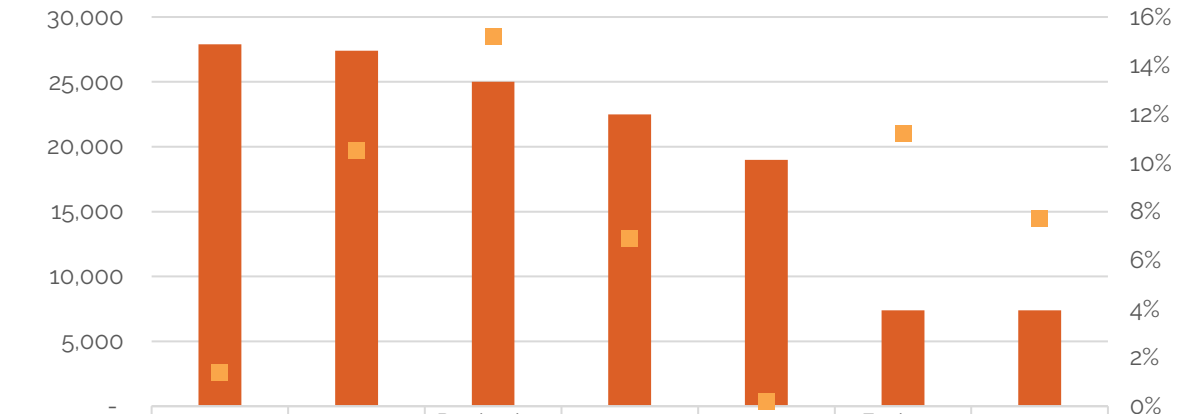
10.1 Science & Engineering Occupations

Figure 10.1 Annual Average Employment (2023) & Annual Average Growth Rates (2018-2023)



	Science & engineering technicians	Production managers etc.	Production, design & QC engineers	Scientists	Other engineering profs	Environ-mental/con servation specialists	Health & safety officers
Employed	27,900	27,400	25,000	22,500	19,000	[7,400]	[7,400]
Growth rate	1.4%	10.5%	15.2%	6.9%	0.2%	[11.2%]	[7.7%]

Overall employment	**136,400**
Share of total workforce	5.0%
Main sectors of employment	49% - Industry 21% - Professional activities [8%] - ICT [6%] - Health
Employment growth	+37,200 between 2018 and 2023 +6.6% on average annually (compared to +3.5% for total workforce)

2023	% Female Q4	% Full-time Q4	% Aged 55 years & over Q4	% Irish citizens Q4	% Third level graduates Q4	Number of new employment permits	Recruitment Agency Survey
Chemical, biological & physical scientists	[46%]	92%	..	74%	97%	429	✓
Other engineering professionals	..	97%	..	73%	92%	1,545	✓
Production, design & QC engineers	[35%]	95%	..	76%	96%	1,748	✓
Science & engineering technicians	45%	98%	..	87%	73%	180	✓
Production managers etc.	[25%]	97%	[23%]	85%	68%	82	✓
Environmental/ conservation specialists	..	[88%]	..	[82%]	[69%]	42	✓
Health and safety officers	..	[85%]	..	[92%]	..	5	✓
Overall total	**33%**	**95%**	**14%**	**80%**	**83%**	**4,031**	

Source: SLMRU (SOLAS) analysis of CSO (LFS) data, DETE, and SLMRU Recruitment Agency Survey (RAS)
Numbers in square brackets should be treated with caution; an ellipsis (..) denotes numbers too small to report

Overall Outlook for these Occupations

Employment growth was above average for this occupational group with demand for these skills evident in the high number of employment permits issued, frequent mentions in online job adverts and difficulty in filling vacancies highlighted in both the Skills for Growth data and through the Recruitment Agency Survey. Only a third of those employed were female; a recent report from SOLAS[1] highlights the fact that reducing occupational gender segregation in certain occupations could unlock additional supply of skills, particularly where skills are in high demand.

Approximately half of the workforce were employed in industrial activities (e.g. medical devices, pharmaceuticals, R&D etc.), with multinational enterprises playing a significant role in future demand. In addition, adapting to new work practices as a result of the green agenda, such as sustainable sourcing, circular lifecycles, energy efficiency, and waste minimization, will ensure a continued strong demand for scientists and engineers in these areas. An analysis by CEDEFOP of online job vacancies for Ireland shows that the number of job ads for professional and associate professional green jobs remains small but policy developments are likely to see an increase in demand for these green skills across a range of occupations (e.g. European Green Deal[2]). A recent report by the EGFSN on the skills needs in the biopharma sector, where many of those employed in these occupations work, estimated the additional jobs required for this sector over the next five years to be in the range of 14,000 to 26,000.[3] The report also notes that new technologies such as artificial intelligence are likely to increase the demand for those who can adapt to and apply new technologies, particularly in certain sectors such as the life sciences.

Skills identified as being in demand by employers (through Skills for Growth and Enterprise Ireland's Spotlight on Skills) included project management, communication, technical skills, product knowledge, documentation/compliance procedures knowledge. Leadership skills were also in demand, as those previously in technical roles move to management, communication and strategic roles; R&D, innovation and product management were also of importance.

Output from third level education remains strong: at levels 8-10, there were over 6,000 science awards and over 4,300 engineering/manufacturing awards made in 2022 to students at HEA-funded institutions.

