Rialtas na hÉireann
Government of Ireland

# The Research and Development Budget (R&D)
2017-2018

Prepared by the Department of Business, Enterprise and Innovation

## Table of Contents

## List of Figures

### Executive Summary



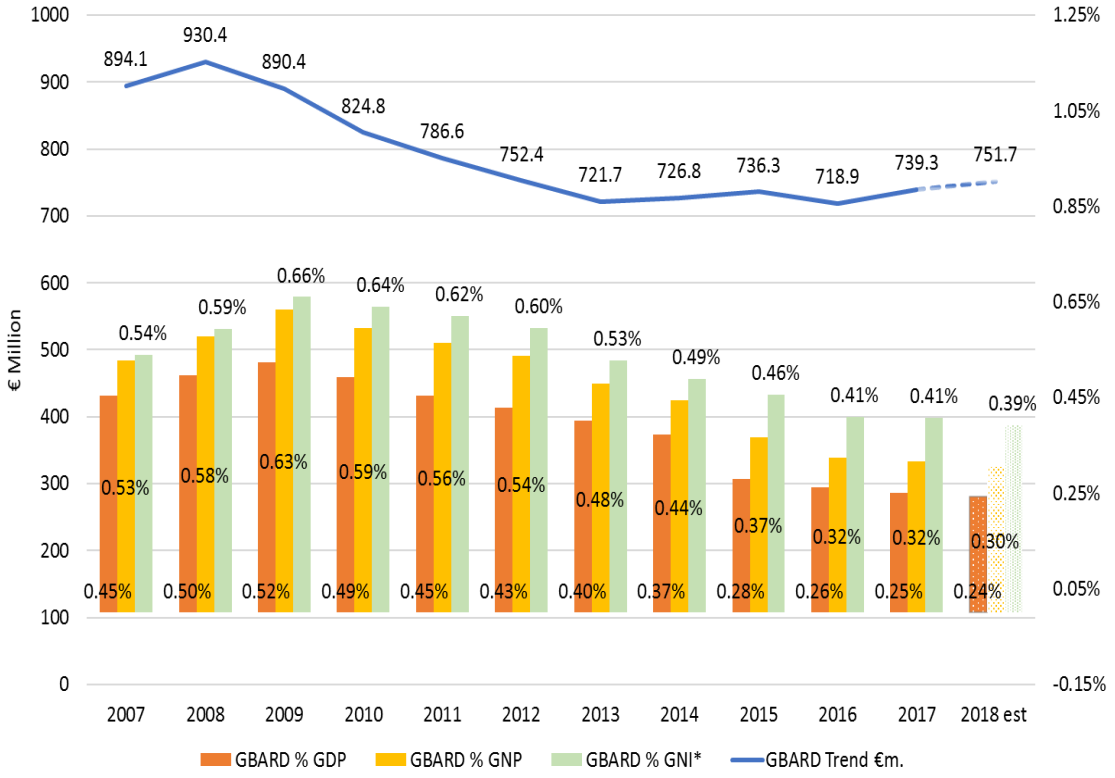
### Report

## List of Tables

## Executive Summary

This report presents the latest available data on the Government Research and Development (R&D) Budget and on Ireland's R&D expenditure across all sectors.

**Figure A: GBARD - Government R&D Budget (€m) current prices and as a percentage of GDP/GNP/GNI*, 2007-2018**




**Note: GDP for 2018 is based on growth rate of 5.3% in current prices (Department of Finance Stability Programme Update, April 2018). Technical assumption is made that GNI* will grow at the same rate as GNP, which is forecast to grow by 5.9% in current prices. Estimates for the increase in GBARD in 2018 are based on the responses to the R&D Budget Survey 2017-2018.**

