most critical nuclear clusters, with recent growth in the sector outpacing national averages, reflecting its increasing contribution to regional and national economic goals.

The nuclear ecosystem spans the entire value chain, with key industry players including Rolls-Royce in Derby (leading the UK's Small Modular Reactor programme), Cavendish Nuclear in Leicestershire, Ansaldo Nuclear in Wolverhampton, and EDF, which owns the West Burton site selected for the STEP fusion programme. These anchor institutions are supported by a vast network of specialist small and medium-sized enterprises (SMEs), many are involved in initiatives such as the Fit4Nuclear programme, designed to build supply chain readiness for new nuclear developments.

3.3 Manufacturing and Supply Chain Strengths

A defining feature of the Midlands' nuclear sector is its deep-rooted manufacturing capability. The region is home to a substantial share of the UK's forging, welding, process control, and automation firms, many of which have longstanding track records in producing components to nuclear-grade standards. This represents a competitive advantage that continues to attract investment and partnership.

The scope of manufacturing activity spans critical areas such as nuclear safety engineering, reactor systems, cooling technologies, plant construction, commissioning, and scientific services. These capabilities are concentrated in industrial hubs around Derby, Birmingham, Stoke, and Leicester, providing fertile ground for knowledge exchange and integrated supply chain development.

Moreover, companies in the Midlands have fostered a distinctive "nuclear culture"—a commitment to quality, documentation, and safety that extends beyond regulatory compliance. This cultural factor, though intangible, contributes to the sector's resilience and reputation.

3.4 Research, Innovation, and Skills Infrastructure

The Midlands is home to a strong nuclear research, innovation, and education infrastructure that shapes skills development and supports technical capability across the region. These facilities form a broader knowledge base supporting expertise growth across different parts of the nuclear sector.

Universities across the region demonstrate strong capabilities in nuclear-relevant disciplines, with institutions including Birmingham, Coventry, De Montfort, Keele, Leicester, Loughborough, Nottingham, Nottingham Trent, and Warwick all contributing to a varied and well-established research environment. The University of Birmingham's High Flux Accelerator-Driven Neutron Facility exemplifies this expertise, enabling research into how materials behave in nuclear environments and, as part of the National Nuclear User Facility programme, supporting both scientific inquiry and the development of specialist knowledge in areas such as neutron interactions and fusion-related processes.

Regional hubs that facilitate collaboration and innovation strengthen these university capabilities. The Energy Research Accelerator (ERA) promotes partnership among Midlands universities in nuclear and low-carbon innovation. At the same time, other regional facilities, such as Infinity Park Derby, have previously supported nuclear-related research. Thus, the ERA creates an interconnected ecosystem that enhances the region's research capacity.

Alongside its research strengths, the Midlands offers a comprehensive education and training landscape supporting current and future skills needs. The University of Birmingham delivers postgraduate programmes in nuclear engineering, reactor physics, and nuclear waste management. Nottingham Trent University offers an undergraduate Physics with Nuclear Technology programme, providing specialised nuclear education at the undergraduate level. Further, the Rolls-Royce Nuclear Skills Academy—

developed in partnership with the University of Derby—provides a structured pathway into the sector, training around 200 apprentices annually.

These higher education routes are supported by a strong network of further education colleges and independent training providers, using long-standing links with the region's industrial stakeholders to offer relevant technical and vocational qualifications. Together, this education and training provision forms an integrated skills pipeline, supporting the development of a workforce capable of meeting the evolving demands of the nuclear industry.

3.5 Advanced Nuclear Technologies and Strategic Growth Drivers

Several key developments in advanced nuclear technologies are expected to shape the future skills landscape in the Midlands, transforming the nuclear sector and creating new opportunities for the region.

Small Modular Reactors (SMRs)

The Rolls-Royce SMR programme, headquartered in Derby, represents a transformative opportunity for the UK's nuclear future. With a manufacturing-led approach, this initiative aligns closely with the region's strengths in high-precision engineering and could create thousands of skilled jobs across the supply chain.

Unlike conventional gigawatt-scale reactors, these SMRs will have an output of approximately 400-450MW, allowing for the benefits of modular design and production line manufacturing approaches. With 90% of the plant being factory-fabricated, SMRs enable easier delivery of components by road and rail, reducing costs, lead times, and risks associated with major construction projects.

This modular approach could achieve cost parity with large reactors through economies of scale in production. With each plant potentially powering up to 450,000 homes, the programme is projected to create up to 40,000 jobs across the UK by 2050.

For the Midlands, SMRs offer greater flexibility in siting than traditional nuclear plants. SMRs can be operated to adjust power output to match changing electricity demand on the grid, supply high-grade heat for industrial applications, and be located away from coastal sites. This creates the potential for deployment at former coal power station sites across the region.

STEP Fusion Programme

The decision to locate the UK's prototype fusion energy plant at West Burton A in Nottinghamshire marks a significant milestone for the region. The project will require entirely new skill sets in fusion physics, tritium handling, and advanced materials science, positioning the Midlands as a focal point for the future of fusion energy.

Unlike fission reactors, fusion produces energy through the fusion of hydrogen isotopes, mirroring the reactions that power the sun. The UK has historically led fusion development through projects like the Joint European Torus (JET) near Oxford. The STEP programme aims to build a prototype fusion power plant to deliver a few hundred megawatts of power.

The STEP programme targets full operability in the 2040s and will require significant research and development in energy generation, tritium management, and materials development. The West Burton site selection positions the Midlands at the forefront of global fusion research, creating opportunities for supply chain development and skills specialisation in this cutting-edge field.

Advanced Modular Reactors (AMRs)

Looking beyond Small Modular Reactors (SMRs), the next generation of nuclear technologies—Generation IV reactors—is being explored to improve fuel efficiency and reduce waste. These advanced designs aim to better use existing resources and introduce new cooling and energy production approaches.

The UK government is investing £170 million through its Advanced Nuclear Fund to support this work. The aim is to demonstrate a new type of Advanced Modular Reactor (AMR) by the early 2030s.

The UK's long-standing experience with gas-cooled reactor designs has shaped ongoing interest in high-temperature systems, and current development efforts include concepts such as molten salt and metal-cooled reactors. In the Midlands, Ansaldo Nuclear's test facility in Wolverhampton—focused on molten lead technologies—illustrates the region's involvement in these developments.

Potential Nuclear Generation Sites

While the region has not historically hosted nuclear power stations, there is potential to repurpose former coal-fired power station sites—particularly along the River Trent—for SMRs or Advanced Modular Reactors. These locations, with existing grid infrastructure, present opportunities for new operational roles and reskilling of local workforces.

The Midlands is well-positioned to lead in deploying advanced nuclear technologies, including the potential siting of Small Modular Reactors (SMRs) and Advanced Modular Reactors (AMRs). Former fossil fuel power stations—such as Cottam, High Marnham, and Drakelow—offer promising redevelopment opportunities, particularly where existing grid infrastructure and water access support feasibility. Nationally, while the government aims to develop up to sixteen SMRs, only half of the required sites have been identified.

Geological Disposal Facility (GDF)

The Theddlethorpe site in Lincolnshire is one of the UK's leading candidates for a Geological Disposal Facility. If approved, it would represent a decades-long infrastructure project requiring expertise in waste management, radiological protection, and long-term environmental stewardship.

This facility would comprise a small surface receiving facility and a deep underground disposal area where the geological environment is suitable and well-characterised. The aim is to have a GDF operational from 2050 onwards, creating more than 4,000 jobs within the first 25 years of operation and around 2,000 ongoing jobs during the facility's 175-year lifetime.

Nuclear Space Applications

Emerging applications of nuclear technology beyond traditional power generation are also creating opportunities. At the University of Leicester, collaboration with the National Nuclear Laboratory has focused on nuclear power systems for space applications, leading to the launch of a spinout company, Perpetual Atomics, in 2024. This represents a novel branch of nuclear technology development with potential for high-value manufacturing and specialised skills development in the region.

3.6 Implications for Skills and Regional Development

These advanced nuclear technologies share common characteristics that align with the Midlands' industrial strengths. They generally require high-precision manufacturing, sophisticated materials science, advanced control systems, and rigorous quality assurance—all areas where the region has established capabilities.

However, these technologies will require skills that differ from those needed for traditional nuclear generation, creating challenges and opportunities for workforce development. The region's educational institutions and training providers must adapt curricula and develop new programmes to support these emerging fields, while facilitating knowledge transfer from experienced workers in traditional nuclear roles.

By positioning itself at the forefront of these advanced nuclear technologies, the Midlands could transition from its historical role in component manufacturing to becoming a centre for developing and deploying next-generation nuclear energy systems.

4. Current Nuclear Workforce and Future Projections

4.1 Current Nuclear Workforce and Demand

Drawing on combined data from the Nuclear Industry Association (NIA)[1] and Fit4Nuclear[2]The Midlands currently has just over **8,600** employees working in the nuclear sector. These roles are spread across **57 companies** operating at **71 regional sites**. A detailed breakdown of employers and workforce figures is available in Appendix A.

The nuclear sector in the Midlands is dominated by small and medium-sized enterprises (SMEs). Of the 57 companies, **44 employ fewer than 100 staff**, and **55 have fewer than 500 employees**. This highlights SMEs' central role in the region's nuclear supply chain.

According to the Nuclear Workforce Assessment (NWA)[3] the region faces a workforce shortfall of over 12%. As such, unfilled roles across the region are estimated at roughly **1,030 positions**. This suggests that current demand is closer to **9,630 employees**, leaving a gap of roughly **1,030 unfilled roles** across the region.

4.2 Future Workforce Projections

There was considerable uncertainty around future growth projections during the SME engagement part of the research, making it difficult to establish consistent expectations. As a result, workforce forecasts have been drawn from organisations participating in the NWA, with a Midlands-specific split of the Assessment being used. Since larger organisations are more likely to contribute to the NWA—and given that supply chain expansion will likely mirror growth at the top end of the sector—these figures offer the most representative basis for regional projections.

Based on this data, the Midlands nuclear sector faces significant workforce pressures and opportunities in the years ahead:

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[1] Nuclear Industry Association (2024) NIA Jobs Map 2024, available at https://www.niauk.org/nia-jobs-map-2024/

[2] Fit4Nuclear (2025) F4N Connect Company Directory, available at https://connect.f4n.namrc.co.uk/profiles?q%5Bkeyword_search%5D=&q%5Bclosest_capability_cd_in%5D%5B%5D=&q%5Bproduct_sectors_id_in%5D%5B%5D=&q%5Bmachine_capabilities_id_in%5D%5B%5D=&q%5Bwelding_capabilities_id_in%5D%5B%5D=&q%5Binspection_capabilities_id_in%5D%5B%5D=&q%5Bdesign_capabilities_id_in%5D%5B%5D=&q%5Bcompany_definition_cd_in%5D%5B%5D=&q%5Bturnover_millions_gteq%5D=&q%5Bturnover_millions_lteq%5D=&q%5Bregion_id_in%5D%5B%5D=&q%5Bregion_id_in%5D%5B%5D=2&q%5Bregion_id_in%5D%5B%5D=8&q%5Bs%5D=&current_tab=%23list-view&_=1745937982027

[3] Cogent Skills (2025) Nuclear Workforce Assessment 2024, available at https://cogentskills.com/publications/nuclear-workforce-assessment-2024/

- A **43% increase in workforce demand is expected by 2030**, increasing the required number of employees from 9,630 to around 13,770.
- **A current workforce shortfall of 12%** is already being felt across the region.
- **39% of the current workforce is over 50**, posing a significant demographic challenge.
- **Around 10% of nuclear workers are over 60**, according to the 2024 NWA.
- The **annual attrition rate is estimated at 8%**, based on NWA figures. While this is comparatively low compared to other industries, the rate is expected to accelerate significantly in the coming years as the ageing workforce reaches retirement age.