Occupation	Economic summary
Scientists* **Skills shortage: Analytical, process, and medical scientists**	Average annual employment growth over the five-year period was above average for this occupation, although employment levels remained unchanged between 2022 and 2023. At 26%, the share of non-Irish citizens employed in this occupation was above the national average. Despite a fall in the number of online job adverts (Eurostat/CEDEFOP) in 2023, scientists were the fifth most frequently occurring occupation across all online job adverts. Employment permits issued were across various roles in industry and health including bio-process associates, QC chemists, and medical scientists. The Recruitment Agency Survey highlighted issues with recruiting process/analytical scientists and microbiologists, while Skills for Growth data identified the need for skills in good manufacturing practices (GMP), quality and validation. The number of biochemistry and chemistry awards made at third level has been growing annually for several years and reached nearly 900 and 1,000 awards respectively in 2022 (up from 580 and 800 in 2018). Similarly, the number of awards made in medical or pharma/bio-pharma fields grew to 1,400 (up from 1,300 in 2018). A high level of demand for these occupations remains evident, with shortages expected to persist, particularly in the life sciences sector, for those with experience and/or in niche areas.

[1] https://www.solas.ie/f/70398/x/3070efff73/solas_summer-skills-bulletin_2024_.pdf
[2] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
[3] https://skillsireland.ie/all-publications/2024/skills-for-biopharma.pdf

Production, design & QC engineers* **Skills shortage: Quality control/ assurance, process, and design engineers**	Employment grew very strongly for this occupation over the five-year period, increasing by over 12,000 persons; between 2022 and 2023 employment levels grew by 3.400. Two thirds were employed in industry; 24% were non-Irish citizens, above the national average. The large volume of employment permits issued were particularly high for quality control/assurance, design and process engineers. This occupation had the highest number of mentions in the Recruitment Agency Survey for engineering roles including quality control/assurance, compliance/regulatory and process, validation and R&D. In terms of skills in demand for these roles, data from Spotlight on Skills and Skills for Growth highlight the need for good interpersonal, project management, budgeting, and quality management skills. The strong employment growth and the numerous mentions across other data sources for these roles shows that demand is continuing and that shortages are occurring particularly for those with specific skills and experience.
Other engineering professionals (e.g. mechanical, electrical and electronic engineers) **Skills shortage: Engineers (mechanical, electrical, automation)**	Employment levels have declined annually for this occupation since 2021, resulting in an average growth rate only slightly above zero. Employment is primarily divided between industry and the professional activities sector. Over a quarter (27%) of those employed were non-Irish citizens and 87% were male. Despite the fall in employment, demand remains evident. This occupation accounted for the highest share of online job adverts (Eurostat/CEDEFOP) in 2023. Vacancies advertised through DSP related mainly to mechanical and electrical engineers. A high volume of employment permits were issued for electrical, mechanical and automation engineers amongst others, and these were mentioned in the Recruitment Agency Survey results as difficult-to-fill vacancies and also in the Spotlight on Skills data. Skills in demand for these roles included project management, interpersonal, analytics and mathematical skills (based on Skills for Growth data). Demand persists for some specific roles within this occupation, namely mechanical, electrical and automation engineers, despite the decline in overall employment levels. While employment for each of these individual occupations is small, these skills play a critical role in industry, particularly in the life sciences, and in the transition to a digital and green economy.
Science & engineering technicians **Skills shortage: Maintenance/lab technicians**	Employment growth was below average for this occupation with employment levels remaining almost unchanged between 2022 and 2023. A half of those employed were in industry, with the remainder spread across most other sectors. Online job adverts (Eurostat/CEDEFOP) were particularly prevalent for lab technicians followed by electrical/electronic technicians, while vacancies advertised through DSP were notable for mechanical, maintenance and electrical technicians. Employment permits were issued across a number of technician roles including manufacturing, mechanical and maintenance. The Recruitment Agency Survey identified vacancies for maintenance and lab technicians as difficult-to-fill, while Skills for Growth data indicated issues with sourcing lab analysts and maintenance, QA/QC and process technicians. Skills in demand included environmental awareness and monitoring as well as health and safety. With output from new apprenticeships (e.g. lab analyst/technician, OEM engineer, wind turbine maintenance technician) along with other apprenticeship awards for these roles (e.g. manufacturing technology), supply may soon be sufficient to meet demand for these roles, particularly without any employment growth. While output from new apprenticeships has begun to emerge, demand for this occupation remains strong with shortages persisting in the short term.
Production managers in manufacturing	Employment growth was above average for this occupation, growing by between 3,500 and 4,400 annually since 2020. Approximately two thirds of those employed held third level qualifications and almost a quarter were aged 55 years and older (above the national average). Employment permits were issued across a number of manufacturing areas including pharmaceuticals, computers, food and medical devices. Employers (via EI's Spotlight on Skills and the Recruitment Agency Survey) have highlighted recruitment difficulties for production (in bio-industry) and operations managers. To date, issues with sourcing candidates with specific skills sets and industry experience are small in number but if employment levels continue to grow, future shortages may emerge.
Environmental/ conservation specialists* **Shortage: Inconclusive**	Although the numbers employed are too small for detailed analysis, employment levels have grown above average over the five-year period. A small number of employment permits were issued in 2023 across a number of sectors for roles such as environmental health & safety (EHS) specialists/managers, environmental engineers and ecologists. EHS engineers were also mentioned in the Recruitment Agency Survey as difficult-to-fill vacancies. As we strive to reach the targets set out in the Climate Action Plan, demand for these roles is likely to increase.
Health and safety officers*	The numbers employed remain too small for detailed analysis but employment growth was above average. Health and safety officers in the construction sector were mentioned in the Recruitment Agency Survey and a small number of employment permits were issued for these roles. Skills for Growth data highlighted skills requirements including industrial safety, risk assessment, report writing and communication.

** This occupation is new or has been changed since the previous edition. See page 126 for details of the revision and Appendix for a list of job roles included in this occupation.*