Skills Development **Scotland**

Sectoral Skills Assessment Chemical Sciences

October 2024



Sectoral Skills Assessments

First launched in 2017, Sectoral Skills Assessments (SSAs) provide a robust and consistent evidence base to support partners in strategic skills investment planning. Skills Development Scotland (SDS) has worked with key partners and stakeholders in the production of SSAs to ensure an inclusive approach to their development, dissemination and utilisation.

SSAs include published data sets. Inevitably, when using published data there is a time lag, but the data contained is the most up-to-date available at the time of writing. SSAs also include forecast data that has been commissioned through Oxford Economics. The Technical Note¹ provides full detail on the caveats that must be applied when using forecast data, but broadly, it should be noted that:

- Forecasts are based on what we know now and include past and present trends projected into the future.
- The more disaggregated they become, especially at smaller geographical units, the less reliable they are likely to be.
- Their value is in identifying likely directions of travel rather than predicting exact figures.
- The forecasts do not account for national or sectoral activities, initiatives or investments that are planned.

Industries and occupations used in the SSAs are defined by standard industrial classifications (SIC)² and standard occupational classifications (SOC).³

This SSA report is for the Chemical Sciences sector. The sector includes the Manufacture of Commodity, Speciality and Consumer Chemicals plus Materials and Industrial Biotechnology. Please see Appendix 1 for the SIC definition used in this report.

Key Sectors are central to our Skills Investment Planning approach. Each Key Sector has a tailored Skills Investment Plan (SIP) which outlines trends in skills and qualification supply and employers' perspectives on the skills issues affecting the sector. Regional SIPs have also been developed and are available alongside SIPs on the SDS website.⁴

The SSAs are part of a suite of Labour Market Insight publications by SDS. Other products in the suite include:



<u>Economy, People and Skills</u> report which provides succinct and up-to-date evidence on Scotland's economy, businesses and people. It is updated monthly.



Regional Skills Assessments provide a coherent, consistent evidence base to inform future investment in skills, built up from existing datasets and forecasts for Regional Outcome Agreement areas, Rural Scotland and all City and Growth Deals regions. They are updated annually.



The **Data Matrix** is an interactive tool, offering more detailed data from a variety of sources in a visually engaging format. It is updated frequently.

Alongside the suite of Labour Market Insight publications, SDS also produces a wide range of reports such as statistics on Modern Apprenticeships and the Annual Participation measure for 16-19 year olds. This includes a wide range of data related to equalities. Further information can be found on the Publications and Statistics section of the SDS website.

We value user feedback on the Sectoral Skills Assessments. If you would like to provide feedback, please do so here. For any further information or queries on the SSAs or any of our other products, please contact: RSA@sds.co.uk

We held a series of webinars to complement the publication of the Sectoral Skills Assessments.



The recording of the Life and Chemical Sciences webinar can be found on the SDS YouTube Channel <u>here</u>.

You can also watch the webinars for other key sectors and regions in Scotland <u>here</u>.

^{1.} SSA Technical Note (2024).

Office for National Statistics UK Standard Industrial Classification (SIC) 2007.

^{3.} Office for National Statistics UK Standard Occupational Classification (SOC) 2010.

^{4.} Skills Development Scotland Skills Investment Plans.

The Context for Scotland's Labour Market

Within the last 10 years, the economy has faced significant disruption due to events such as the pandemic, Brexit, the war in Ukraine, and the cost-of-living crisis. In addition, megatrends around demography, technology, and the environment have continued shaping Scotland's economy and labour market, many of which are interdependent. Below is an overview of the drivers expected to have the greatest influence on Scotland's labour market outlook in the near term, based on a comprehensive analysis of structural and cyclical factors.



The Economy

The economic outlook for Scotland has improved, but growth is still expected to be modest in 2024, after annual GDP figures estimated the Scottish economy (like that of the UK) remained broadly flat throughout 2023. While inflation rates have eased from their peak in October 2022, the effects of rising prices and high interest rates continue to impact Scottish households and businesses. Scotland has experienced a tight labour market in recent years, but there have been signs of this loosening in 2024.