4.3 Recruitment Requirements by 2030

To meet projected demand, the Midlands nuclear sector must recruit approximately **8,800 new employees by 2030**, equivalent to 102% of the current workforce. This figure includes:

1. **Current shortfall**: 1030 roles that are currently unfilled
2. **Growth-related demand**: 4,140 new positions to support the forecast 43% expansion
3. **Retirement replacements**: 860 roles to replace workers currently aged over 60 (10% of the workforce)
4. **General attrition**: 2,770 roles to account for typical annual departures from the sector

This scale of recruitment highlights the considerable workforce transition anticipated in the region over the coming years.

4.4 Critical Skills Challenges in the Midlands Nuclear Sector

The numerical challenge facing the region's nuclear sector outlined above is clear: recruiting 8,800 new employees by 2030 represents a significant undertaking. Yet the challenge extends beyond simple volume. Critical skills—those that are difficult to source and whose absence can disrupt operations—present an even more pressing concern for employers across the sector.

4.5 Identifying Critical Skills

Identifying critical skills has been undertaken through a structured national process as part of the Nuclear Workforce Assessment (NWA). A series of critical roles identification

sessions were held, during which organisations across the nuclear sector mapped and prioritised roles based on recruitment difficulty and operational impact.

Meanwhile, during stakeholder engagement for the Midlands Nuclear project (covered in Section 5), critical skills challenges formed a key component of semi-structured interviews with supply chain organisations.

Whilst both processes identified overlapping skill requirements, they revealed distinct emphases reflecting the different nature of organisations within the nuclear sector. The NWA process typically involves larger organisations focused on design, safety case development, and project management functions. Supply chain companies, by contrast, frequently occupy more specialised manufacturing and service provision roles, with concerns centred on hands-on technical skills required to produce components and systems to nuclear-grade specifications.

From this comprehensive analysis, both national and regional, the following critical skills have been identified for the Midlands nuclear sector:

Table 1 Critical Skills Framework for Regional Analysis

Skills Category	Specific Skills
Engineering & Technical	Mechanical, Civil/Structural, Electrical Engineering
	Systems Engineering
	Skilled Technical Workers (Machinists, fitters)
Regulatory & Safety	Safety Case development
	Radiological Protection
	Quality Control Personnel
Project Delivery	Project Planning & Controls
	Welding
Digital & Innovation	Hardware Engineers
	Digital systems capabilities

The prominence of core engineering disciplines, particularly mechanical engineering, across both assessment processes demonstrates the fundamental importance of these capabilities at all levels of the nuclear sector. These critical skills form the basis of the risk and opportunity analysis in Section 6 of this report. Skills shortages, alongside the broader recruitment challenges highlighted earlier, underscore the complexity of workforce development needs facing the Midlands nuclear sector in the years ahead.

5. Stakeholder Perspectives

5.1 Methodology

Our stakeholder engagement focused primarily on small and medium-sized enterprises (SMEs) within the nuclear supply chain, alongside key education providers. Despite initial challenges in recruiting organisations—mainly due to confidentiality concerns and competitive tensions within the sector—we successfully implemented alternative approaches to increase participation.

A referral strategy proved effective, whereby existing participants recommended other potential contributors. Additionally, offering anonymity to all participants improved response rates. The study gathered valuable insights from more than 20 individuals representing 15 SMEs and education providers operating throughout the Midlands region through these combined methods. This represents around 26% of the region's nuclear sector.

The data collection methodology centred on semi-structured virtual or face-to-face interviews according to participants' preferences and practical considerations. This approach was deliberately selected to maintain methodological consistency while providing the flexibility to explore emerging themes. Such adaptability proved valuable given the diverse organisational profiles within our sample, enabling participants to address issues most relevant to their specific circumstances.

Interviews typically lasted between 30 and 60 minutes, exploring key thematic areas including current workforce composition, recruitment strategies, skills development programmes, and anticipated future capability requirements. All conversations followed a standardised core framework to ensure complete coverage of essential topics, complemented by tailored probing questions that allowed deeper examination of organisation-specific contexts and challenges. This balanced structure facilitated comparative analysis across the sample and rich, contextualised insights from individual participants.

Following the interviews, we conducted manual content analysis to identify recurring themes, challenges, and opportunities. This process highlighted six key areas of concern that consistently arose during conversations. To maintain confidentiality, all references to individuals or organisations have been anonymised.

The findings are presented thematically rather than by organisational type, as this approach better reflects the shared challenges faced across different parts of the sector.

Challenge 1: Apprenticeships and Talent Development

Within the Midlands nuclear sector, apprenticeships remain the preferred route for developing new talent. Some organisations report that apprentices constitute as much as 15 percent of their workforce. This underscores the continuing importance of vocational pathways for building the future workforce.

Nevertheless, participants consistently described a long-term decline in apprenticeship numbers compared to earlier decades, when large employers in and around the region, such as Imperial Chemical Industries (ICI), General Electric (GE), and British Steel, invested heavily in training programmes. This earlier model supported a steady flow of skilled individuals into the wider supply chain. The subsequent reduction in such large-scale training has led to a fragmented landscape, where smaller organisations cannot often deliver comprehensive training programmes independently.

This challenge reflects the broader industrial restructuring across the UK during the 1980s and 1990s, which saw a significant shift from manufacturing to a service-based economy. Subsequently, education and skills policies were adjusted to support this new economic direction, focusing more on service sector competencies and academic qualifications. However, in recent years, there has been a gradual revival in advanced and high-end manufacturing, including nuclear.

Despite this industrial evolution, the education and skills landscape has remained largely unchanged, creating a growing divide between industrial needs and skills provision. This disconnect stems partly from the fact that the manufacturing resurgence has not been fully recognised in policy circles, hindering the necessary reorientation of the education system. The misalignment is especially noticeable in the region's nuclear supply chain, where technical capabilities and specialised vocational training are crucial but increasingly difficult to access through existing educational frameworks.

In response to these challenges, organisations have developed various strategic approaches. One larger employer has created a comprehensive apprenticeship programme that includes approximately 25 new graduate and degree-level trainees each year, developed in partnership with local universities. Meanwhile, smaller businesses maintain a consistent flow of apprentices by recruiting smaller numbers per year and offering university placements, prioritising efficiency rather than growth.

A recurring concern was the impending retirement of experienced professionals and the consequent loss of sector-specific knowledge. The technical expertise and deep operational understanding accumulated over decades cannot be readily replaced by early-career entrants, regardless of their academic qualifications or initial training. This

knowledge gap poses a significant challenge to the industry's operational continuity and safety standards.

Many participants noted the difficulty of encouraging senior staff to move into mentoring roles during the final phase of their careers, thereby limiting opportunities for effective knowledge transfer. This reluctance often stems from a combination of factors: the absence of formal recognition or career pathways for mentoring activities, limited financial incentives compared to technical roles, insufficient time allocation within existing workloads, and, in some cases, a cultural emphasis on direct production rather than skills development. Without addressing these structural barriers, the industry risks losing invaluable knowledge that cannot be captured in procedural documentation alone.

Challenge 2: Misalignment Between Education and Industry

Despite ongoing efforts to align educational provision with industry needs, gaps remain between the skills required in the nuclear sector and the education currently available, particularly at university level. Many courses are perceived as too broad, emphasising emerging trends rather than core technical knowledge. Industry feedback suggests that numerous programmes are fragmented, mixing basic skills with subjects like digital technology and artificial intelligence. Consequently, many graduates enter the workplace without the strong foundational knowledge needed for success in the sector.

Several organisations emphasised that education and training should prioritise fundamental engineering capabilities. Essential skills include mastering the engineering design process of problem definition, solution generation, and iterative testing; developing systems thinking to understand component interactions within complex systems; applying safety factors and conducting risk assessments; and practising optimisation to balance competing demands of cost, performance, safety, and reliability. The consensus amongst employers is that these core competencies provide the foundation upon which nuclear-specific expertise can be built through targeted, on-the-job training tailored to each organisation's particular operational requirements.

Alongside concerns about higher education, participants raised issues regarding literacy and numeracy among new apprentices. Some arrive with significant gaps in fundamental knowledge, which raises important questions about how well earlier education stages prepare students for technical roles. This issue has come into sharper focus following the government's decision to make English and maths optional for adult apprentices over 19. Whilst the aim of reducing barriers to entry to the sector is welcomed, there are concerns that the change could undermine the perception of engineering as a high-skill profession requiring strong academic foundations.

Whilst the introduction of T Levels was not reported by participants as addressing these educational alignment challenges, they may offer future potential if developed with effective industry engagement to ensure nuclear-relevant pathways provide the core technical foundations employers require.

Interestingly, participants broadly agreed that only a small portion of nuclear sector skills—around 10% by some estimates—are specific to the field. This consensus supports the idea that education providers should prioritise strong general skills development, with job-specific training delivered in the workplace. Some institutions are already adapting to this approach, with advanced manufacturing centres incorporating nuclear-focused modules into wider training programmes to provide more flexible pathways into the sector.

The engagement between schools and industry was frequently described as limited and sometimes superficial. In numerous cases, careers activities were characterised as compliance exercises by education providers fulfilling mandated careers services requirements rather than meaningful preparation for students considering technical careers. However, notable positive examples are emerging across the region. Some companies sponsor STEM events, support engineering competitions, and provide valuable work placements. In some instances, apprentices are directly involved in running these outreach programmes, providing authentic peer-to-peer insights that were reported to resonate particularly well with young people.

Current engagement approaches remain largely piecemeal, with little evidence of a coordinated sector-wide strategy at the SME level. This fragmented approach presents a significant barrier to identifying and sharing best practice across the nuclear supply chain.

Employment-linked training models, such as those successfully implemented by the Advanced Manufacturing Research Centre (AMRC), were consistently praised for blending academic learning with hands-on industry experience. This approach develops relevant skills and helps widen access to technical careers, particularly for students from less advantaged backgrounds who might otherwise struggle to access traditional academic routes.

However, whilst SME representatives were aware of current education policy reforms, including changes to apprenticeship structures and the introduction of new foundation pathways, they could not articulate how these changes might impact recruitment and access within the sector. This suggests that whilst policy announcements reach the smaller end of the advanced manufacturing supply chain, there remains insufficient

detailed understanding of how these reforms will translate into practical implications for workforce development.

Encouragingly, education providers are beginning to adapt to these challenges. Regional providers are looking to build nuclear engagement into their strategic work, and research centres are introducing targeted programmes, including specialised courses on materials used in nuclear applications. Some institutions are also developing online introductory modules in material and data science, specifically aimed at those entering the sector from other careers. Additionally, proposals for dedicated skills academies are in development, offering short, accredited courses designed to help people transition into the sector from declining industries.

Challenge 3: Documentation and Regulatory Pressures

The nuclear industry operates under stringent regulatory and documentation requirements, which can account for a substantial proportion of project costs. Many organisations reported that this administrative burden frequently pulls skilled staff away from their core technical work, creating significant inefficiencies.

