Nuclear Skills Strategy Group

Working in partnership to deliver skills leadership

Nuclear Workforce Assessment 2021 - Summary

Comprehensive insight for evidence based decision making

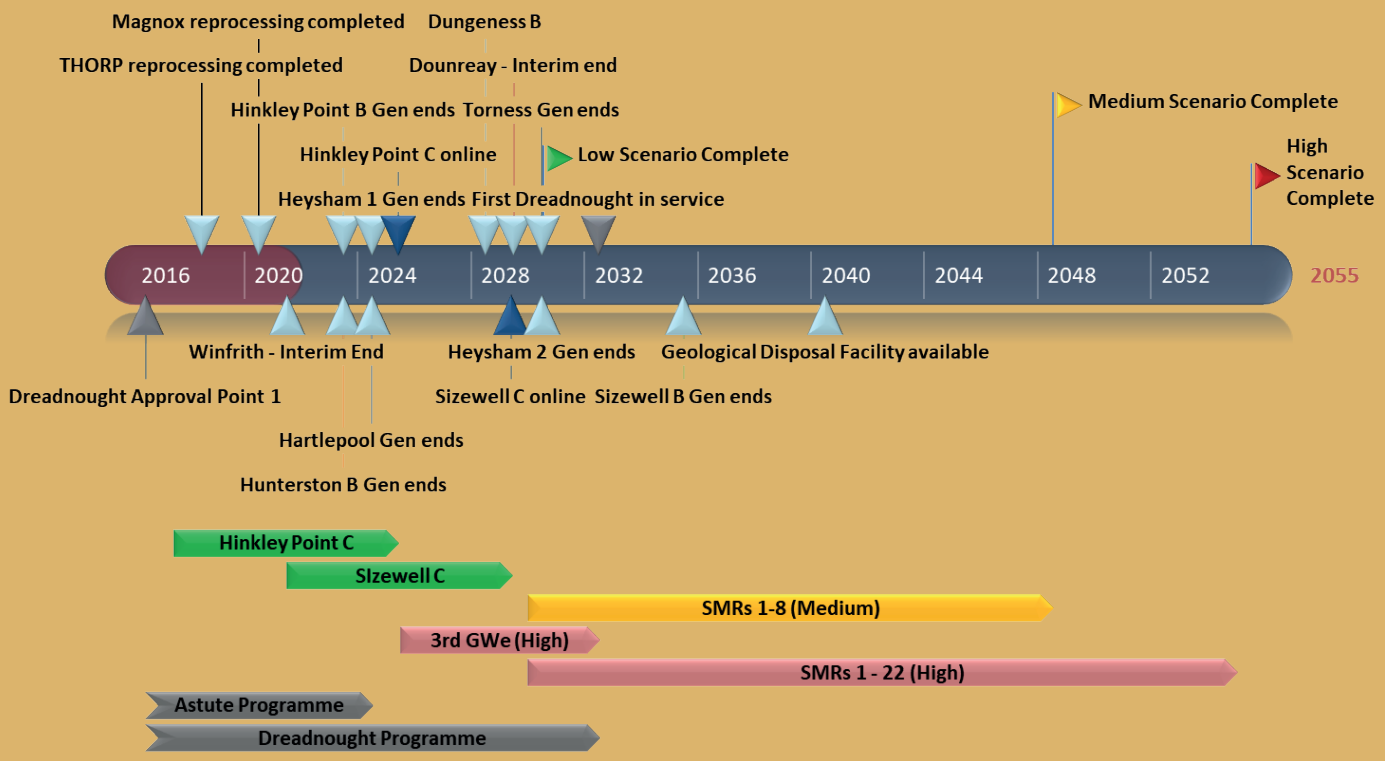
Single source of UK nuclear workforce data, built in collaboration with leading nuclear employers; covering demographics, recruitment, attrition, training and future demand. Full report is available on request: nssgmembers@cogentskills.com

www.nssguk.com

The Nuclear Workforce Assessment* (NWA) 2019 was the first to look at a range of scenarios for civil electricity generation over the next two decades. A Dynamic Workforce Model (DWM) has now been developed to better reflect the range of small and large-scale reactor technologies. Calculations for the workforce implications for three scenarios have been produced, consistent with the Government's most recent policy and funding announcements. As updated data becomes available to describe the different workforce profiles of new reactor technologies the model can easily be adjusted to include those.