Demographic Change

Scotland has an ageing population. In 2022, around 20 per cent of Scotland's population was aged 65 years or over, and around 15 per cent were aged under 15 years old. Population growth is also expected to slow in the next decade, and it is anticipated that the country is likely to rely on in-migration for population growth. These demographic changes in Scotland have important implications for the labour market and economy.



Inclusive Growth and Equality

Scotland continues to experience inequality, which can impact individuals' access to labour market opportunities. Cost-of-living pressures have affected different groups disproportionately, particularly in lower-income households. Geographical inequalities also exist across Scottish regions that can affect individuals' access to opportunities. There have been some advances in improving diversity within the workforce and reducing inequality, but challenges remain.



Technology and Automation

Scotland has a strong technology sector, with specific strengths in digital technology, life sciences and financial technology (fintech). The current makeup of the technology sector suggests Al will likely be the most important technological advance for the foreseeable future. It is estimated that 60 per cent of jobs in developed countries will be affected by AI. This could be disruptive within the labour market, creating challenges and opportunities for job roles and businesses.



Climate Change

The Scottish and UK governments have committed to meeting targets for Net Zero carbon emissions. The transition to Net Zero will directly impact jobs, with potential for job growth in Scotland. Upskilling and reskilling will be vital to equip Scotland's workforce with the skills needed to meet the transition. Scotland is well placed to take a lead in the development of new green technologies building on its significant natural resources and strengths in key sectors.



A fuller report on Scotland's Labour Market Drivers can be found here.

Sectoral Insight¹

The previous page provided an overview of the key drivers expected to have the greatest influence on Scotland's labour market. Below, we explore how some of these drivers, and others, may influence the sector.

Digitalisation and Continuous Innovation: Technological innovation, automation and the expansion of roles at the interface of therapeutic manufacturing and medical devices, are requiring regular (and interdisciplinary) upskilling and reskilling of the workforce.

Bioproducts: The drive to reduce pressure on natural resources is creating opportunities for enabling subsectors like Industrial Biotechnology that have the potential to develop tools for exploiting and optimising the efficiency of bioprocesses and the specific characteristics of biologically derived products, i.e. bioproducts. Industrial Biotechnology allows biological processes to underpin the whole health and wellbeing and sustainability agendas.

Sustainability, Net Zero and Carbon Reduction:
Consumer behaviours, policy and legislative drivers, and the use of new processes are all driving change in the sector. For example, with the move to a low carbon economy, end-product manufacturers of leading brands are committing to reducing their carbon footprint. This is having an impact throughout the supply chain including the choice of base ingredients, the processes adopted, and the increasing use of biotechnologies.

Within the Chemical Sciences sector, there has been a recent policy shift towards cleaner, greener alternatives. From a Scottish Government perspective, there is a policy focus on Industrial Biotechnology (identified in both the National Strategy for Economic Transformation (NSET) and the National Innovation Strategy). UK Government policy has also focussed on Engineering Biology (such as the National Vision for Engineering Biology).

In 2023, the UK Government announced £100m funding for six mission hubs and 22 mission awards in Biotechnology/Engineering Biology. The University of Edinburgh was one of the successful hubs, with each hub receiving up to £12m.

The recently published Scottish Government <u>Green Industrial Strategy</u> acknowledges the need to reduce the reliance on fossil fuels and move towards cleaner alternatives, such as biofuels, to achieve Net Zero ambitions. Whilst important across the whole of Scotland, a cluster of activities is taking place in Grangemouth and Falkirk that are of significance to the sector. Current activities include:

- Grangemouth Future Industry Board which includes a skills workstream.
- Grangemouth: Carbon Capture and Utilisation and Biorefining Accelerator Pilot Programme.

The Life and Chemical Sciences Skills Group provides strategic direction for evidence-based skills interventions; aligning and supporting wider strategic groups for the sector such as the Scottish Bioeconomy Council. The Skills Group consists of industry, academia, public sector agencies and trade bodies.

Insight from industry and trade bodies identify a range of current and future skills needs, including:

- Process manufacturing;
- · Process engineering;
- · Fermentation scientists;
- Total quality; and
- · Regulatory affairs.

It is important to note that the forecasts used in this Sectoral Skills Assessment are policy and investment neutral.