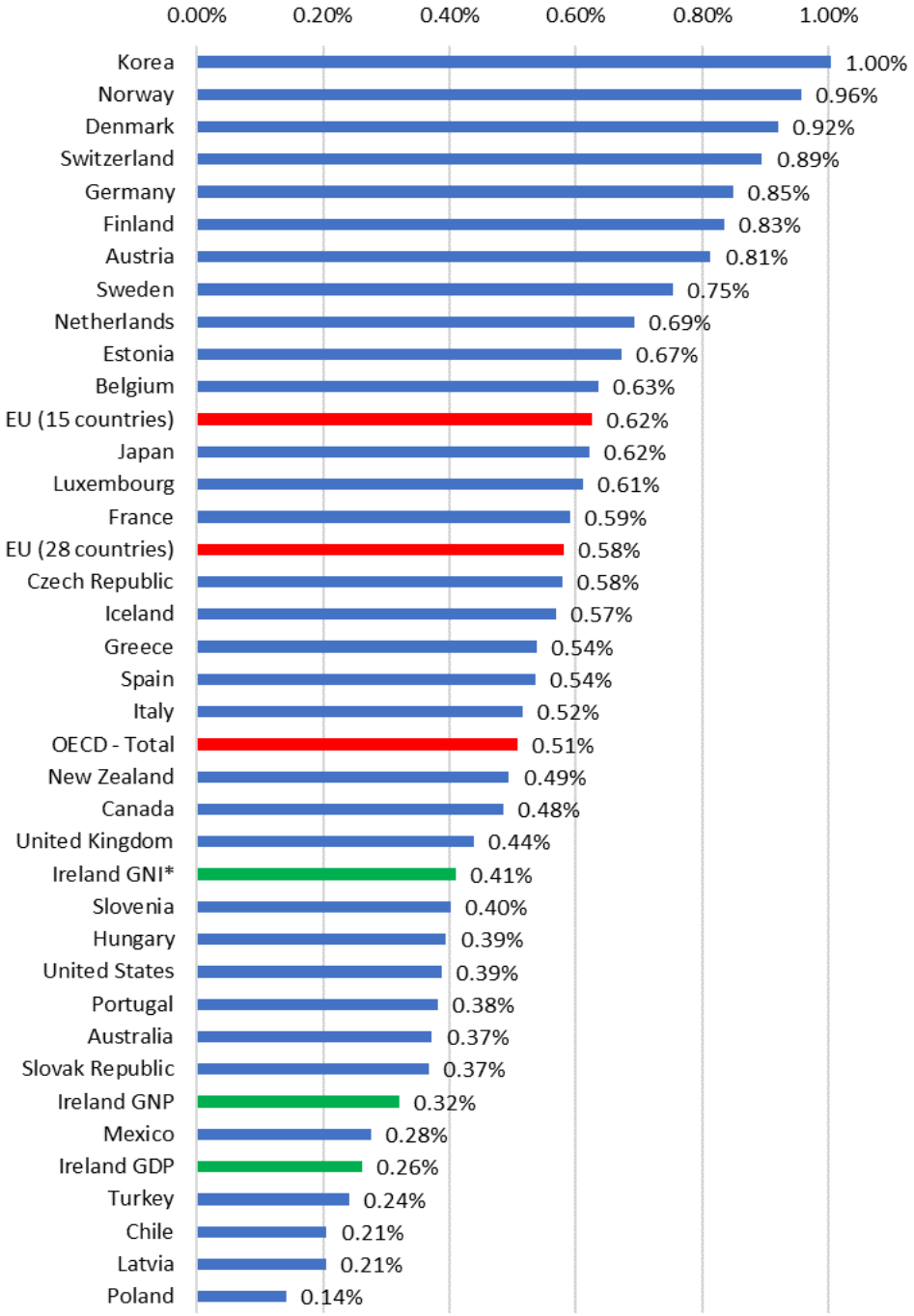
Government Budget Allocations for R&D (GBARD)[1] in 2017 was €739.3m, which marks an increase of 2.8% in expenditure over the previous year. It is estimated to increase by 1.7% in 2018 with allocated funding of €751.7m. The R&D budget as a percentage of GDP/GNP/GNI* (R&D intensity rate) fell over the past decade to 0.25%/0.32%/0.41% in 2017 and is expected to be 0.24%/0.30%/0.39% in 2018.

Whilst the R&D budget fell from €930.4m in 2008 to €721.7m in 2013, it has since grown to €739.3m in 2017.

[1] GBARD is all the funding allocated by Government to R&D to be performed in all sectors of the economy e.g. within the higher education sector, by businesses or by Government Agencies.

The fall in our R&D intensity rate is partly due to a significant increase in GDP, GNP and GNI* in recent years. Since 2008 our GDP has increased by 57% in current values, GNP has increased 45% and GNI* has increased by 15%, while GBARD has declined by 21% over the same period. (See Appendix 2).