The Nuclear Timeline

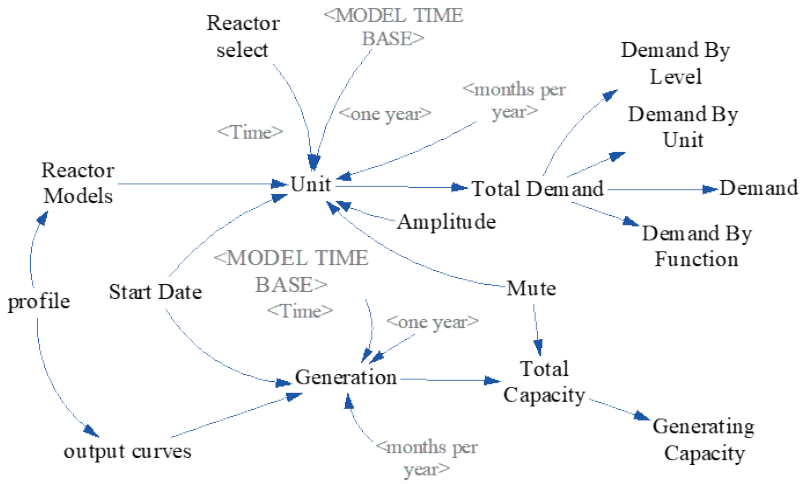
The overall demand for nuclear skills is determined by a combination of nuclear projects spanning the decommissioning of existing facilities, the development of future technologies, the construction of new civil power generation and the implementation of defence programmes. Some of these, particularly decommissioning and submarine construction have well established timelines. Others await commercial and governmental decisions, the most significant of which is the civil nuclear electricity generating programme.