This means the figures present a baseline outlook that takes into account historical trends and external economic conditions, but the figures do not reflect investment or policy that is unconfirmed or at planning/development stage. Therefore, the forecasts should be used in conjunction with other sources, and readers are encouraged to overlay these with their own local and sectoral knowledge.

The Economy¹

Gross Value Added (GVA, £m) (2014-2034)²



In 2024, GVA in the Chemical Sciences sector was estimated to be £2,104m, generating 1.4% of Scotland's total economic output. Between 2014 and 2024, GVA in the sector was estimated to have increased by 3.8% on average each year, compared to growth of 0.5% across Scotland over the same period.

Due to economic uncertainties and high inflation, consumption and investment decreased in 2023 causing a decline in the Chemical Sciences sector output. Even though demand in the sector is still likely to be comparatively weak due to wider economic conditions, it was estimated that GVA output in the sector would grow by 2.8% in 2024.

Looking ahead, GVA in the Chemical Sciences sector is forecast to grow on average by 2.2% each year between 2024 and 2034, which is above Scotland's average. In 2034, the Chemical Sciences sector is forecast to account for 1.6% of Scotland's total economic output.

Chemical Sciences forecast GVA in 2027: £2,265m

£2,265111

up 7.7% from 2024

Scotland forecast GVA in 2027: £151,968m

up 4.2% from 2024

Chemical Sciences forecast GVA in 2034: £2,611m

up 15.3% from 2027

Scotland forecast GVA in 2034:

£166,273m

up 9.4% from 2027

Productivity (GVA per job)³

In this report, we have used Oxford Economics' measure of productivity, which is calculated by dividing total sectoral GVA by total sectoral employment (measured by jobs). Please note, there are different ways of calculating productivity, and caution is needed when interpreting productivity data presented in this report. It must be considered in the context of other data and insight.

In 2024, productivity in the **Chemical Sciences** sector was estimated to be £223,500. In comparison, the Scottish average was £52,000.





Chemical Sciences forecast productivity in





Scotland forecast productivity in 2027: £53,000



up 1.9% from 2024



Chemical Sciences forecast productivity in 2034: £292.800

Scotland forecast productivity in 2034: £57,100





up 7.9% from 2027

- **2.** GVA is the measure of the value of goods and services produced within the economy and is an indicator of the sector's health. GVA in constant
- 2019 prices.
- **3.** Productivity is the measure of goods and services produced per unit of labour input. The Oxford Economics forecasts of productivity shown here

have been calculated by dividing total sector GVA by total sector employment (measured by jobs).

^{1.} SDS (2024). Oxford Economics Forecasts.

Current Demand¹



Workforce size 2024: 8,700 people

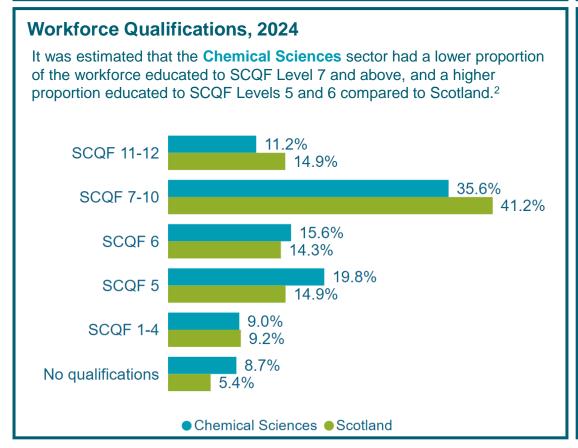
The sector's workforce was estimated to have **declined** by **-19.8%** or **-2,100** people between 2014 and 2024. During this 10 year period, the pandemic had a notable effect on the workforce, as it **declined** by **-12.0%** or **-1,400** people between 2019 and 2021.