In some cases, documentation requirements can constitute nearly half the total cost of a nuclear job, covering everything from material certificates and storage records to welder qualifications, inspections, and equipment calibration. This extensive paperwork reflects the industry's focus on safety and quality assurance but creates operational challenges that must be carefully managed.

Midlands supply chain companies often find that their experienced engineers spend considerable time on documentation rather than applying their technical expertise to manufacturing or engineering challenges. This shift creates inefficiencies, as valuable technical capability is diverted from areas where it adds the most value. The problem is particularly acute in smaller organisations where resources are already thin.

New entrants to the sector typically face a steep adjustment period, particularly when transitioning from less regulated industries. Understanding nuclear-specific quality and compliance standards requires dedicated training and time. Indeed, the nuclear mindset extends well beyond technical skill, demanding precision and quality assurance that far exceeds most other sectors.

This makes career switching especially challenging, as individuals must adapt not only to new technical expectations but also to a culture of strict accountability and meticulous attention to detail. Instilling this approach in staff accustomed to different standards can be difficult, particularly among those with long-standing habits formed in

other industrial environments. Successful integration, therefore, requires not just technical training but a fundamental shift in professional mindset.

To ease these regulatory pressures, some forward-thinking companies are exploring automation solutions. Several seek to develop artificial intelligence tools to support documentation tasks and streamline compliance processes. Whilst early results are promising, these technological solutions inevitably take time, investment, and the development of new digital skills to integrate effectively, and many firms expect considerable changes to systems and processes before the benefits are fully realised.

The complexity of nuclear regulations can also deter new businesses from entering the sector. Several participants noted that newer entrants often underestimate the level of detail involved in nuclear projects and the resource implications of meeting regulatory requirements. This underappreciation can lead to underbidding, followed by challenges in delivery when the full extent of the documentation becomes apparent. There have been cases where companies won contracts based on competitive prices but subsequently struggled with the workload, adversely affecting project outcomes and broader supply chain stability.

The strict quality and safety standards that define the sector also significantly shape how companies approach recruitment. Many prioritise candidates with the right mindset—focused, detail-oriented, and demonstrably committed to maintaining high standards—rather than those with specific qualifications alone. In this context, approach and attitude are often seen as equally important as formal training, reflecting the distinctive demands of nuclear work.

Challenge 4: Recruitment and Sector Perception

A complex interplay of perception issues, security constraints, and structural workforce gaps shapes recruitment in the nuclear sector. As highlighted previously, employers frequently prioritise candidates with the right mindset and a willingness to learn, rather than focusing exclusively on formal qualifications. Adaptability and attention to detail are essential qualities for the sector's success. These character traits and approaches to work are generally more complex to teach than technical skills, which can usually be developed through structured training programmes. This emphasis on potential over credentials reflects a broader shift in how capability is assessed across the industry.

However, national security requirements can limit who can apply for specific roles, particularly in the defence side of the sector, where higher security clearances are often required. This unavoidably narrows the available talent pool and makes improving diversity and inclusion across the workforce more challenging. The impact is

particularly felt by companies working on sensitive projects, where clearance requirements further restrict access to a limited supply of skilled professionals. Unlike other manufacturing sectors, nuclear production must remain within the UK for national security reasons, preventing companies from addressing skills shortages through offshore manufacturing or relocating to regions with more available talent pools.

Industry representatives highlighted a shortage of mid-career professionals, creating a significant experience gap in the workforce. This gap represents a legacy of historic under-recruitment during previous decades. As experienced workers begin to retire, the relative scarcity of this middle tier makes it increasingly difficult to pass on specialist knowledge effectively. Without enough in this crucial bracket to bridge the gap between new starters and veterans, knowledge transfer becomes a pressing issue and risks being permanently lost if not addressed through structured planning and mentorship.

Furthermore, nuclear employers face significant challenges in attracting skilled candidates, with engineering expertise in high demand across numerous regional sectors. Smaller companies can struggle to compete with larger employers regarding pay, benefits, or visibility in the job market. This competitive disadvantage makes it harder for supply chain companies to fill critical roles, especially those requiring specific technical skills or previous industry experience. In this context, successful recruitment is not merely about finding qualified individuals but also about making a compelling case for the sector as a rewarding and meaningful career path.

Public misconceptions about nuclear work also continue to affect regional recruitment efforts. Outdated views or negative associations may discourage potential candidates from considering roles in the sector. In response, some organisations are changing how they communicate these career opportunities. Rather than focusing solely on the nuclear aspect, they increasingly highlight their contribution to high-quality manufacturing, clean energy, and the broader transition to net zero. This more holistic approach is helping to broaden interest and attract candidates who might not have otherwise considered a role in the nuclear sector.

Specific shortages in skilled technical roles, such as machinists and fitters, create operational bottlenecks across the supply chain. These persistent shortages are often linked to long-standing misalignments between education and industry needs. In many cases, practical and vocational skills have not been sufficiently prioritised in mainstream education. This leads to a lack of candidates with the hands-on experience required for these crucial roles.

Challenge 5: Retention and Workforce Mobility

Retention presents ongoing challenges across the nuclear sector, particularly among early-career professionals. Although the overall sector attrition rate of 8% remains comparatively low, many younger employees leave within their first two years, driven by limited internal career structures and a lack of clear progression opportunities. This pattern, identified in the Nuclear Workforce Assessment, disrupts project delivery and places additional pressure on institutional knowledge, as companies face a continuous cycle of recruitment and training for entry-level positions. For many in the early stages of their careers, roles are increasingly viewed as temporary stepping stones rather than long-term commitments, making it challenging to build sustained capacity within teams.

Looking ahead, retention challenges are expected to intensify significantly as the sector's ageing workforce approaches retirement age, creating a dual pressure of replacing departing experience and simultaneously developing early-career talent. This situation reflects a broader shift in employment patterns, with younger workers approaching their careers differently than previous generations. Where past professionals might have remained with a single employer for decades, today's workforce generally values mobility and demonstrates less inclination towards long-term loyalty. This expectation change requires a rethink of how career development and retention strategies are designed, especially in sectors like nuclear that rely heavily on long-term knowledge retention and project continuity.

A key factor underlying poor retention rates is the absence of visible career pathways within many organisations. Without clear progression routes across technical, managerial, or commercial roles, talented individuals frequently leave for better opportunities elsewhere. In response to this challenge, some employers are trialling more flexible career structures that allow employees to move between departments and functions. By creating space for internal mobility, these organisations hope to keep skilled individuals engaged and invested in their long-term professional development.

At the same time, several participants acknowledged the potential value of a more mobile workforce across the sector as a whole. Sharing staff across organisations, particularly during slower project periods, could help manage resource capacity more effectively while offering professionals broader experience. This collaborative approach encourages a more strategic outlook on talent development, where mobility is not perceived as a loss but as an opportunity to strengthen the sector through shared expertise and cross-pollination of innovative ideas.

Professionals moving between companies of different sizes bring reciprocal benefits to the workforce. While larger organisations typically offer stability and structured training programmes, smaller firms generally provide broader responsibilities and greater exposure to innovative approaches. Individuals moving from small to large businesses or vice versa carry practical knowledge and insights that strengthen both environments and contribute to the sector's overall resilience.

For smaller firms, project delays pose significant risks to workforce retention. Unlike larger companies that can weather slowdowns with ongoing funding, smaller suppliers may face immediate cash flow issues and a corresponding dip in staff confidence. These pressures increase the likelihood of employees leaving the sector altogether for more stable roles elsewhere. Often, they transition into other engineering sectors where their expertise is highly valued, such as advanced manufacturing or aerospace.

When skilled professionals leave during project lulls, they take specialist knowledge and sector-specific expertise that is extremely difficult to replace. This creates inefficiencies when projects eventually resume, as companies must once again recruit and train new staff to fill the same roles. This stop-start dynamic disrupts delivery timelines and undermines knowledge continuity across the supply chain.

One potential solution to this challenge is to reframe the role of smaller businesses as entry points for talent development, rather than merely as service providers. These organisations could serve as valuable training grounds or knowledge hubs, preparing individuals who might later move into larger firms. This innovative model positions SMEs as vital contributors to the sector's overall talent strategy and suggests they could be recognised and supported financially for their crucial role in building nuclear capability.

A more coordinated and collaborative approach to workforce development would be required to make this model work effectively. Some participants suggested structured arrangements, where individuals are formally linked to larger employers but spend time in smaller organisations to gain specific experience. This rotational system could offer meaningful career development while maintaining important sector ties and building a more resilient talent pool.

Delivering on this vision would require the sector to overcome traditional competition between organisations and adopt shared frameworks for recognising and rewarding contributions to industry-wide skills development. It would also demand better systems for tracking career journeys and assessing the impact of different interventions, to ensure that workforce strategies deliver real, long-term value for individuals and the wider sector.

Challenge 6: Collaboration Across (and Beyond) the Sector

Our stakeholder engagement consistently highlighted the pressing need for improved collaboration throughout the nuclear sector and with adjacent industries. Participants emphasised that the current fragmented approach, with stakeholders working independently on similar challenges, prevents shared workforce development despite the apparent benefits of coordination.

The Midlands nuclear supply chain differs significantly from other UK nuclear clusters by focusing on advanced manufacturing and supply chain activities rather than direct generation facilities. This regional distinctiveness requires carefully tailored skills development approaches that cannot simply adopt generic national initiatives designed for different contexts. Regional coordination was considered particularly important in addressing the specific characteristics of the Midlands ecosystem.

A more unified supply chain strategy would build long-term resilience by recognising the interdependencies between companies of various sizes and specialisations and developing practical mechanisms for strategic collaboration. Many supply chain participants operate in relative isolation, missing valuable opportunities for shared learning and collaborative problem-solving on skills issues that affect the wider regional economy. A coordinated approach would help address the gap left by the historical reduction in large-scale apprenticeship programmes, which individual organisations now struggle to fill independently. By aggregating demand across multiple employers, both within and outside of nuclear, stronger cases could be made for expanded training provision in critical skills areas such as machining and fitting.

The inability to present a unified view of skills demand across the supply chain was identified as a barrier to addressing shortages in technical trades and skilled manual roles. Joint approaches to training development could help address the resource constraints faced by individual SMEs, creating economies of scale that benefit the entire sector. Smaller organisations were identified as valuable sources of innovation and specialist knowledge that could benefit the wider sector if shared more effectively.

Rather than viewing staff mobility as a challenge to be minimised, participants suggested reframing it as a mechanism for transferring knowledge across the ecosystem, making talent management a collective responsibility rather than solely an organisational one. This perspective fundamentally reframes how companies might approach workforce development.

Several participants proposed forming a Midlands-wide intervention group to coordinate engagement with education providers and develop more consistent

messaging about nuclear careers. The group could share best practices in education engagement and provide a unified voice when communicating industry needs. This could help address the widespread criticism that school career events often function as compliance exercises rather than meaningful engagement opportunities.

The intense competition for technical skills from adjacent industries like aerospace and automotive suggests potential for cross-industry collaboration on foundational skills development, with sector-specific specialisation introduced at later stages. Many of the technical skills required in nuclear work are equally valuable in other high-integrity engineering sectors, creating opportunities for joint approaches rather than direct competition.