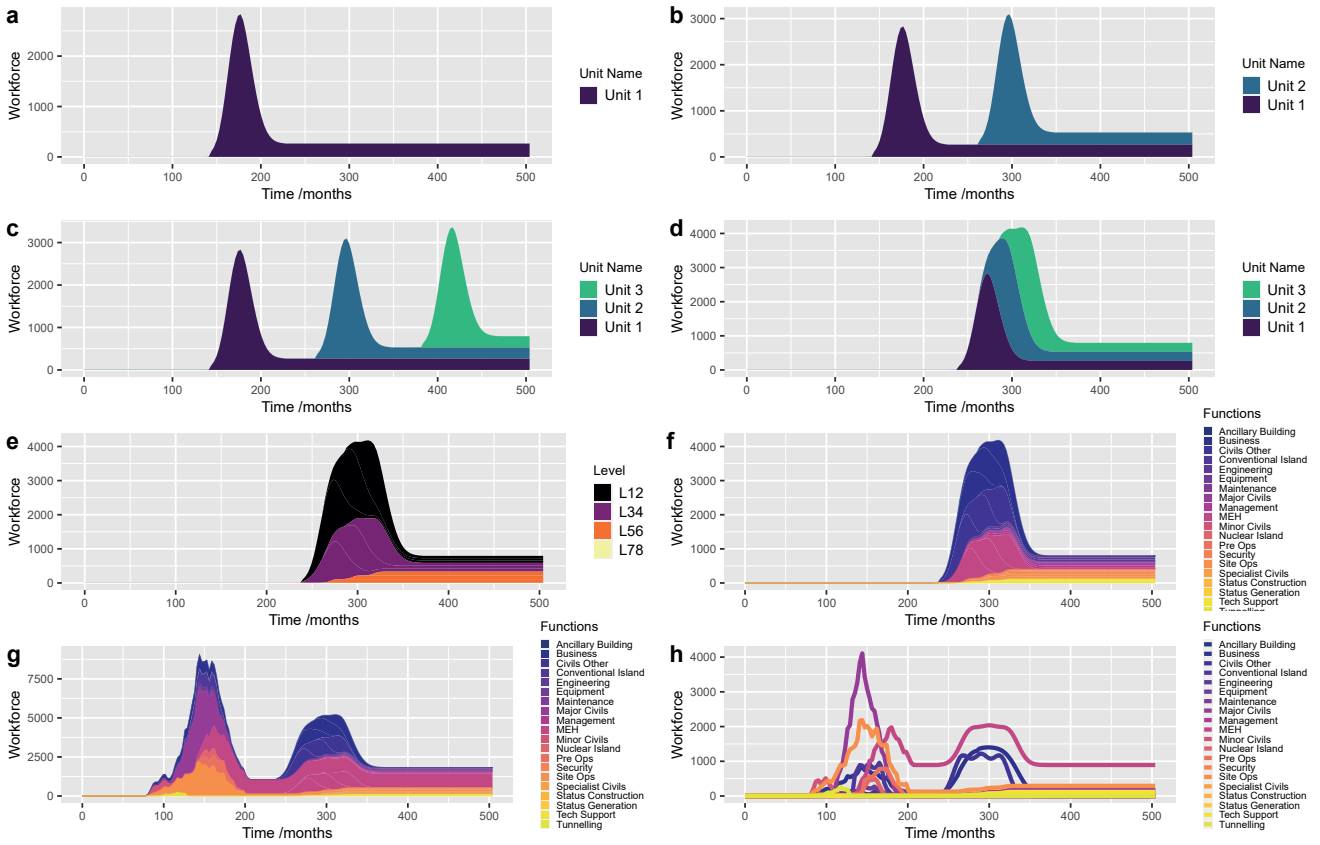


This timeline is an estimate of significant nuclear milestones extending beyond the net-zero greenhouse gas emission target date of 2050, and will be adjusted as further information becomes available. It includes three civil new build scenarios described next.

Dynamic Workforce Model

The Dynamic Workforce Model allows pre-defined new build workforce units to be placed on a timeline. Represented at the top level as a Causal Loop Diagram, the model keeps track of workforce occupations and levels as the units are adjusted in time. This allows for rapid recalculation of evolving expectations. Charts a) to h) show test profiles added and moved, at different levels of segmentation.

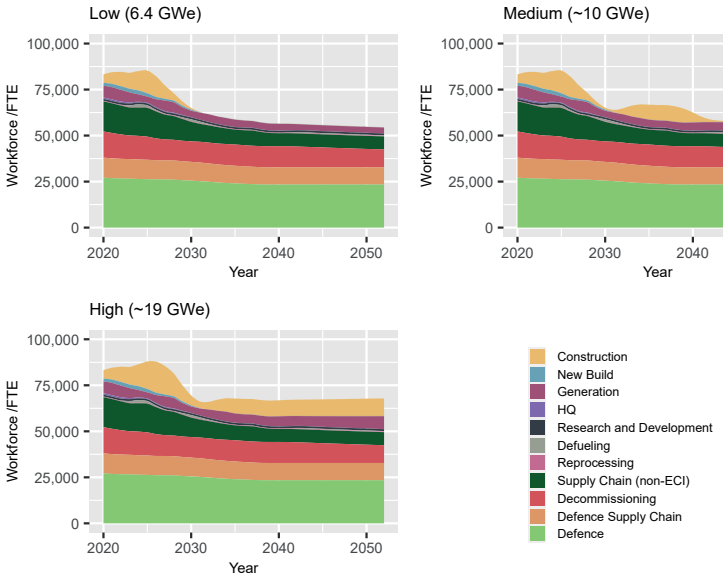




Three Scenarios

Workforce Demand

Using the Dynamic Workforce Model, the charts below show the combination of the existing estate with three new build scenarios added in the top layers.