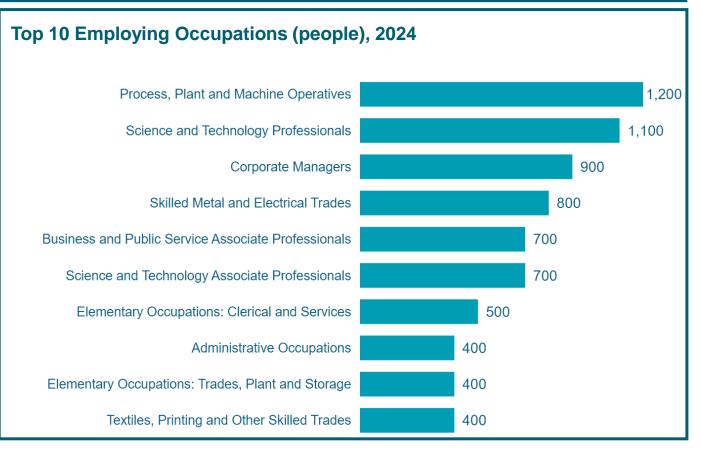
This compares to a Scotland wide increase of **3.8%** or **97,300** people between 2014 and 2024.

Employment by Region (people), 2024

The greatest number of people employed in **Chemical Sciences** were estimated to be in:

Ayrshire	Forth Valley	Tayside	West Region	
1,300	1,200	1,000	1,000	





^{1.} SDS (2024). Oxford Economics Forecasts.

^{2.} See <u>SCQF Framework</u> for further information on SCQF qualification levels.

Current Demand¹

The proportion of Local Authorities' workforce employed in Chemical Sciences, 2024²

In 2024, the **Chemical Sciences** sector was estimated to account for **0.3%** of Scottish employment.

Scottish local authorities have sectoral strengths that make them unique. This means that the **Chemical Sciences** sector may be more important to some local economies, as a higher proportion of the local workforce is employed in the sector.

The sector was most prominent in these local authorities:

North Ayrshire

2.5%

Falkirk

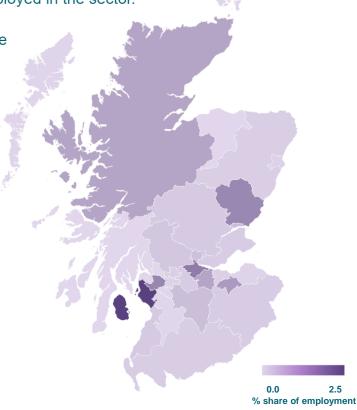
1.5%

Renfrewshire

1.3%

Angus

1.3%



1. SDS (2024). Oxford Economics Forecasts.

- **2.** The proportion of the workforce in the Local Authority employed in the sector is calculated by dividing the sectoral employment in the area by total employment in the area.
- **3.** Scottish Government (2023). Annual Survey of Hours and Earnings: 2023. Due to data availability, a 'best fit <u>SIC code</u> approach' has been used, so the sectoral definitions and totals in this section may vary from those we have used elsewhere.

Real Living Wage and Gender Pay Gap³

Individuals earning Real Living Wage or more:

In April 2023, the real living wage rate for employees who did not work in London was £10.90.



Manufacturing

2022: **90.6%** 2023: **90.6%**

All sectors

2022: **90.6%** 2023: **89.9%**

Gender Pay Gap for median full-time hourly earnings:



Manufacturing

2022: **16.6%** 2023: **13.9%**

Scotland

2022: **3.0**% 2023: **1.7**%

Due to data availability, a 'best fit SIC code approach' has been used, so sectors definitions here may not fully match key sector definitions.

Modern Apprenticeships⁴



MAs starts for Chemicals & Biotechnology Related*:

Q4 2022/23: **29** Q4 2023/24: **27** Q1 2024/25: Less than **5**



MAs in training for Chemicals & Biotechnology Related*:

Q4 2022/23: **72** Q4 2023/24: **69** Q1 2024/25: **61**

* Based on SDS Occupational Groupings.

For data on FAs and GAs please see the Publications section of our <u>website</u>. For data on colleges and universities please see <u>Scottish Funding Council</u> and <u>Higher Education Statistics Agency</u>.

4. SDS (2024). Modern Apprenticeship Statistics, Quarter 1, 2024/25.

Job Postings^{1,2}



Spotlight on... Process Engineers³

Between July 2023 and June 2024, there were **330 job postings**. Job postings were high during 2022, and as a result the number of job postings has decreased by 20.2% compared to the period between July 2022 and June 2023 (21% decline across all occupations comparatively). Despite the decline, the number of job postings remained above the pre-pandemic level for Process Engineers.

