

Statistical bulletin

Gross domestic expenditure on research and development, UK: 2020

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



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Release date:
22 November 2022

Next release:
To be announced

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1 . Main points

- Expenditure on research and development (R&D) that was performed in the UK (in current prices) was £61.8 billion in 2020; this was an increase of £2.1 billion since 2019 and £3.4 billion since 2018, which is the first period available using improved methodology.
- The largest components of R&D expenditure were the business sector at £44.0 billion (71% of the UK total), followed by the higher education sector at £13.9 billion (22%).
- The government sector, including UK Research and Innovation, performed £3.1 billion (5% of the UK total) and the private non-profit sector performed the least at £0.8 billion (1%).
- The methodology used to produce estimates of R&D performed in the business and higher education sectors has been improved to better reflect all R&D activity in these sectors; values of total expenditure on R&D performed in the UK, by all sectors, in 2018 and 2019 are both £21.1 billion higher than previously published.

These figures provide the current best estimate of R&D at the UK level. These have been validated against other available data, but there is more uncertainty in the estimates below the UK and performing sector level. Below the UK level, there are also less data for validation. To maintain the quality of the statistics, this publication will feature a reduced number of detailed breakdowns compared with previous releases. While the existing National Statistics designation for the total and performing sector level R&D figures will remain, to help further convey the uncertainty, the Office for National Statistics (ONS) have asked the Office for Statistics Regulation (OSR) to temporarily pause the National Statistics status of the detailed breakdowns. OSR confirmed their agreement to this approach [in their letter published on 21 November 2022](#). This is until the further redevelopment takes place and there is more certainty on the distribution below this level. Methodological improvements have been implemented for the 2018 period onwards, meaning that comparisons of estimates for total R&D performed in the UK, and R&D performed in the business and higher education sectors before 2018 are not possible.

2 . Gross domestic expenditure on research and development data

[UK gross domestic expenditure on research and development, 2020 \(designated as official statistics\)](#)

Dataset | Released 22 November 2022

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, 2020 \(designated as national statistics\)](#)

Dataset | Released 22 November 2022

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 are known collectively as gross domestic expenditure on R&D (GERD).

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

The methodology for collecting data for the business and higher education sectors has been improved in this release.

Business sector

Although our best available estimates at the time, there is undercoverage of small businesses in previously published business enterprise research and development (BERD) statistics. Methodological improvements have been made to address this undercoverage in the BERD survey results, which are now more representative of small businesses performing research and development (R&D). The approach uses uplift factors, which have been applied to the survey results that have otherwise been prepared using the usual BERD survey results process. These changes have been implemented in the BERD statistics for the 2018 period onwards, and the estimates for the BERD sector using the new method are available in the BERD 2021 statistical bulletin, also published on 22 November 2022.

Further technical information about how and why the uplift approach was developed for the BERD statistics, is available in our [Comparison of Office for National Statistics \(ONS\) business enterprise research and development statistics with HM Revenue and Customs \(HMRC\) research and development tax credit statistics article](#) published on 29 September 2022.

Further information about the range of approaches considered and how these were validated can be found in our [Options for transformation of business enterprise research and development statistics article](#), published on 22 November 2022. Note that the 2018, 2019 and 2020 values for business R&D in these articles were the latest available at the time the work was undertaken, but they have been updated in the BERD 2021 statistical bulletin.

The new figures provide the current best estimate of business enterprise research and development at the UK level, which has been validated against other available data. Naturally though, as the uplift factors have 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 are also less data for validation. To maintain the quality of the statistics, this publication features a reduced number of detailed breakdowns than usual.

While the existing National Statistics designation for the total and sector breakdowns in GERD will remain, to help further convey the uncertainty ONS have asked the Office for Statistics Regulation (OSR) to temporarily pause the National Statistics status of the detailed breakdowns that involve BERD until the further redevelopment takes place and there is more certainty on the distribution below the total level.

Higher education sector

In this release we have 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 activities within the higher education sector.

The existing measures of R&D in the higher education sector have not been able to fully capture all work being performed. These methods focussed on flows of money into the sector for R&D to be performed, rather than actual R&D performance. We were therefore unable to capture R&D that was both performed and funded from within the sector itself, for example funded by surpluses from other activities not directly related to R&D. This has resulted in a new estimate of R&D performed in the higher education sector in 2020, that was funded by the sector itself, of £4.9 billion. In previous GERD releases this element of R&D has been shown as zero in the data tables, because our existing sources did not cover this type of R&D. Also, while the existing measurement covered direct costs of R&D work, some indirect costs were not covered. Indirect R&D costs are for activities not directly part of the R&D work, but are needed for the R&D to take place, such as laboratory security and cleaning costs.

The new data source has been implemented from 2018 onwards. Therefore, the estimates of R&D performed by the sector have been revised, from £8.7 billion to £14.0 billion in 2018 and from £ 9.1 billion to £14.0 billion in 2019.

The new TRAC measure uses different definitions for the business and overseas sectors when measuring funding flows into the higher education sector. Therefore, estimates of funding for these detailed comparisons are not comparable between the 2018 period and earlier years.

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 release. 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. The earliest opportunity to feed the revised R&D estimates into the national accounts will coincide with completion of the next stage of development towards the end of 2023.

In the GERD 2019 release, we indicated that the 2019 estimate for the percentage of GDP spent on R&D could be approximately 0.1 to 0.3 percentage points higher than the published value of 1.7%. This was because of the work in progress at the time to improve the measurement of R&D performed in the higher education sector only. Since then, we have carried out further work to improve the BERD statistics, which have been incorporated into this release and therefore the overall impact on expenditure on R&D as a percentage of GDP will be higher than the estimate of 0.1 to 0.3 percentage points. As both these methodological changes to the higher education and business sectors have not been incorporated into the calculations of GDP, at this stage it is not currently possible to estimate the percentage of GDP that was spent on R&D performed in the UK. 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, as well as regular revisions to the survey data because of further validation, have been implemented for the 2018 period onwards, meaning that comparisons of estimates for total R&D performed in the UK, and R&D performed in the business and higher education sectors before 2018 are not possible.

More quality and methodology information on strengths, limitations, appropriate uses, and how the data were created is available in our [UK gross domestic expenditure on research and development Quality and Methodology Information \(QMI\) article](#).

5 . Related links

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

Bulletin | Released 22 November 2022

UK estimates of annual research and development (R&D) spending by UK businesses.

[Research and development expenditure by the UK government: 2020](#)

Bulletin | Released 8 April 2022

Research and development and related expenditure by UK government departments, UK Research and Innovation (UKRI) and higher education funding bodies. Formerly released as UK government expenditure on science, engineering and technology (SET).

6 . Cite this statistical bulletin

Office for National Statistics (ONS), released 22 November 2022, ONS website, statistical bulletin, [Gross domestic expenditure on research and development, UK: 2020](#)