Existing partnerships between industry and research institutions, particularly around AI applications for documentation processes, provide promising models that could be expanded to address other technological and skills challenges. These strategic partnerships can provide valuable access to emerging research while helping shape education provision to meet evolving industry needs.

While there was broad recognition of the benefits of greater collaboration, translating this into practical action requires overcoming barriers, including competitive pressures, resource constraints, and the absence of established coordination mechanisms. Developing successful collaborative approaches requires determined industry leadership and supportive policy frameworks.

5.2 Summary of Stakeholder Perspectives: Key Challenges

The stakeholder engagement process revealed interconnected challenges that collectively impact the Midlands nuclear sector's ability to develop, attract, and retain the workforce needed for current operations and future growth.

The most fundamental issue is the decline in structured pathways for developing technical talent. The long-term reduction in apprenticeship programmes—particularly those previously offered by large regional employers—has created a fragmented training landscape where smaller organisations cannot fill the gap independently. This is exacerbated by an impending "knowledge cliff" as experienced professionals approach retirement without effective mechanisms for transferring their specialist expertise to new entrants.

This talent development challenge is compounded by persistent misalignment between education provision and industry needs. Educational programmes often emphasise modern trends over core technical fundamentals, while school engagement activities frequently lack meaningful industry connections. Meanwhile, basic literacy and

numeracy deficiencies among some new entrants raise concerns about foundational skills development earlier in the education system.

The nuclear sector's stringent documentation and regulatory requirements create additional operational pressures, with paperwork sometimes constituting nearly half the total cost of nuclear projects. These administrative burdens often pull skilled technical staff away from their core work, creating inefficiencies, particularly acute in smaller organisations with limited resources. Adapting to these standards also presents barriers for new entrants to the sector and professionals transitioning from less regulated industries.

Recruitment challenges stem from multiple factors: competition from other sectors for technical talent, security clearance requirements that narrow the available talent pool, public misconceptions about nuclear work, and structural gaps in the workforce—particularly at mid-career level—resulting from historical under-recruitment. Smaller companies face difficulties attracting candidates when competing against larger organisations with better-known brands and more substantial resources.

Retention presents a persistent problem, especially among early-career professionals who frequently leave within their first two years. The absence of visible progression pathways within many organisations contributes to this turnover. At the same time, project delays create additional retention risks for smaller suppliers who may lose skilled staff during periods of reduced activity. When these professionals depart, they take valuable sector-specific knowledge that is difficult to replace.

Finally, limited collaboration across the sector hampers workforce development efforts. The current fragmented approach, with stakeholders working independently on similar challenges, prevents effective shared solutions despite the apparent benefits of coordination. This is particularly problematic for the Midlands nuclear supply chain, which differs significantly from other UK nuclear clusters' focus on advanced manufacturing rather than generation, requiring tailored approaches to skills development.

Addressing these interconnected challenges will require coordinated action across multiple fronts: strengthening talent pipelines, improving education-industry alignment, streamlining regulatory compliance, enhancing recruitment and retention strategies, and fostering greater collaboration across the sector. The recommendations outlined in Section 8 present a comprehensive approach to tackling these issues and building a workforce capable of supporting the region's nuclear ambitions.

6. Regional Workforce Analysis

6.1 Approach to the Workforce Analysis

This section offers a data-driven assessment of the nuclear-relevant workforce in the Midlands, focusing on the critical skills required for both current operations and future developments. The research analyses 46 nuclear-relevant occupations directly linked to essential skills needed in the core nuclear sector and its supply chain.

Our methodology maps these critical skills—identified through national research and regional stakeholder engagement, as outlined in previous sections—to Standard Occupational Classification (SOC) codes. It also attempts to define the regional nuclear sector using Standard Industrial Classification (SIC) codes. This approach enables alignment with national workforce and employment data published by the Office for National Statistics (ONS).

Some critical skills correspond directly to specific SOC occupations (for example, mechanical engineering aligns closely with the SOC category for mechanical engineers). Others are mapped more broadly, representing looser associations with transferable skills in related occupations. More specialist nuclear roles—such as those in safety case development or radiological protection—are matched to occupations where such expertise is typically embedded, albeit not always explicitly defined.

This methodology enables us to identify direct transfer opportunities (requiring minimal additional training) and indirect pathways (where more substantial reskilling or upskilling is necessary). It also highlights competing industries that may pose recruitment challenges to the region's nuclear sector by attracting individuals with comparable skillsets.

The analysis draws primarily on the ONS Labour Force Survey and the Annual Survey of Hours and Earnings, offering an evidence-based overview of the regional labour market related to nuclear skills. The workforce is examined from multiple perspectives, including occupational representation, industry distribution, and industrial trends.

The section is structured into five main parts. First, we define the scale of the sector helping to support nuclear delivery, encompassing core nuclear activities and supply chain contributions. Second, we assess regional comparative advantages and disadvantages in nuclear-relevant occupations, identifying where the Midlands outperforms—or lags—national benchmarks. Third, we explore the distribution of nuclear-relevant skills across the region’s industrial landscape. Fourth, we examine sectoral growth and decline trends over the past decade, identifying both emerging competition for talent and potential sources of skilled labour from contracting

industries. Finally, we present key risks and strategic opportunities for nuclear workforce development. We offer practical insights into bridging skills gaps, capitalising on regional strengths, and enabling effective skills transfer pathways to support the Midlands' current and future nuclear ambitions.

6.2 Size of the Nuclear Sector in the Midlands

Defining the nuclear sector and the wider industry supporting nuclear development using Standard Industrial Classification (SIC) codes is challenging. Codes associated with core nuclear activities typically focus on the processing of nuclear fuels or the manufacture of weapons and ammunition, while decommissioning is classified under the collection of hazardous waste. This represents a narrow interpretation of what is a far broader sector. The absence of nuclear power generation in the Midlands means the region's nuclear sector cannot be meaningfully captured through these traditional classifications.

As highlighted during stakeholder engagement undertaken for this study, most organisations active in the region's nuclear sector are not exclusively nuclear-focused. Rolls-Royce, the Midlands' largest nuclear employer, exemplifies this. The company's operations span steam generator manufacturing, engine and turbine production, and machining—none of which are nuclear-specific activities.

Further complexity arises when attempting to define the nuclear supply chain. Many businesses supplying goods and services to the sector do not operate exclusively within it. As a result, it is challenging to produce precise estimates of the nuclear sector's size compared to the region's wider engineering, manufacturing, and construction industries.

To address this, we adopted an alternative approach to identifying industries employing skills in demand by the region's nuclear sector. We then distinguished between those more likely to be involved in core nuclear activities and those participating in the broader nuclear supply chain. This provides us with a set of nuclear-related industries that do not necessarily operate directly within the nuclear sector but employ people with skills in demand by nuclear organisations in the Midlands.

6.3 Scale of the Workforce Supporting Delivery of Nuclear in the Midlands

Our analysis shows that industries employing skills related to core nuclear activities account for nearly 470,000 workers across the Midlands. The public administration and defence sector represents the most significant component, with approximately 375,000 employees. Although we acknowledge that many in this industry are employed as civil servants, public administrators, and other public services, the industry contains a high

proportion of regulator officials and programme support employees in high demand by the nuclear sector.

Other significant contributors include electricity, gas, steam and air conditioning supply (over 35,000 workers), the manufacture of basic metals (nearly 24,000), scientific research and development (over 18,000), and waste collection, treatment, and disposal activities (approximately 17,000).

Table 2 The size of the Midlands workforce employing skills related to core nuclear activities

	2-digit SIC	2024
Core Nuclear Industries	24 Manufacture of basic metals	23,503
	35 Electricity, gas, steam and air conditioning supply	35,267
	38 Waste collection, treatment and disposal activities; materials recovery	17,036
	72 Scientific research and development	18,462
	84 Public administration and defence; compulsory social security	374,951
	Total	**469,219**

Looking at industries that employ skills related to the nuclear supply chain, our analysis reveals an even larger workforce of approximately 695,000 people. This encompasses a diverse range of sectors, including specialised construction activities (nearly 147,000 workers), computer programming and consultancy (over 136,000), architectural and engineering activities (119,000), and civil engineering (over 77,000). Additional significant contributors include machinery and equipment manufacturing (63,000), fabricated metal product manufacturing (over 58,000), other professional activities (49,000), and machinery repair and installation (45,000).

Table 3 The size of the Midlands workforce employing skills related to nuclear supply chain activities

	2-digit SIC	2024

Supply Chain and Enabling Industries	25 Manufacture of fabricated metal products, except machinery and equipment	58,465
	28 Manufacture of machinery and equipment n.e.c.	63,255
	33 Repair and installation of machinery and equipment	45,134
	42 Civil engineering	77,451
	43 Specialised construction activities	146,744
	62 Computer programming, consultancy and related activities	136,227
	71 Architectural and engineering activities; technical testing and analysis	119,004
	74 Other professional, scientific and technical activities	49,203
	Total	**695,483**

The data shows that the current Midlands nuclear sector, which employs approximately 8,800 people, represents only a small fraction of the wider nuclear-related workforce in the region. This substantial difference in size between the nuclear and nuclear-related sectors presents challenges and opportunities. On one hand, it indicates significant competition for nuclear-related skills within the region, potentially creating recruitment difficulties for organisations specifically focused on nuclear activities. On the other hand, this extensive pool of workers with transferable skills represents a valuable resource that could be strategically tapped should the nuclear sector prioritise skills transfer as their chosen approach to workforce development.

6.4 Analysis of Comparative Advantages and Disadvantages of Occupations Supporting Nuclear Delivery

As the UK's nuclear sector evolves to meet growing energy demands and net-zero ambitions, the availability and distribution of relevant workforce capabilities across regions will be critical in shaping delivery outcomes. Understanding where specific occupations related to nuclear are concentrated—or notably lacking—provides insight into the regional readiness to support current operations and future projects.

The Midlands, home to 16.0% of the UK workforce, accounts for a slightly higher 16.8% national employment in occupations related to nuclear. While this suggests a modest

over-representation overall, the aggregate figure conceals significant variation in the regional distribution of specific nuclear-relevant roles. Some occupations are intensely concentrated in the region, indicating potential comparative advantages that can be leveraged for nuclear project delivery. Others are under-represented, highlighting gaps that could constrain progress without targeted intervention.

This section thoroughly explores those occupational patterns, identifying where the Midlands holds a comparative advantage—employing more than its workforce share (16.0%) of the UK total in specific roles—and where it shows disadvantage. The analysis helps clarify which skillsets the region can readily supply to the nuclear sector and where new strategies may be needed to address emerging workforce challenges.

Regional Comparative Advantage: Over-represented Occupations

Engineering Design and Systems Integration

Roles focused on system design, integration, and technical planning are well represented across the Midlands, with employment shares significantly exceeding national averages. The over-representation of these occupations suggests a comparative advantage in capabilities defined in the Critical Skills Framework (Table 1):

- **Civil/Building:** High concentration of building and civil engineering technicians (28.8%) and civil engineers (19.7%)
- **Mechanical:** Strong representation of mechanical engineers (24.7%) and general engineering professionals (25.4%)
- **Electrical:** Significant employment in electrical engineers (25.3%) and electronics technicians (24.0%)
- **Systems:** Capabilities reflected through engineering professionals and technicians (22.1-25.4%)

These engineering capabilities are critical in meeting the region's current nuclear requirements. They also offer a strong skills base to support future ambitions in advanced nuclear technologies, especially during the design and development phases of SMR deployment.