Top Locations between July 2023 and June 2024 were:



Aberdeen City
110 job postings



Glasgow City
60 job postings



Edinburgh City
40 job postings

The largest growth in job postings between July 2022 - June 2023 and July 2023 - June 2024 was in Edinburgh City (+28) and Aberdeenshire (+16).

Specialised skills and knowledge requested (July 2023 - June 2024) included:



Process Engineering



Process Safety and Design



Chemical Engineering



Hazard and Operability Study



Median real-time advertised salary July 2023 – July 2024: £50,000



Spotlight on... Chemical Scientists⁴

Between July 2023 and June 2024, there were **330 job postings**. Job postings were high during 2022, and as a result the number of job postings has decreased by 4.4% compared to the period between July 2022 and June 2023 (21% decline across all occupations comparatively). Despite the decline, the number of job postings remained above the pre-pandemic level for Chemical Scientists.

Top Locations between July 2023 and June 2024 were:



Edinburgh City **50 job postings**



Glasgow City
40 job postings



West Lothian
40 job postings

The largest growth in job postings between July 2022 - June 2023 and July 2023 - June 2024 was in West Lothian (+16), Angus (+11), and East Lothian (+10).

Specialised skills and knowledge requested (July 2023 - June 2024) included:



Chemistry and Analytical Chemistry



Good Manufacturing Practices



Pharmaceuticals



High-Performance Liquid Chromatography



Median real-time advertised salary July 2023 – July 2024: **£32,900**

- 1. Lightcast 2024. Online job postings data provides a useful barometer for the health of the jobs market. It is important to note that the data does not capture all activity, so it should be considered as an estimate of activity.

 2. Job postings are rounded to the nearest 10.
- **3**. Data is based on job titles for the whole of Scotland. Median salary based on 15% of job postings.
- **4.** Data is based on SOC 2111 for the whole of Scotland. Median salary based on 31% of job postings.

Future Demand: Mid-term (2024-2027)¹

In the mid-term (2024-2027), the number of people in employment is forecast to decline by 0.8% (-100 people) in the Chemical Sciences sector. This contrasts with growth that is forecast overall across Scotland where employment is predicted to rise by 1.9% (49,800 people).

In 2027, the top employing regions in the sector are forecast to be **Ayrshire** and **Forth Valley**, the same as in 2024. Similar to 2024, **the largest proportion of the workforce** is forecast to be educated **to SCQF 7-10**. The top employing occupation is forecast to be **Process**, **Plant and Machine Operatives**.

Forecasts for the mid-term (2024-2027) suggest there could be demand for **600 people in the sector**, as a result of the need to replace workers leaving the labour market.

Workforce (people), 2027



Workforce size 2027: 8,600 people



The sector's workforce is expected to **decline** by **-0.8%** or **-100** people between 2024 and 2027



Compared to a Scotland wide increase of **1.9%** or **49,800** people

Total Requirement*





+



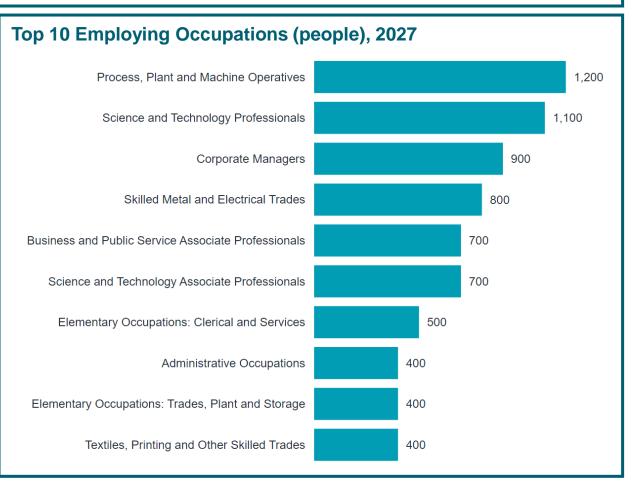
Total requirement: 600 people

Replacement demand: 600 people

Expansion demand:-100 people

Chemical Sciences is forecast to account for **0.2**% of Scotland's total requirement for people in the mid-term (2024-2027)

1. SDS (2024). Oxford Economics Forecasts.



The replacement demand is the number of people required to replace workers leaving the labour market (i.e. those who retire, move away or change jobs). Please note, figures are rounded to the nearest 100 and as a result totals may not equal the sum of the constituent parts.