**Figure B: International comparison of Civil GBARD as a percentage of GDP and of GNP/GNI* for Ireland, 2016**




**Source: OECD, Main Science and Technology Indicators. Note Civil GBARD excludes Military R&D.**

Figure B shows the results for Civil GBARD as a percentage of GDP for all countries where data is available for 2016. Ireland at 0.41% of GNI* and 0.26% of GDP is below the OECD average of 0.51% of GDP and behind other small advanced OECD countries such as Denmark, Switzerland, Finland, and New Zealand. Latest data for EU28 member states for 2016 shows an average of 0.58% of GDP.

**Figure C: GBARD as a percentage of Total Government Expenditure, 2007-2018**

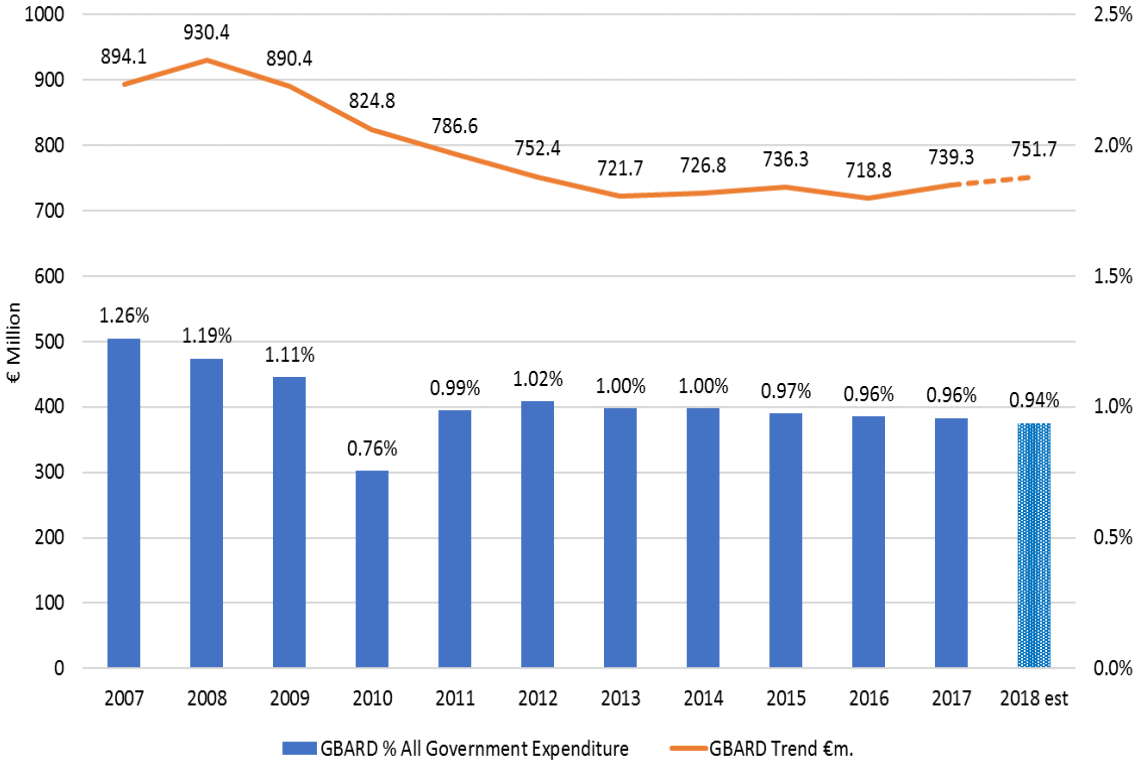
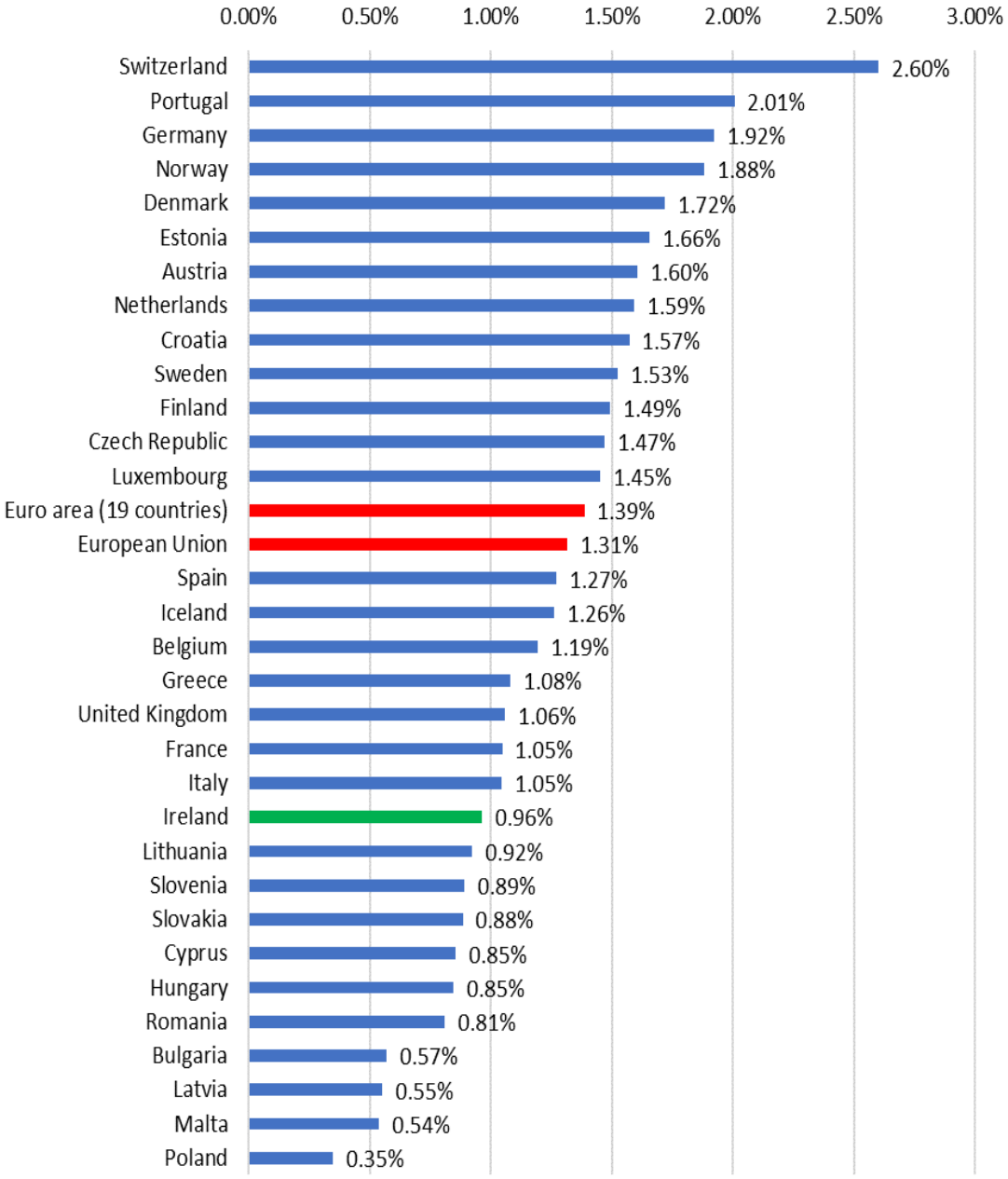