Construction and Manufacturing Delivery

Occupations crucial for executing major infrastructure projects show strong regional representation across the Midlands, with employment shares exceeding national averages. The region's concentration in welding trades (31.4%) directly supports critical nuclear sector requirements, alongside substantial over-representation of metal machining setters (31.1%), skilled trades supervisors (22.1%), and metal working fitters (22.0%). Construction project managers (20.9%) provide essential project delivery capabilities.

Again, this manufacturing and construction expertise aligns well with next-generation nuclear technologies, particularly the high-precision manufacturing needed for SMR components.

Assurance, Testing and Regulatory Compliance

The Midlands shows strong representation in occupations responsible for operational integrity, quality control, and regulatory compliance, with employment shares substantially exceeding national averages. These include quality assurance technicians (28.0%), environmental health professionals (24.4%), routine inspectors and testers (22.2%), inspectors of standards and regulations (20.0%), and quality assurance and regulatory professionals (18.7%). This concentration provides a valuable pipeline of workers with specialised skills to meet the nuclear sector's stringent requirements whilst creating an innovation-supporting environment for the successful delivery of future nuclear projects.

Regional Comparative Disadvantage: Under-represented Occupations

Digital Systems, Data and Cyber Architecture

A notable shortfall exists in roles essential for developing, managing, and securing digital systems across the Midlands, with employment shares significantly below national averages. Key technology gaps include IT network professionals (15.6%), information technology professionals n.e.c. (14.6%), cyber security professionals (14.1%), IT business analysts, architects, and systems designers (13.4%), data analysts (12.0%), and programmers and software development professionals (11.2%). This comparative shortage presents a strategic challenge as nuclear operations increasingly rely on digital technologies.

Scientific Research, Process Engineering and Innovation

Scientific and process engineering occupations show significant under-representation across the Midlands. Key gaps affecting nuclear technology development include

physical scientists (13.8%), production and process engineers (13.7%), chemical and related process operatives (6.6%), planning, process and production technicians (4.2%), and precision instrument makers and repairers (11.0%). This deficit challenges emerging nuclear technologies like the STEP fusion programme at West Burton and advanced modular reactors.

Project Governance and Organisational Leadership

Programme management capabilities are under-represented, with shortfalls in Control engineers (15.8%), Health and safety managers (12.6%), and Business and financial project management professionals (12.9%). These functions are essential for safely delivering complex nuclear projects to the required standards.

Specialist Construction and Heavy Engineering Trades

Critical construction trades show significant underrepresentation, including tool makers, tool fitters, and markers-out (12.0%), while pipe fitters and steel erectors register 0.0% regional employment. These zero figures likely reflect sampling limitations rather than complete absence but indicate potential scarcity in roles pivotal for nuclear construction phases. This shortage presents barriers to infrastructure development essential for the region's future nuclear ambitions.

6.5 Regional Comparative Advantage/Disadvantage Summary

This assessment presents a strategic analysis of the Midlands' nuclear workforce capabilities, examining regional comparative advantages and disadvantages across critical skill areas. Figure 2 summarises the skills advantage/disadvantage matrix and identifies areas for leverage and investment, highlighting established capabilities in engineering and construction alongside significant shortfalls in digital systems and scientific research. This provides a foundation for informed workforce development strategies supporting current nuclear operations and emerging technologies such as SMRs and fusion development.

Figure 2 Midlands Nuclear Workforce - Regional Comparative Advantage/Disadvantage Analysis

Regional Comparative Advantage/Disadvantage Summary

Regional Workforce Analysis for Nuclear Sector Development

Regional Overview

The Midlands presents a nuanced skills landscape with distinct comparative advantages alongside significant gaps. Employment patterns reveal both clear areas of strength and challenges that will influence the region's ability to support current and future nuclear opportunities.

Skills Advantage and Disadvantage Matrix

Skill Category	Current Talent Pool	Local Demand Alignment	Future Tech Readiness	Strategic Priority
Engineering Design & Systems Integration	STRONG	HIGH	MODERATE	LEVERAGE
Construction & Infrastructure Delivery	STRONG	HIGH	GOOD	LEVERAGE
Assurance & Regulatory Compliance	STRONG	HIGH	GOOD	LEVERAGE
Digital Systems & Cyber Architecture	WEAK	LOW	CRITICAL	INVEST
Scientific Research & Process Engineering	WEAK	MODERATE	CRITICAL	INVEST
Specialised Project Governance	WEAK	MODERATE	MODERATE	DEVELOP

Strength/Over-represented Mixed/Emerging Gap/Under-represented

LEVERAGE EXISTING STRENGTHS

- Support career transitions from adjacent engineering sectors
- Utilise existing construction expertise for nuclear infrastructure
- Build on established quality assurance capabilities
- Create competitive employment offers to attract talent

TARGETED INVESTMENT REQUIRED

- Develop digital systems and cybersecurity programmes
- Invest in scientific research capabilities
- Strengthen project governance and management skills
- Create coordinated education and training strategies

6.6 Analysis of Industrial Concentrations of Occupations Related to Nuclear in the Midlands

Building on the previous section's identification of comparative advantages and disadvantages in occupations related to nuclear, this section examines which industries concentrate these skills within the Midlands' economy. Using two-digit Standard Industrial Classification (SIC) codes, which classify companies' primary business activities, the analysis identifies where nuclear-related skills are located to assess how they can be accessed, mobilised, or redirected to support nuclear sector development.

The analysis focuses on leading industry sectors employing occupations identified as significantly over- or under-represented in the region, highlighting principal industry clusters where key occupations are most prevalent rather than offering precise employment estimates. This provides a practical view of how the Midlands' existing industrial base supports or constrains nuclear workforce development, particularly across industries involved in complex engineering, advanced manufacturing, large-scale infrastructure, energy generation, and other highly regulated environments where transferable skills are most likely found. The section identifies workforce development pathways that align with the region's industrial strengths and challenges, outlining how these skills could transfer into the current and future nuclear sector.

Industry Clusters Supporting Comparative Advantages

Engineering Design and Systems Integration

Mechanical, electrical, and civil engineering roles and associated engineering technicians and building engineering professionals are predominantly found in architectural and engineering activities, manufacturing, and construction sectors. These industries provide a technically mature environment with established capabilities in complex system integration. While highly relevant to nuclear project design, safety case development, and infrastructure specification, skills sourced from these sectors would require adaptation to meet the nuclear industry's rigorous quality assurance and regulatory standards.

Principal industry sectors employing these occupations include architectural and engineering activities with technical testing and analysis (SIC 71), construction of buildings (SIC 41), manufacture of machinery and equipment (SIC 28), civil engineering (SIC 42), manufacture of other transport equipment (SIC 30), and manufacture of motor vehicles and trailers (SIC 29).

Skills transfer potential: Workers from these sectors bring valuable experience in complex systems design and integration that could be readily transferred to nuclear engineering roles through targeted training in nuclear-specific regulations, safety case methodologies, and quality assurance processes. The automotive and transport equipment manufacturing sectors particularly offer skills in precision engineering and integrated systems design that align well with nuclear component design and fabrication requirements.

Construction and Infrastructure Delivery

Roles vital for site-based work, such as welders, metalworkers, plant operatives, quantity surveyors, and electricians, are primarily embedded in heavy construction, equipment manufacturing, industrial maintenance, and specialised trades sectors. These industries represent a potential labour pool for site preparation, fabrication, installation, and commissioning activities central to the current and future nuclear workforce. Successful transition for workers from these sectors into nuclear environments necessitates adherence to stringent nuclear site protocols, safety culture, and quality standards.

Principal industry sectors employing these occupations include the manufacture of fabricated metal products (SIC 25), specialised construction activities (SIC 43), the manufacture of machinery and equipment (SIC 28), the construction of buildings (SIC 41), the repair and installation of machinery and equipment (SIC 33), and architectural and engineering activities with technical testing and analysis (SIC 71).

Skills transfer potential: The construction and manufacturing sectors provide a ready workforce with transferable technical skills for current nuclear activities and future nuclear site development in the region, particularly for SMR deployment. Targeted programmes focused on nuclear safety culture, quality documentation, and regulatory familiarity would enable these workers to transition effectively into nuclear roles whilst maintaining their core technical competencies.

Assurance, Testing and Regulatory Compliance

Occupations related to quality assurance, environmental health, and inspection are distributed across various industries where regulatory compliance and adherence to technical standards are essential operational factors. Skills found in public administration, defence, and architectural/engineering consultancy possess direct

relevance to the nuclear sector. However, these occupational titles in less directly related sectors, such as food production and financial services auxiliaries, likely reflect more generic assurance functions. Skills from these latter contexts would require significant adaptation, sector-specific training, and familiarisation with the unique nuclear regulatory environment to be effectively applied.

Principal industry sectors employing these occupations include public administration and defence with compulsory social security (SIC 84), activities auxiliary to financial services and insurance (SIC 66), architectural and engineering activities with technical testing and analysis (SIC 71), manufacture of other transport equipment (SIC 30), veterinary activities (SIC 75), and manufacture of food products (SIC 10).

Skills transfer potential: Quality assurance professionals from highly regulated industries like defence and transport equipment manufacturing could transition into nuclear roles with targeted training on nuclear-specific regulatory frameworks. Their experience with rigorous inspection protocols and compliance documentation provides a solid foundation for meeting the nuclear sector's stringent quality requirements, particularly important for operational facilities and new advanced nuclear technologies.

Industry Context for Comparative Disadvantages: Addressing Critical Shortages

Digital Systems, Data and Cyber Architecture

Specialist roles in cyber security, software development, data analysis, and digital systems architecture are primarily concentrated in dedicated technology sectors (IT services, telecommunications) and consultancy firms. ONS data suggests a limited presence of these roles within the Midlands' workforce, potentially impacting the region's ability to deploy, manage, and secure integrated digital control systems, secure data environments, automation technologies, and operational technology specific to nuclear sector safety, security, and operational requirements.

Principal industry sectors employing these occupations include computer programming, consultancy and related activities (SIC 62), public administration and defence with compulsory social security (SIC 84), financial services excluding insurance and pensions (SIC 64), telecommunications (SIC 61), activities of head offices and management consultancy (SIC 70), and architectural and engineering activities with technical testing and analysis (SIC 71).

Skills development needs: The limited presence of advanced digital skills poses barriers to supporting the nuclear sector's digitalisation. Attracting digital professionals

from the finance and telecoms sectors could help bridge this gap whilst developing tailored training programmes focused on nuclear-specific digital skills, such as operational technology security and industrial control systems for next-generation facilities.

Scientific Research, Process Engineering, and Innovation

Specialist scientific and technical roles, such as physical scientists and process engineers relevant to advanced nuclear concepts (fusion, small or advanced modular reactors), appear sparsely distributed across the Midlands' main industrial sectors. While some presence exists in engineering consultancy and relevant manufacturing areas such as transport equipment, the data indicates limited footprint within dedicated research-intensive industries or higher education research settings. This scarcity presents strategic challenges for the Midlands in contributing to national advanced nuclear R&D efforts, particularly concerning next-generation reactor designs, fuel systems, or waste management solutions.

Principal industry sectors employing these occupations include architectural and engineering activities with technical testing and analysis (SIC 71), wholesale and retail trade and repair of motor vehicles (SIC 45), manufacture of other transport equipment (SIC 30), manufacture of motor vehicles and trailers (SIC 29), mining support service activities (SIC 09), and manufacture of machinery and equipment (SIC 28).