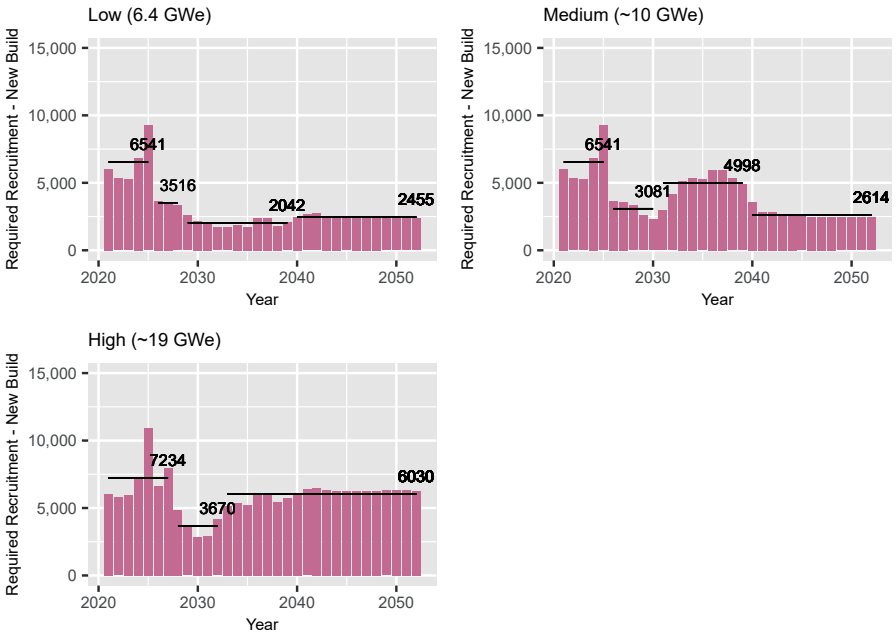
The scenarios have been chosen to represent achievable low (6.4 GWe), medium (9.6 GWe – 10.2 GWe) and high (18.4 GWe – 19.9 GWe) capacity development options. The lowest assumes the completion of Hinkley Point C and the addition of a second gigawatt scale project (for which Sizewell C is currently the most advanced). The Government has indicated it aims 'to bring at least one large-scale nuclear project to the point of Final Investment Decision by the end of this Parliament', This would provide 6.4 GWe generating capacity.

The medium scenario builds on the low scenario by adding eight Small Modular Reactors (SMRs) contributing around 3.6 GWe, depending on the technology, and beginning around 2030.

The most ambitious scenario expands SMR deployment to 9.9 GWe (approximately 22 units) and adds a third gigawatt scale plant to provide a total of around 19 GWe by 2050.

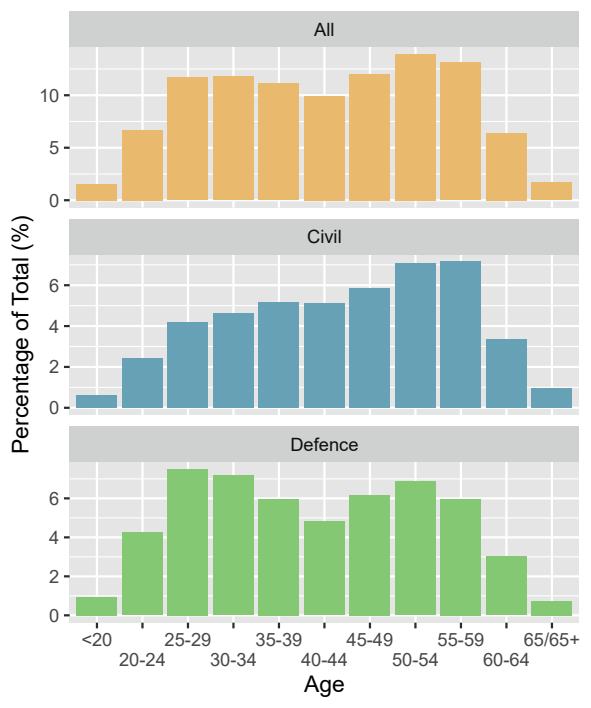
Required supply to meet demand

Given an attrition rate of 7 % for the existing workforce, an annual supply of new workers would be required to meet demand, as shown on the right. Fluctuations in demand produce a changing recruitment requirement. The horizontal lines show the mean annual workforce inflow (as Full Time Equivalents) to meet peaks in demand. Only limited recruitment data is available but, as a benchmark, current steady state operations is estimated to require 2000 to 3000 new workers each year to meet replacement demand.