Figure C shows that levels of Government R&D expenditure as a percentage of all Government expenditure has remained at approximately 1% over the past seven years. In 2017, 0.96% of total general Government expenditure was spent on R&D. It is estimated to be 0.94% in 2018.[2]

[2] Estimate for Total General Government Expenditure in 2018 (€80,080 million) is taken from the Department of Finance Stability Programme Update, April 2018. Estimate for GBARD is based on the responses to the R&D Budget Survey 2017-2018.

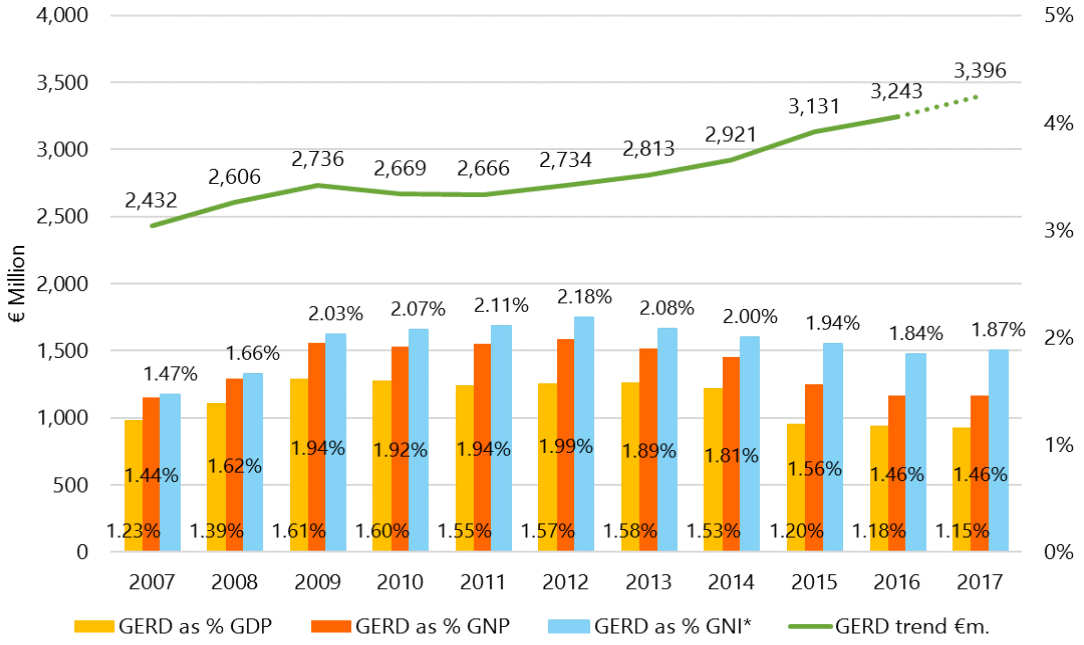
**Figure D: International comparison of Civil GBARD as a percentage of Total Government Expenditure, 2016**




**Source: Eurostat. Note Civil GBARD excludes Military R&D.**

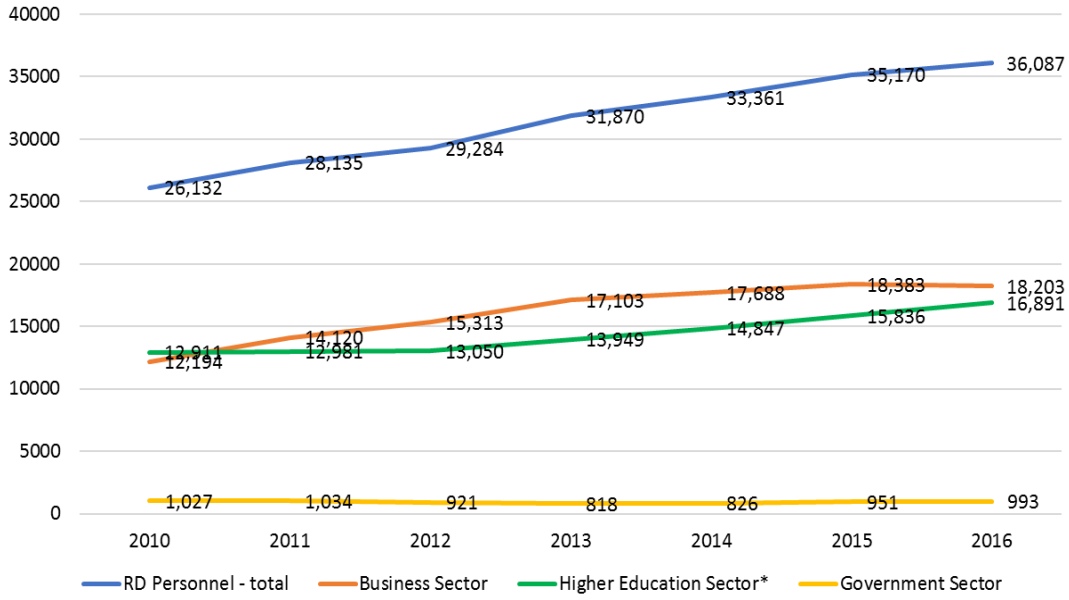
At 0.96% Ireland is below the European Union average of 1.31% and the euro area average of 1.39% for GBARD as a percentage of Total Government Expenditure in 2016.