Skills development needs: Supporting advanced nuclear technologies requires stronger scientific research capabilities, such as attracting experienced scientists and expanding dedicated nuclear science education pathways with regional universities. Leveraging process engineering expertise from the vehicle manufacturing and transport equipment sectors could provide transferable skills for nuclear process applications, though significant upskilling would be required.

Project Governance and Organisational Support

Roles essential for governing large-scale programmes, including project controls, planning, health and safety management, and quality planning, show representation in public administration and engineering consultancy sectors. However, data suggests these functions may not be deeply embedded within the region's core construction and energy supply chain companies at the scale required for major nuclear projects. This indicates potential limitations in readily available regional capacity for integrated

project execution and assurance, suggesting focused development of project management capabilities tailored to nuclear programmes' complexity, longevity, and stringent regulatory requirements.

Principal industry sectors employing these occupations include public administration and defence with compulsory social security (SIC 84), architectural and engineering activities with technical testing and analysis (SIC 71), education (SIC 85), financial services excluding insurance and pensions (SIC 64), specialised construction activities (SIC 43), and civil engineering (SIC 42).

Skills development needs: Developing project governance capabilities for nuclear programmes necessitates targeted training for project professionals from public administration and consultancy backgrounds, focusing on nuclear-specific programme controls, safety case management, and regulatory compliance. Creating structured pathways for financial services professionals into nuclear project roles could help address programme delivery expertise shortages.

Specialist Construction and Heavy Engineering Trades

Pipe fitters and steel erectors recorded no measurable employment within the Midlands according to LFS data, whilst tool makers and related fitting roles showed minimal activity, concentrated in basic metals and fabricated metal products manufacturing. Zero counts likely reflect sampling limitations for specific, often project-based trades rather than confirming complete regional absence. Nevertheless, these findings underscore a potential undersupply within readily identifiable labour pools, posing bottleneck risks during critical nuclear construction phases requiring specialised site-based assembly, precision welding, and structural installation. This situation could increase reliance on attracting labour from outside the region or engaging specialist contracting firms.

The principal industry sectors employing these occupations include the manufacture of fabricated metal products (SIC 25) and the manufacture of basic metals (SIC 24).

Skills development needs: Addressing apparent specialist construction trades shortages requires targeted apprenticeship programmes focused on nuclear construction requirements. Developing nuclear-specific qualifications for pipe fitting and steel erection, potentially partnering with existing fabrication businesses, would help create a pipeline of skilled workers for future nuclear infrastructure projects in the region.

6.7 Summary of Industrial Concentrations of Occupations Supporting Nuclear in the Midlands

The Midlands possesses strong capabilities in traditional mechanical, electrical, and civil engineering disciplines, concentrated in construction, machinery manufacturing, and transport equipment. These sectors form a technically mature ecosystem with proven strengths that align closely with nuclear project requirements, though targeted upskilling in nuclear-specific protocols would be necessary.

Construction, metalworking, and industrial maintenance sectors host skilled trades vital for nuclear development. Welders, electricians, and other skilled workers represent an accessible labour pool, especially relevant for small modular reactor deployment, though training in nuclear safety culture and compliance would be required.

Quality assurance and regulatory occupations exist across defence, public administration, and consultancy sectors, offering transferable experience. However, the region shows deficiencies in several critical areas: digital systems and cybersecurity specialists are underrepresented, potentially limiting support for secure nuclear operations; scientific research and process engineering occupations appear insufficient for advanced nuclear technology development; project governance capabilities seem limited within construction and energy supply chains; and specialist site-based trades like pipe fitters and steel erectors are minimally represented.

While the Midlands' industrial base offers substantial opportunities to support nuclear sector growth, addressing these capability gaps through targeted skills development and strategic investment will be crucial for the region to play a leading role in the UK's nuclear future.

7. Analysis of Industry Growth and Decline Trends

Building on the preceding analysis of industrial concentrations, this section explores how broader employment trends across the Midlands may influence the availability of skills relevant to the nuclear sector. During this period, total employment in the Midlands grew by approximately 10.8%, adding over 520,000 jobs across the economy. The section examines industry sectors that are either growing or contracting, focusing on those with occupational profiles that overlap with the skills required across the nuclear lifecycle.

Rapid growth in specific sectors may lead to increased competition for key talent, particularly where technical, managerial, or regulatory competencies are shared with the nuclear industry. At the same time, declining sectors may offer strategic opportunities to attract experienced workers whose skills could be adapted for use in nuclear programmes. Understanding these dynamics is essential for anticipating future labour market pressures and identifying potential pathways for workforce development and transition.

7.1 Growing Related Sectors: Potential for Talent Competition

Several industry sectors in the Midlands that employ workers with skills relevant to the nuclear sector have experienced strong employment growth between 2015 and 2024. This growth may signal increasing competition for skilled labour, particularly where occupational requirements overlap.

Table 4 Growing sectors related to the Midlands' Nuclear Sector

2-digit SIC	Employment 2024	Net Change Since 2015	% Change Since 2015
86 Human health activities	430,545	+99,010	+29.9%
85 Education	586,069	+62,016	+11.8%
70 Activities of head offices; management consultancy activities	77,574	+24,781	+46.9%
41 Construction of buildings	129,470	+13,822	+12.0%
66 Activities auxiliary to financial services and insurance activities	64,332	+12,448	+24.0%
80 Security and investigation activities	35,294	+12,125	+52.3%
29 Manufacture of motor vehicles, trailers and semi-trailers	74,593	+11,021	+17.3%
69 Legal and accounting activities	79,536	+9,354	+13.3%
75 Veterinary activities	18,545	+9,060	+95.5%

The **Human health** industry in the Midlands has recorded the largest employment gain with over 99,000 new jobs since 2015. While distinct from nuclear, potential

occupational overlap exists in areas like radiological safety, health physics and data analysis within regulated environments. These roles often require comparable technical competencies and STEM qualifications.

Management consultancy activities have grown substantially, indicating rising demand for project managers, programme controllers, business analysts, and change management specialists. These skills are integral to delivering complex nuclear programmes, suggesting potential competition for experienced management professionals.

The **security and investigation** sector has expanded rapidly over the past decade. Given the nuclear sector's security requirements, this growth is relevant, with potential overlap in roles needing security clearance and surveillance expertise.

Legal and accounting activities added over 9,300 jobs, suggesting an increasing demand for compliance officers, regulatory advisors, and contract managers -- profiles also prevalent in the nuclear sector due to its regulatory landscape.

Construction of buildings and the **manufacture of motor vehicles** also saw notable employment increases. These industries employ skilled tradespeople, mechanical engineers, and electrical technicians, roles that are vital for the continued and future operation of the region's nuclear sector.

7.2 Declining Related Sectors: Potential for Workforce Transition

Conversely, industries experiencing employment decline may present opportunities for the nuclear sector to access experienced technical talent, particularly where skills or operational environments share similarities.

Table 5 Declining sectors related to the Midlands' Nuclear Sector

2-digit SIC	Employment 2024	Net Change Since 2015	% Change Since 2015
23 Manufacture of other non-metallic mineral products	20,068	-9,357	-31.8%
49 Land transport and transport via pipelines	119,506	-6,763	-5.4%
30 Manufacture of other transport equipment	45,668	-4,209	-8.4%
61 Telecommunications	23,791	-2,401	-9.2%
39 Remediation activities and other waste management services	2,139	-1,764	-45.2%
19 Manufacture of coke and refined petroleum products	651	-1,603	-71.1%
05 Mining of coal and lignite	219	-1,533	-87.5%
06 Extraction of crude petroleum and natural gas	203	-852	-80.8%

The **manufacture of other non-metallic mineral products** saw the largest numerical decline, with a reduction of over 9,000 workers in the past decade. This sector involves material handling, process operations and work in hazardous environments. Skills related to handling specific materials or managing safety-critical processes could be relevant to nuclear activities like waste encapsulation or materials fabrication.

Despite losing over 6,700 jobs, companies in the **land transport and transport via pipelines** sector remain a large regional employer. Their workforce includes professionals experienced in logistics planning, hazardous goods transport and operating within regulated systems. These capabilities may be transferable to nuclear logistics or secure transport operations.

The **traditional energy extraction and processing** industry in the Midlands has seen sharp percentage declines since 2015. Experience in these sectors often involves working in high-hazard environments, adhering to safety protocols, and complying with regulatory compliance—characteristics shared with the nuclear sector.

Remediation activities and waste management services also declined substantially. Its focus on environmental safety, hazardous material control and waste treatment suggests potential alignment with roles in nuclear site remediation, decommissioning and radioactive waste management.

7.3 Summary of Industry Growth and Decline Trends

This section highlights how evolving employment patterns across the Midlands are reshaping the region's skills landscape in ways that directly impact the nuclear sector. It finds that several growing industries—notably health, education, management consultancy, and construction—are driving demand for skills that overlap with those required across the nuclear lifecycle. These include technical competencies in regulated environments, project and programme delivery expertise, and compliance, security, and engineering roles. This trend signals the potential for increased competition for key talent, particularly in areas where demand already exceeds supply.

At the same time, the analysis identifies a set of declining industries—such as mineral product manufacturing, land transport, petroleum and gas extraction, and remediation services—that could offer a valuable pool of experienced workers. Many of these sectors involve high-hazard operational environments, regulatory oversight, and specialised technical processes, aligning them well with the needs of nuclear

employers. As these industries contract, they may present a strategic opportunity for reskilling and redeployment into nuclear programmes, particularly in roles related to logistics, waste management, materials handling, and decommissioning.

Together, these findings suggest that the Midlands' nuclear sector must navigate a complex labour market, balancing the risk of talent competition from expanding industries against the opportunity to absorb skilled workers from declining ones. A targeted and agile workforce strategy will ensure that the sector can sustain and grow its talent base over the coming decade.

8. Risks and Opportunities

This section builds on the previous analysis by identifying the development risks and opportunities of the region's nuclear sector. By analysing areas where the region faces skills vulnerabilities alongside industries competing for similar talent, we highlight critical risks that could constrain nuclear growth if left unaddressed. Correspondingly, we identify strategic opportunities from regional strengths and declining industries that could provide transferable skills. The aim is to provide a comprehensive assessment of the Midlands' nuclear workforce positioning, informing targeted interventions that can enhance regional capabilities while mitigating potential constraints to nuclear sector development.

8.1 Skills Risks for the Nuclear Sector

Critical Skills Challenges in High-Growth Areas

The Midlands faces significant workforce risks in several key areas where critical nuclear skills are underrepresented in the region and concentrated in growing industries, creating potential competition for talent.

Digital Capabilities Vulnerability Digital capabilities represent a significant vulnerability, with programmers, data analysts, IT architects, and cybersecurity professionals substantially under-represented regionally. These roles are concentrated in expanding sectors such as management consultancy, financial services auxiliaries, and legal/accounting activities. As digital systems become increasingly central to nuclear operations, nuclear organisations will face intense competition from these growing sectors, potentially leading to recruitment difficulties, wage inflation, and project delays. This is compounded by automation trends aimed at streamlining documentation processes, which can constitute nearly half of nuclear project costs. These trends are increasing demand for software engineers and systems architects, particularly when specialists are in short supply regionally.