Workforce Demographics

Age of the Workforce



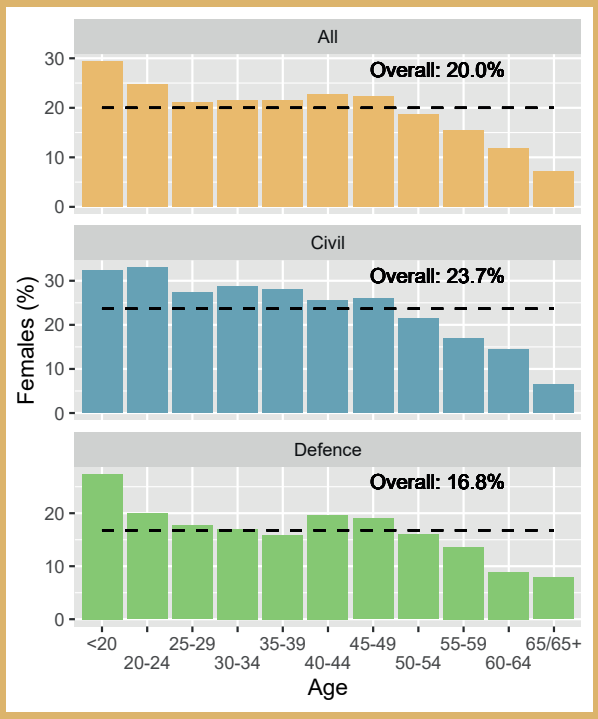
The nuclear workforce is generally regarded as ageing. This is particularly true of the civil sector, apparent in the middle panel. The age distribution of the nuclear workforce is not as balanced as we would expect where early career recruitment is planned to replace the workforce that is retiring. Of course, there are situations when allowing a workforce to decline naturally using retirement is the favoured approach, notably when the overall workforce is contracting. However this can create problems in terms of distribution of experience across the workforce when rapid growth is required.

Across both sectors over a third of the workforce (35.2 %) is aged 50 or over, with 8.1 % aged 60 or over (9 % Male, 4.4 % Female).

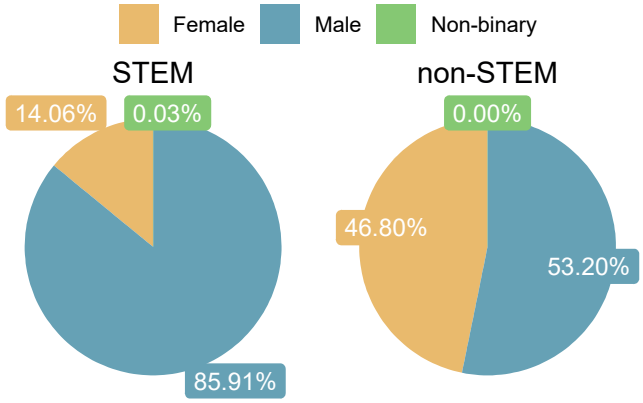
Women in the Workforce

Female participation in the UK Nuclear Workforce remains at 20 % , essentially unchanged from the level reported in 2019. The highest levels are found in the youngest age groups, reflecting more gender balanced recruitment at graduate and apprenticeship level, though still much lower than would be required for a more representative workforce overall.

Improvement is limited by both the gender balance in recruitment, which remains limited, the relatively slow rate of turnover of the workforce generally, and the contraction of the non-construction workforce.