^{*} Total requirement for people is made up of expansion and replacement demand.

The expansion demand is the number of people required as a result of economic growth or contraction.

Future Demand: Long-term (2027-2034)¹

Employment contraction in the Chemical Sciences sector is forecast to continue, with a decline of 6.0% (-500 people) in the long-term (2027-2034). This contrasts with the growth that is forecast overall across Scotland where employment is predicted to rise by 1.2% (32,000 people).

In 2034, Ayrshire and Forth Valley are forecast to remain the top-employing regions in the sector. The largest proportion of the workforce employed in the sector is forecast to be educated to SCQF 7-10 and Science and Technology Professionals is forecast to become the most in-demand occupation within the sector.

Forecasts for the long-term (2027-2034) estimate that **900 people** could be required in the sector. This will be driven by **the need to replace workers** leaving the labour market.

Workforce (people), 2034



Workforce size 2034: 8,100 people



The sector's workforce is expected to **decline** by **-6.0%** or **-500** people between 2027 and 2034



Compared to a Scotland wide increase of **1.2%** or **32,000** people

Total Requirement*





+



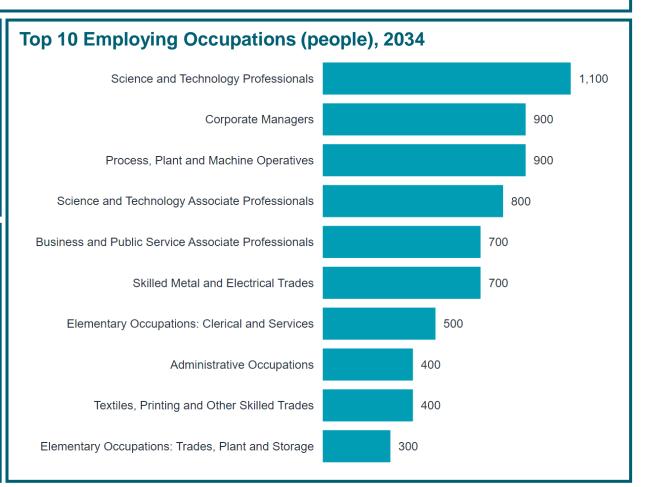
Total requirement: 900 people

Replacement demand: 1,400 people

Expansion demand: -500 people

Chemical Sciences is forecast to account for **0.1%** of Scotland's total requirement for people in the long-term (2027-2034)

1. SDS (2024). Oxford Economics Forecasts.



The replacement demand is the number of people required to replace workers leaving the labour market (i.e. those who retire, move away or change jobs). Please note, figures are rounded to the nearest 100 and as a result totals may not equal the sum of the constituent parts.

^{*} Total requirement for people is made up of expansion and replacement demand.

The expansion demand is the number of people required as a result of economic growth or contraction.

Appendix 1: Chemical Sciences Sector Definition (SIC 2007)

SIC	Name
20.11	Manufacture of industrial gases
20.12	Manufacture of dyes and pigments
20.13	Manufacture of other inorganic basic chemicals
20.14	Manufacture of other organic basic chemicals
20.15	Manufacture of fertilisers and nitrogen compounds
20.16	Manufacture of plastics in primary forms
20.17	Manufacture of synthetic rubber in primary forms
20.20	Manufacture of pesticides and other agrochemical products
20.30/1	Manufacture of paints, varnishes and similar coatings, mastics and sealants
20.30/2	Manufacture of printing ink
20.41/1	Manufacture of soap and detergents
20.41/2	Manufacture of cleaning and polishing preparations
20.51	Manufacture of explosives
20.52	Manufacture of glues
20.53	Manufacture of essential oils
20.59	Manufacture of other chemical products n.e.c.
20.60	Manufacture of man-made fibres
21.1	Manufacture of basic pharmaceutical products
21.2	Manufacture of pharmaceutical preparations



For further information or queries on the SSAs or any of our other products, please contact: RSA@sds.co.uk