Scientific Research and Innovation Concerns Physical scientists and process engineers are notably under-represented in the Midlands, with limited concentration within dedicated research-intensive industries or higher education settings, despite some presence in engineering consultancy and transport equipment manufacturing. This scientific skills challenge is particularly concerning for the STEP fusion programme and future SMR deployments, which require sophisticated materials science, nuclear physics, and advanced process engineering capabilities. Without targeted interventions to develop these skills locally or attract them externally, the Midlands risks being unable to capitalise on advanced nuclear opportunities fully.

Project Governance Risks Project governance capabilities pose significant risks to effective programme delivery, with health and safety management, business and financial project management, and planning roles showing limited regional representation. These skills are predominantly found in public administration, consultancy, and education sectors rather than embedded within core construction and energy companies at the scale required for major nuclear projects. Management consultancy sector growth signals increasing competition for these professionals, potentially limiting the nuclear sector's ability to effectively govern complex, long-duration projects requiring specialised nuclear regulatory framework understanding.

Specialist Construction Trades Shortage The apparent shortage of specialist construction trades represents perhaps the most immediate critical vulnerability. Pipe fitters and steel erectors register negligible employment in regional data, while tool makers show minimal presence. This scarcity could create significant bottlenecks during nuclear construction, requiring specialised site-based assembly, precision welding, and structural installation expertise. Construction sector growth suggests increasing competition for limited construction talent, potentially necessitating external recruitment or specialist contracting at premium rates.

Industry Competition for Technical Talent Growth in healthcare, construction, and automotive manufacturing presents intensifying competition for technical talent. Healthcare expansion creates demand for professionals with radiological safety expertise, data analysis capabilities, and regulated environment experience—all relevant to nuclear operations. Automotive sector expansion increases competition for skilled trades essential for nuclear component design and fabrication. The security sector's rapid growth is particularly relevant given nuclear industry security requirements, suggesting increasing competition for professionals with security clearance experience and risk management capabilities. The expansion of legal and accounting activities increases the demand for compliance officers, regulatory advisors, and contract managers, potentially impeding the nuclear sector's development of robust regulatory compliance capabilities essential for licensing and operational safety.

8.2 Skills Opportunities for the Nuclear Sector

Leveraging Regional Strengths

The Midlands demonstrates significant comparative advantages in **engineering design and systems integration**, with over-representation of civil engineers and engineering technicians concentrated in architectural and engineering activities, manufacturing, and construction sectors. The concentration of engineering expertise within transport

equipment and machinery manufacturing offers particularly relevant experience in precision engineering and integrated systems design applicable to nuclear component development and safety system integration.

Construction and infrastructure delivery represent another area of strength, with welding trades, metal machining, skilled metal trades supervisors, and metal working fitters showing a strong regional presence in metal product manufacturing and specialised construction activities. The welding trades' exceptional over-representation is particularly significant given the critical importance of high-integrity welding for nuclear pressure vessels, containment structures, and primary circuit components.

The region's robust capabilities in **quality assurance and regulatory compliance**, evidenced by over-representation of quality assurance technicians, environmental health professionals, routine inspectors and testers, and inspectors of standards and regulations, provide essential skills for maintaining the nuclear sector's stringent quality and safety standards. The high concentration of quality assurance expertise in transport equipment manufacturing is particularly valuable, as this sector shares the nuclear industry's requirements for precision manufacture, documented quality control, and adherence to technical specifications.

Skills Transfer from Declining Industries

Several industries experiencing employment decline present opportunities for workforce transition into the nuclear sector. The **manufacture of non-metallic mineral products** has lost thousands of jobs since 2015, releasing workers with experience in material handling, process operations, and hazardous environments that could transfer to nuclear activities like waste encapsulation, materials fabrication, or site operations with targeted nuclear-specific training.

Despite losing thousands of jobs, the **land transport and pipelines sector** remains a large regional employer with professionals experienced in logistics planning, hazardous goods transport, and regulated systems operations. This represents a substantial talent pool with transferable skills for nuclear logistics, secure transport operations, or compliance management, particularly relevant for nuclear fuel cycle logistics and radioactive materials management.

The **sharp decline in traditional energy extraction and processing industries** (manufacture of coke and refined petroleum products, mining of coal and lignite, and extraction of crude petroleum and natural gas) has created a potential talent pool familiar with high-hazard environments and regulatory compliance. While these sectors now represent relatively small workforces, their specialised experience in energy

production and industrial safety cultures offers valuable capabilities for nuclear operations, particularly for workers with engineering or technical backgrounds.

The **reduction in remediation and waste management services** employment offers potential alignment with nuclear site remediation, decommissioning, and radioactive waste management roles. Workers from this sector bring valuable experience in environmental protection, contamination control, and hazardous waste handling that could transfer effectively to nuclear decommissioning activities with supplementary training in radiological protection and nuclear-specific waste management protocols.

8.3 Strategic Implications

The Midlands' nuclear workforce landscape presents significant challenges and strategic opportunities requiring a coordinated regional response. The digital skills challenge represents the most pressing long-term issue, necessitating targeted education initiatives, cross-sector training programmes, and strategic partnerships with technology firms to develop nuclear-specific digital capabilities essential for next-generation technologies.

Scientific research and process engineering shortfalls require investment in research capabilities through academic-industry collaborations, dedicated nuclear education pathways, and attraction strategies for experienced scientists. The STEP fusion programme at West Burton offers a catalyst for developing these capabilities if appropriate skills development strategies are implemented early.

Workforce transitions from declining industries present immediate opportunities through targeted retraining programmes. Creating structured pathways for workers from sectors like mineral products manufacturing, traditional energy, and transport equipment could provide readily accessible talent while addressing economic restructuring challenges in affected communities.

The region's established strengths in engineering, construction, and regulatory compliance provide a foundation for addressing current nuclear workforce needs while building future capacity. These capabilities could be leveraged through nuclear-specific training programmes, supply chain development initiatives, and coordinated workforce mobility approaches, enabling skills transfer from adjacent sectors.

Successful nuclear workforce development requires a comprehensive approach addressing immediate skills needs and long-term capability development through competitive attraction strategies for talent in growing sectors, structured transition pathways from declining industries, and targeted initiatives addressing critical digital and scientific skills challenges. By building on existing industrial strengths while

strategically addressing workforce vulnerabilities, the Midlands can position itself effectively within the UK's nuclear ambitions.

9. Recommendations

Based on stakeholder engagement and the analysis presented in the preceding sections, we have identified a focused set of strategic interventions to strengthen regional nuclear capabilities and address critical skills challenges. These recommendations are organised by delivery timeframe and responsibility, prioritising actions that will deliver the greatest impact on regional nuclear workforce development.

Priority 1: Immediate Actions (2025-2026)

Fully Engage with the Established Midlands Regional Hub: Prioritise active participation in the existing Midlands Regional Hub to coordinate skills demand data, training provision, and knowledge sharing across the regional supply chain. This addresses the fragmented approach to skills development identified in the analysis, whilst building on established infrastructure.

Launch Targeted Transition Programmes: Develop structured programmes to attract experienced workers from declining sectors, particularly targeting process engineering and technical trades expertise. This will help capture valuable skills and the transfer of valuable knowledge from other sectors within the region.

Create Nuclear-Specific Training Modules: Partner with regional education institutions to develop accredited nuclear safety, quality assurance, and regulatory modules that integrate into existing programmes, building on fusion and broader energy sector skills initiatives where appropriate. This addresses critical gaps in nuclear-specific knowledge whilst leveraging established educational capacity.

Priority 2: Regional Collaborative Initiatives (2026-2028)

Implement a Collective Apprenticeship Programme: Establish shared apprenticeship training, enabling smaller supply chain companies to participate collectively in talent development. This addresses capacity constraints among smaller regional employers whilst maintaining quality standards.

Develop a Cross-Sector Skills Recognition Framework: Create standardised frameworks for recognising nuclear-relevant skills from adjacent sectors such as automotive and aerospace. This facilitates workforce mobility by building on identified overlaps in technical competencies.

Establish an Advanced Nuclear Skills Academy: Develop dedicated facilities offering flexible nuclear-specific training for experienced professionals, career changers, and senior-level upskilling programmes. This addresses geographical gaps in specialist nuclear training provision across the region.

Launch a Systematic STEM Outreach Programme: Embed nuclear career awareness in regional secondary education, creating consistent pathways for young people into the sector. Focus particularly on areas currently underrepresented in the nuclear workforce.

Priority 3: Strategic Advocacy and Policy Alignment (2025-2030)

Advocate for a Nuclear Skills Investment Fund: Work with regional and national governments to establish dedicated nuclear workforce development funding, recognising the strategic importance of nuclear capabilities to net-zero objectives.

Promote the development of National Digital and Process Engineering Standards: Lead industry collaboration to address critical regional skills gaps through national qualification development, ensuring standards reflect current industry needs and future requirements.

Strengthen Regional Supply Chain Coordination: Advocate for enhanced collaboration mechanisms between nuclear prime contractors and regional supply chain companies, improving the visibility of future skills requirements and enabling better workforce planning.

Integrate Nuclear Priorities into the Regional Economic Strategy: Align local skills strategies, planning policies, and economic development initiatives with nuclear workforce needs, leveraging local government powers to support sector growth.

Implementation Approach

These 11 recommendations focus on interventions that can deliver measurable impacts on regional nuclear workforce capacity. Each addresses specific gaps identified in the analysis whilst remaining within realistic delivery capabilities. Success depends on strong collaboration between industry, education, and government stakeholders, with Midlands Nuclear coordinating where it has direct influence and advocating where broader stakeholder action is required. Implementation should align with related sectoral skills initiatives, particularly the UK Fusion Skills Council, given STEP's regional presence and broader clean energy strategies, where common challenges in engineering skills, project delivery, and STEM pipeline development offer opportunities for shared solutions.

10. Conclusion

The Midlands stands at a pivotal moment in the UK's nuclear future. This analysis reveals a region with substantial existing engineering, manufacturing, and quality assurance capabilities that align well with nuclear sector requirements, yet one that faces significant skills challenges that could constrain its ability to capitalise on emerging opportunities.

The numbers paint a challenging picture of the workforce transition ahead. With a requirement to recruit 8,800 new employees by 2030—equivalent to 102% of the current workforce—the region faces a significant skills mobilisation challenge. This scale of recruitment, driven by a 43% expansion in sector demand, an ageing workforce, and persistent skills shortages, demands immediate and coordinated action.

However, this challenge occurs within a broader context of opportunity. The region has a vast potential talent pool of 1.16 million workers could be strategically mobilised to support nuclear growth. The Midlands' comparative advantages in welding trades, mechanical engineering, and quality assurance provide a solid foundation, while declining industries offer pathways for skills transition that could address immediate workforce needs.

The stakeholder engagement reveals that the barriers to realising this potential are not insurmountable. The fragmented approach to skills development, misalignment between education and industry needs, and limited collaboration across the sector are challenges that can be addressed through focused intervention. The region's SME-dominated nuclear supply chain, whilst presenting coordination challenges, offers flexibility and innovation that larger, more rigid industrial structures might lack.

Looking ahead, the convergence of advanced nuclear technologies—SMRs, the STEP fusion programme, and potential Advanced Modular Reactor developments—positions the Midlands as a testbed for the future of nuclear energy. Success in meeting these workforce challenges will determine whether the region becomes a leader in next-generation nuclear technology or struggles to realise its potential.