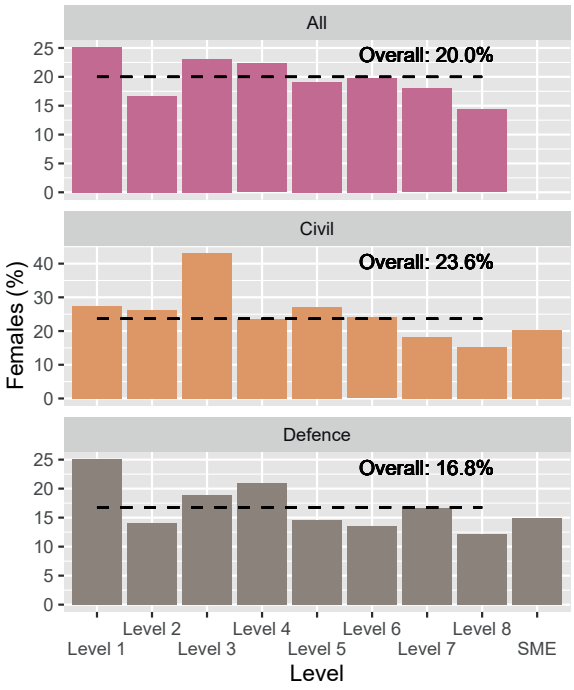


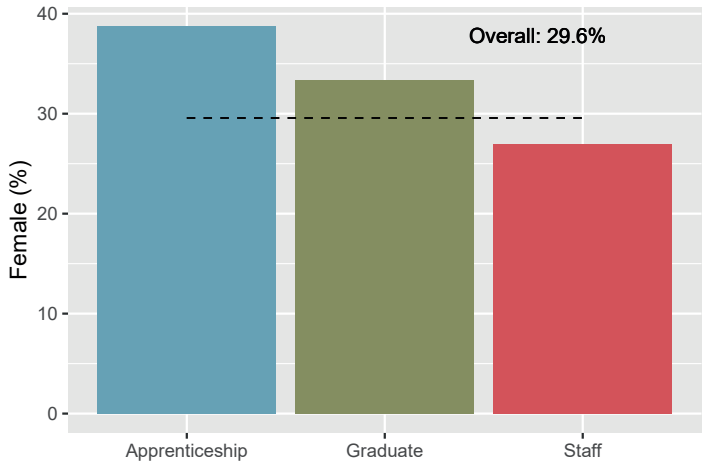
Women in the Workforce



There is a marked difference between non-STEM occupations (46.8 % female), and STEM occupations (14.1 %). The graphs also illustrate very low percentages of the workforce that are recorded as non-binary. Further work is required to establish whether this reflects individuals' gender identification across the sector, or whether the data reflect an unwillingness of individuals to self-report.

Women are better represented at level 1 and levels 3 and 4 (right). As reported in NWA 2019, there is a notable worsening of the gender balance at levels 7 and 8, and among Subject Matter Experts. Levels represent the experience required for a role/ educational level and as such can be an indicator of seniority. Higher proportions at level 3 in the civil sector reflect administrative roles. Work to achieve gender balanced recruitment must consider all types of role (STEM and non STEM) and at all levels.

