

Statistical bulletin

Gross domestic expenditure on research and development, UK: 2021

Annual estimates of research and development performed and funded by business enterprise, higher education, government, UK Research & Innovation and private non-profit organisations.



Contact:
Cecil Prescott
RandD@ons.gov.uk
+44 1633 456767

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1 . Main points

- Expenditure on research and development (R&D) that was performed in the UK (in current prices) was £66.2 billion in 2021; an increase of £4.3 billion since 2020 and £7.8 billion since 2018, which is the first period available using improved methodology.
- The largest components of R&D expenditure were the business sector at £46.9 billion (71% of the UK total), followed by the higher education sector at £14.9 billion (23% of the UK total).
- The government sector, including UK Research and Innovation, performed £3.4 billion (5% of the UK total) of R&D and the private non-profit sector performed the least at £1.0 billion (1%).
- The methodology used to produce estimates of R&D performed in the business and higher education sectors was improved in our [Gross domestic expenditure on research and development \(GERD\), UK: 2020 bulletin](#); estimates in this release have been compiled using those improved methodologies.

2 . Gross domestic expenditure on research and development data

[UK gross domestic expenditure on research and development, 2021 \(designated as official statistics\)](#)

Dataset | Released 17 July 2023

Annual estimates of research and development in the UK performed and funded by business enterprise, higher education, government, UK Research and Innovation, and private non-profit organisations.

[UK gross domestic expenditure on research and development, 2021 \(designated as national statistics\)](#)

Dataset | Released 17 July 2023

Annual estimates of research and development in the UK performed and funded by business enterprise, higher education, government, UK Research and Innovation, and private non-profit organisations.

3 . Measuring the data

This release provides estimates of research and development (R&D) performed in, and funded by, the following four sectors of the UK economy, as defined in the [Frascati Manual 2015](#):

- business enterprise R&D (BERD)
- higher education R&D (HERD)
- government, including UK Research and Innovation, R&D (GovERD)
- private non-profit organisations R&D (PNPRD)

These sectors' R&D data collectively form the gross domestic expenditure on R&D (GERD) measure.

In this statistical bulletin, R&D and related concepts follow internationally agreed standards defined by the [Organisation for Economic Co-operation and Development \(OECD\)](#), as published in the Frascati Manual 2015. GERD is the OECD's preferred measure of R&D activity for use in international comparisons.

R&D can be measured by the expenditure on R&D performed by an organisation, or the funding received by an organisation for R&D work. These are often, but not always, the same. Performance is regarded as a more accurate measure than funding received, as not all funds received may be used as intended. This release reports on R&D expenditure in UK organisations, irrespective of the country of residence of the ultimate owner or users of the R&D produced.

All figures quoted are in current prices, unless otherwise stated.

4 . Methodological developments

In this bulletin, the UK total and performing sector level research and development (R&D) figures are designated as National Statistics, while the remaining figures have official statistics designation.

This approach was introduced in our [Gross domestic expenditure on research and development \(GERD\), UK 2020 bulletin](#), following the introduction of new methodologies for measuring the business and higher education sectors. The GERD, UK 2020 bulletin, published on 22 November 2022, includes information about the reduction in the available data breakdowns and the redesignation of the lower-level estimates to official statistics.

This publication will continue to include a reduced number of detailed breakdowns compared with releases published for periods up to 2019.

Business sector

The Office for National Statistics (ONS) identified that there was undercoverage of small businesses in our previously published [Business Enterprise Research and Development \(BERD\)](#) statistics for periods up to the 2020 BERD release.

Methodological improvements were made to address this under coverage in the results published in the BERD 2021 statistical bulletin. This included revisions to the 2020 results using the new methodology and these revised 2020 estimates were included in the [GERD 2020 statistical bulletin](#). Both the GERD 2020 and BERD 2021 statistical bulletins were published on 22 November 2022.

The new figures provide the best estimates of BERD at the UK level. As the new methodology has been applied to the results after the survey has run in the usual way, the estimates in this release for the business sector, and therefore total UK R&D, are subject to some uncertainty. This uncertainty increases below the UK level and there is also less data for validation. To maintain the quality of the statistics, this publication features fewer detailed breakdowns than usual.

The National Statistics designation for the total and sector breakdowns in GERD remains. However, the ONS asked the [Office for Statistics Regulation \(OSR\)](#) to temporarily pause the National Statistics status of the detailed GERD breakdowns, that include the BERD data, to convey their uncertainty. The suspension of National Statistics status will continue until further redevelopment takes place and there is more certainty on the distribution of business R&D below the UK level.

Higher education sector

The [Gross domestic expenditure on research and development 2020](#) release improved the measurement of R&D performed in the higher education sector, by introducing a new data source: the [Transparent Approach to Costing \(TRAC\)](#). This data source was developed to help cost R&D activity within the higher education sector.

The previous source used to measure R&D activity in the higher education sector was not able to fully capture all R&D being performed. The source was compiled based on flows of money into the higher education sector for R&D to be performed, rather than actual R&D performance. Further details of the changes made are available in our [GERD 2020 bulletin](#).

In this release, TRAC continues to be the main data source for R&D performed in the higher education sector. However, the ONS has estimated R&D expenditure in a small number of regions in place of the TRAC data. This approach was taken because a small number of universities were either unable to submit their TRAC returns on time for inclusion in the TRAC results, or the returns were still under review. No account is made for these universities in the TRAC estimates, as noted in the most recent annual [TRAC](#) publication. The ONS estimated expenditure based on growth rates for the affected regions. This will mean that estimates in this bulletin are inconsistent with the most recent TRAC publication. The estimated values calculated by the ONS only represent a small proportion of the overall total for the higher education sector.

Impact on measures of R&D as a proportion of gross domestic product (GDP)

The estimates of the percentage of gross domestic product (GDP) that was spent on R&D performed in the UK, that are usually published in the GERD results, are not available in this bulletin. This is because we have not yet incorporated the improvements to the measurement of R&D in the business and higher education sectors into the calculations of GDP.

We will look to reinstate this calculation in future releases once these changes have been incorporated fully into UK GDP estimates.

Quality

The methodological improvements related to periods from 2018 onwards were implemented in our [Gross domestic expenditure on research and development, UK: 2020 bulletin](#) and carried into this release. These changes, as well as regular revisions to the survey data due to further validation, mean that comparisons of estimates for total research and development (R&D) performed in the UK, and R&D performed in the business and higher education sectors before 2018 are not possible.

We are updating our UK gross domestic expenditure on research and development Quality and Methodology (QMI) that details the strengths, limitations, appropriate uses and methodologies applied to compile survey estimates.

5 . Related links

[Business enterprise research and development, UK: 2021](#)

Bulletin | Released 22 November 2022

Spending and numbers employed on research and development by businesses in the UK, including data on sources of funds and regional spread.

[Research and development expenditure by the UK government: 2021](#)

Bulletin | Released 30 March 2023

Research and development and related expenditure by UK government departments and devolved administrations.

6 . Cite this statistical bulletin

Office for National Statistics (ONS), released 17 July 2023, ONS website, statistical bulletin, [Gross domestic expenditure on research and development, UK: 2021](#)