The 11 recommendations presented offer a roadmap for addressing these challenges through immediate action, regional collaboration, and strategic advocacy. Yet their success depends on stakeholders across the region recognising that nuclear workforce development is not just a sectoral issue, but a regional economic imperative that requires coordinated commitment.

The Midlands has the industrial heritage, technical capabilities, and strategic positioning to lead the UK's nuclear renaissance. The actions taken in the following critical years will determine whether it seizes this opportunity to build the workforce that tomorrow's nuclear sector demands.

Appendix A

Midlands Nuclear Organisations

Region	Company	Employees (Est. workforce engaged with nuclear at each organisation)
East Midlands	AECOM	1
West Midlands	Alleima Limited	1
East Midlands	Alten Ltd	35
West Midlands	Ansaldo Nuclear Limited	242
East Midlands	Ansys UK Ltd	1
West Midlands	Arrowsmith Engineering	67
West Midlands	ARUP	10
West Midlands	ASD	15
East Midlands	Assystem UK Ltd	93
East Midlands	Atkins Réalis	98

East Midlands	Augean Limited	4
East Midlands	Bodycote H.I.P. Ltd	10
West Midlands	Brown and Holmes	62
West Midlands	Capula Ltd	243
East Midlands	Cavendish Nuclear Ltd	311
East Midlands	CE Turner	82
East Midlands	Certex Lifting	128
East Midlands	DBD International	16
East Midlands	Deloitte UK LLP	7
East Midlands	ECS Engineering Services	140
West Midlands	Frazer-Nash Consultancy - A KBR Company	60
East Midlands	Gleeds	10
West Midlands	Goodwin International Ltd	250
West Midlands	Gowling WLG	5
West Midlands	Heathyards Engineering	65

West Midlands	Hydrobolt	232
West Midlands	Hydrock Consultants Ltd	1
West Midlands	ITI Group	60
West Midlands	Jacobs Clean Energy Ltd	14
West Midlands	Joseph Ash Galvanising	563
West Midlands	KGD Industrial Services	90
West Midlands	Kuka Systems UK	150
East Midlands	Laing O'Rourke	19
East Midlands	Last Energy	1
East Midlands	Lestercast	37
East Midlands	Mace	2
West Midlands	Mammoet UK Ltd	3
West Midlands	Manufacturing Technology Centre	15
East Midlands	Morgan Sindall Infrastructure	9
East Midlands	Mott MacDonald Ltd	3

East Midlands	Nuclear Advanced Manufacturing Research Centre	98
East Midlands	Nuclear Energy Components Ltd	15
East Midlands	Nuclear Transport Solutions	21
East Midlands	Penny Nuclear	87
West Midlands	Pinsent Masons LLP	12
East Midlands	RAM Universal Ltd	18
West Midlands	Recruit12	2
East Midlands	Rolls-Royce plc	4,358
East Midlands	Rolls-Royce SMR Limited	456
East Midlands	SL Engineering	51
West Midlands	Somers Forge	120
West Midlands	Syspal	165
East Midlands	Tetra Tech	14
East Midlands	UK Atomic Energy Authority - West Burton	3
East Midlands	Vulcain Engineering	1

East Midlands	Westinghouse UK	24
East Midlands	WSP UK	23

Appendix B

Regional Workforce Analysis Methodology

Context and Objectives

This Labour Market Intelligence (LMI) report focuses on workforce patterns and trends relevant to the nuclear sector within England's Midlands region (comprising the East Midlands and West Midlands). Its primary purpose is to inform strategic workforce planning for Midlands Nuclear by providing detailed insights into the current labour market landscape. The analysis identifies regional strengths and potential vulnerabilities and highlights areas where critical skills may be in short supply or, conversely, where there might be available talent pools.

Specifically, this analysis aims to:

- Quantify current employment levels in occupations identified as necessary to the nuclear sector within the Midlands.
- Identify regional specialisations and potential weaknesses in workforce capacity relevant to nuclear activities.
- Assess recent employment trends across key industry sectors to evaluate future workforce availability and understand potential competition for essential skills.

Data Sources and Analysis Methods

The core data sources underpinning this analysis are the Labour Force Survey (LFS) and the Annual Survey of Hours and Earnings (ASHE), both managed by the UK's Office for National Statistics (ONS).

The **Labour Force Survey (LFS)** is the UK's largest and most authoritative household study concerning employment. Conducted quarterly, it gathers data from approximately 75,000 individuals across 35,000 households. Its scale, frequency, and long-standing use by government, researchers, and industry bodies establish it as the definitive source for workforce analysis at both national and regional levels. In this report, LFS data were utilised to:

- Estimate employment levels in 46 specific nuclear-relevant occupations across the Midlands and the wider UK.
- Analyse the qualification levels and age profiles associated with these roles (note: due to data robustness, this specific analysis is conducted at the UK level only).

- Identify the primary industry sectors that employ individuals within these key occupational groups.
- Track overall employment trends across relevant industry sectors between 2015 and 2024.

Understanding Standard Classification Systems: SIC and SOC Codes

The UK uses two standard classification systems to organise and interpret workforce data:

- **Standard Industrial Classification (SIC) codes:** These categorise businesses and organisations based on their primary economic activity (i.e., the industry they operate in).
- **Standard Occupational Classification (SOC) codes:** These group individual job roles based on the type of work performed and the associated skill level required.

SIC and SOC codes underpin major labour market datasets like the LFS and ASHE. They follow a hierarchical structure, allowing analysis at various levels of detail – from broad industry or occupational categories down to more specific groupings. This flexibility supports diverse analytical needs, from understanding high-level national trends to focusing on job roles or niche sectors.

For example, the SOC code system is structured as follows:

- **Major group**: 3: Associate professional occupations
    - **Sub-major group**: 31: Science, engineering and technology associate professionals
        - **Minor group**: 311: Science, engineering and production technicians
            - **Unit group**: 3115: Quality assurance technicians

This structure facilitates detailed analysis while keeping related job roles grouped logically. However, even at the most specific 'unit group' level (like 3115), the category encompasses a range of similar job titles (e.g., Quality Analyst, Quality Control Technician, Test Technician).

By combining SIC codes (providing the industry context) with SOC codes (defining the occupation), this report develops a comprehensive and nuanced understanding of employment patterns and workforce dynamics relevant to the nuclear sector.

Defining the Nuclear Industry Using SIC Codes

Precisely isolating the nuclear sector using standard industry classifications (SIC codes) presents challenges, as activities related to nuclear are often embedded within broader industry categories that also include non-nuclear work. To balance the need for sector relevance with the requirement for statistically reliable data, this analysis defines relevant industries primarily at the 2-digit SIC code level. While more granular 4-digit SIC codes exist, employment estimates at that level often suffer from unreliability due to smaller sample sizes in surveys like the LFS.

Using broader 2-digit categories ensures the analysis is founded on robust data, while still effectively capturing the key industrial components of the nuclear sector and its immediate supply chain. This approach inevitably includes non-nuclear firms within the analysis and may omit some highly specialised niche nuclear suppliers. However, it produces datasets large enough to analyse confidently and remains closely aligned with the sector's overall industrial footprint. Furthermore, it is reasonable to assume that where other sub-sectors fall within these 2-digit definitions, they often represent adjacent industries likely employing individuals with skills and experience that are potentially relevant and transferable to the nuclear sector.

For this analysis, relevant industries have been grouped into two broad categories:

Core Nuclear Industries: Sectors containing activities directly linked to nuclear energy generation, defence applications, related scientific research, and waste management.

- 24: Manufacture of basic metals
- 35: Electricity, gas, steam and air conditioning supply
- 38: Waste collection, treatment and disposal activities; materials recovery
- 72: Scientific research and development
- 84: Public administration and defence; compulsory social security

Supply Chain and Enabling Industries: Sectors providing essential goods, services, and skilled labour that support core nuclear activities.

- 25: Manufacture of fabricated metal products (except machinery and equipment)
- 28: Manufacture of machinery and equipment n.e.c.
- 33: Repair and installation of machinery and equipment

- 42: Civil engineering
- 43: Specialised construction activities
- 62: Computer programming, consultancy and related activities
- 71: Architectural and engineering activities; technical testing and analysis
- 74: Other professional, scientific and technical activities

Identifying Nuclear-Relevant Occupations

The selection of occupations for this analysis is grounded in an established framework identifying 11 'Critical Skills' areas deemed essential for the UK nuclear sector. These skill areas have been systematically mapped to 46 distinct occupations, defined at the detailed 4-digit level within the SOC code system. Due to the cross-cutting nature of many technical functions, some occupations align with more than one Critical Skills area.

To ensure clarity and avoid double-counting in the analysis (particularly regarding occupational concentrations), these 46 occupations have been grouped into broader functional categories relevant to the report's structure. This approach allows the analysis to effectively highlight regional over- or under-representation patterns without repetition, while still encompassing the full spectrum of nuclear-relevant capabilities on the broader labour market.

Collectively, these 46 occupations represent a cross-section of the workforce most likely to contribute, directly or indirectly, to the UK nuclear industry. This includes activities spanning power generation, decommissioning, defence programmes, fuel cycle management, waste management, and developing and maintaining associated infrastructure. While these occupations are not exclusive to the nuclear sector, they are routinely deployed within it. They cover core skills such as various engineering disciplines, scientific research, construction and project management, regulatory compliance, operational IT, cybersecurity, and numerous skilled technical trades.

It is essential to recognise that most individuals currently employed within these 46 occupations work in sectors other than nuclear. However, many possess valuable, transferable expertise. With appropriate sector-specific upskilling, familiarisation, or reskilling, these individuals represent a significant potential talent pool that could be leveraged to support the future development and transformation of the UK's nuclear workforce.

Defining the Midlands Region

Official ONS data is structured around standard UK regions. For this analysis, the 'Midlands' is defined as the combined geographical area of the **East Midlands** and **West Midlands** government regions.

The East Midlands region comprises the following six ceremonial counties:

- Derbyshire
- Leicestershire
- Lincolnshire (excluding North Lincolnshire and North East Lincolnshire)
- Northamptonshire
- Nottinghamshire
- Rutland

The West Midlands region comprises these six ceremonial counties:

- Herefordshire
- Shropshire
- Staffordshire
- Warwickshire
- West Midlands
- Worcestershire

It is important to note that the primary data sources (LFS and ASHE) do not support statistically robust analysis at more granular geographical levels, such as sub-regional partnerships or individual local authorities. Consequently, it is not possible within the constraints of this data to isolate specific local areas or refine these regional definitions to align more precisely with any specific operational footprint of Midlands Nuclear.

Data Limitations

While the LFS is a highly reliable and well-established data source, users of this report should be aware of two main limitations inherent in survey-based analysis:

- **Sampling Variability:** Both surveys are based on population samples and therefore subject to margins of error. Findings should be treated as robust estimates rather than precise counts. To mitigate the impact of short-term

fluctuations and improve stability, annual employment figures presented in this report are calculated as averages across all four quarters of the relevant year.

- **Granularity and Sample Size:** As data analysis becomes more detailed – for example, when examining occupations within particular industries or small geographical areas – the underlying sample sizes decrease. This can reduce the statistical reliability of the estimates. Where analysis at the regional level (East or West Midlands) was deemed not statistically robust (e.g., for detailed age profiles or qualification breakdowns by occupation), data have been presented at the UK level only to ensure confidence in the findings.