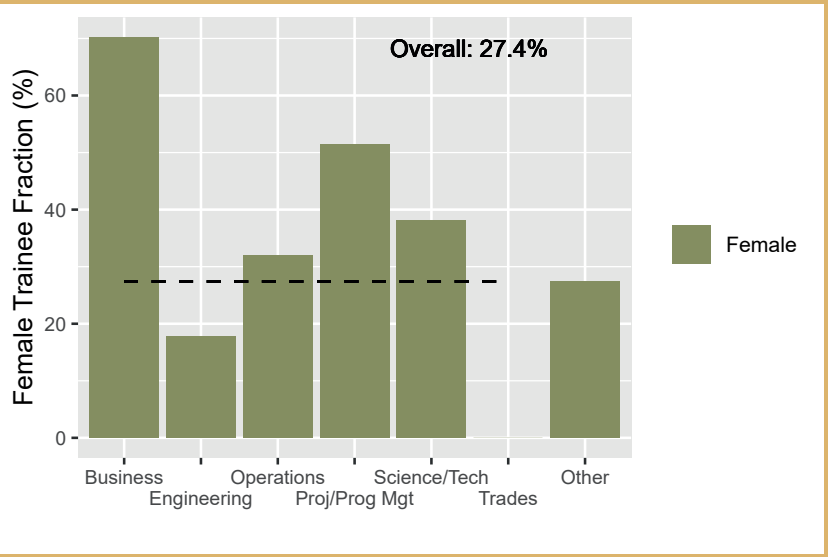


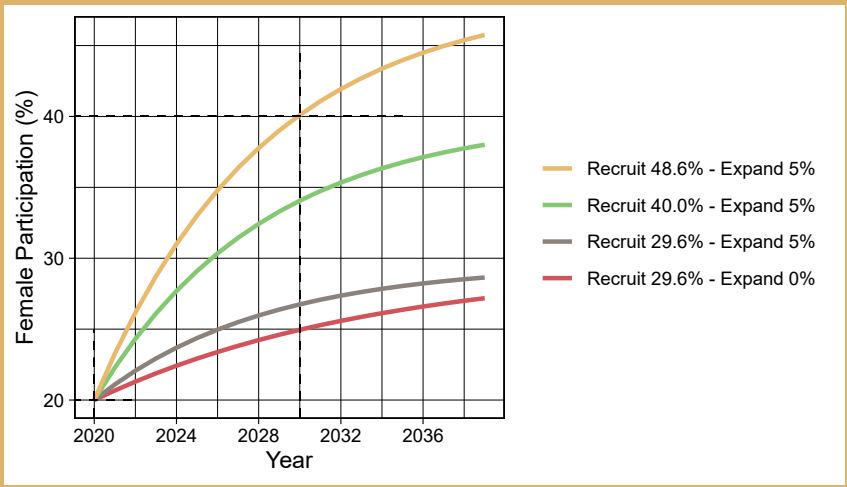


Recruitment data is limited to a subset of civil sector companies, but provides an indicator of progress in gender rebalancing. If the recruitment rate remains constant, it becomes the long-term limit. At 29.6 % , recruitment is more balanced than the current workforce but needs to exceed 40 % on average if the 2030 target is to be met.

Women in the Workforce

Those in training with NSSG employers form another part of the future workforce pipeline. Across all disciplines women hold 27.4 % of training places. Again, this is better than the established workforce, but only a small contribution to reaching the 40 % target.





Projections of the gender balance depend on recruitment, attrition (set here at 7 %) and any net expansion (or contraction) of the total workforce.

Key measures of Gender Balance

Area	Group	Fraction	Area	Group	Fraction
Current Workforce	Civil	23.7 %	Degree	Female	26.4 %
	Defence	16.8 %	Framework	Female	28.3 %
	All	20.0 %	Standard	Female	26.9 %
STEM Status	non-STEM	46.8 %	Apprenticeships Combined	Female	27.8 %
	STEM	14.1 %	All Trainees	Female	27.4 %
	All	20.0 %	Recruitment	Apprenticeship	38.7 %
Leaver fraction	All	7.0 %		Graduate	33.3 %
	Female	6.1 %		Staff	26.9 %
	Male	7.3 %		All	29.6 %

Key Points

- The peak mobilisation of new workers (Construction and Engineering Construction) into the nuclear sector is expected to occur in the next two or three years with overlapping builds at Hinkley Point and Sizewell, with the possible addition of a third large scale plant. This recruitment pressure will be further exacerbated by non-nuclear construction activities which pull on similar skill sets.
- The decline in decommissioning activity is offset in the medium and high scenarios by a shift to nuclear manufacturing jobs, particularly beyond 2030.
- Defence data does not yet reflect the granularity of future defence programmes in construction or decommissioning activities. Work is ongoing to ensure this is rectified.
- The high scenario extends demand to 2050 and beyond, making the difference between a net decline in the workforce under the low and medium scenarios, and a stable or slightly expanding population.
- The relatively low turn-over of workers limits the rate at which the gender balance can be improved.
- Around 7 % of the workforce changed in 2019/2020. Female (civil) recruitment was 29.6 % compared to 23.7 % in the existing civil workforce.
- There remains a large imbalance between women in STEM and non-STEM jobs.
- The highest level of female recruitment is among new apprentices at 38.7 % .
- The NWA captures considerable data around the nuclear workforce demand, as well as the current supply via existing workforce. From this, and with additional more qualitative input from major employers we are able to develop skills risk matrices which help to prioritise future interventions.

*Appendix

Nuclear Workforce Assessment

- Single comprehensive source of UK nuclear workforce data, including both civil and defence.
- Produced every 18 months to 2 years with bespoke data cuts are taken at other points.
- Covers Age, Level, Job Type and location for the existing workforce.
- Looks at Recruitment, Attrition and Training pipeline.
- Forecasts workforce demand based on a range of scenarios.
- Provides monitoring data on gender (planning on extending to other EDI characteristics).
- Data is supplied directly by major employers EDF, NDA Sellafield, BAE, AWE and others.