**Figure E: Gross Expenditure on R&D (GERD) and as a percentage of GDP/GNP/GNI*, 2007-2017**




Gross Expenditure on R&D (GERD)[3] expressed as a percentage of GDP/GNP/GNI* stood at 1.15%, 1.46% and 1.87% respectively in 2017. The GERD intensity has been falling since 2012 when it stood at 1.57%,1.99% and 2.18% of GDP/GNP/GNI* respectively. However, the actual amount of R&D investment has increased over this period from €2.432bn in 2007 to an estimated €3.396bn in 2017.

**Figure F: R&D Personnel (FTE) in Ireland by Sector, 2010-2016**




[3] GERD includes all expenditure from all sources (public and private) spent on R&D performed in the Government, business and higher education sectors.

There was a total of 36,087 personnel (Full-time equivalents - FTEs) working in R&D in 2016. Of these R&D personnel 50.4% or 18,203 were working in the business sector, 16,891 in the higher education sector, 933 in the Government sector.

Between 2010 and 2015, the business sector has seen a steady increase in the number of R&D personnel, before declining slightly in 2016. Between 2010 and 2016 the Higher Education Sector increased its R&D personnel by 30.8%, while the Government Sector decreased its number by 3.3%.

# Introduction

**Research and Development - definition**

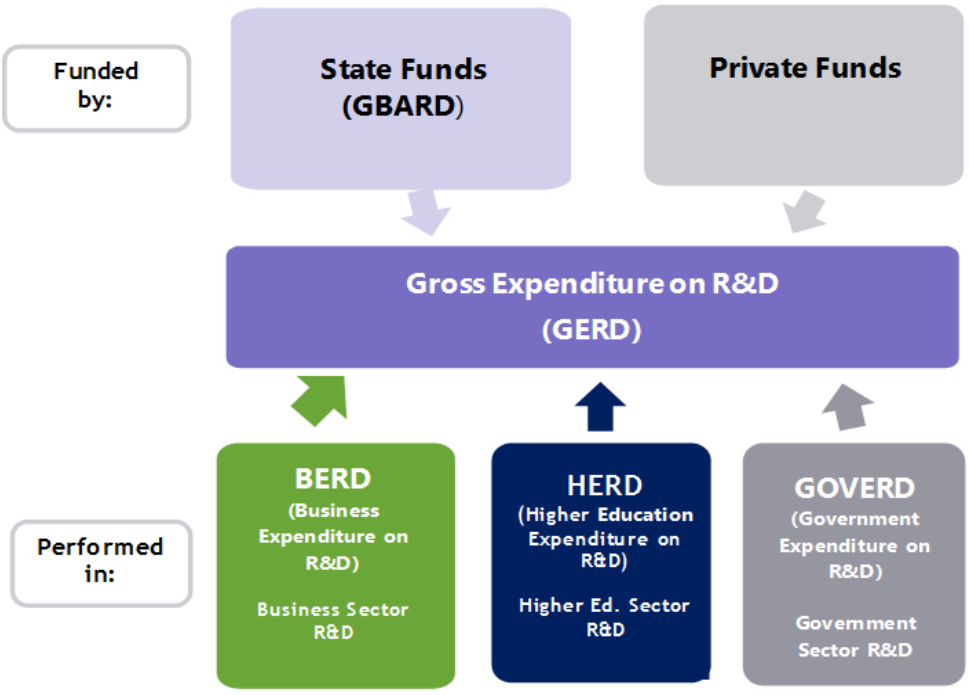
Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge.

**Frascati Manual 2015, OECD**

This report tracks Government budget allocations for Research & Development (GBARD) over the period 2007 to 2018.

The most recent data for this time-series was collected through the 'R&D Budget 2017-2018' survey undertaken by the Department of Business, Enterprise and Innovation in 2018. (See Appendix 1 for Methodology and Appendix 6 for a copy of the questionnaire.)

The survey was sent to a total of 30 Government Departments and agencies who were engaged in some form of R&D activity in either 2017 or 2018. (See Appendix 3 for the list of Government Departments and their Agencies who provided data for this report).




In addition, this report brings together the expenditure and personnel figures for all R&D performers in the economy. Data on R&D performers is collected through three surveys and the latest data is available from 2015, 2016 and 2017, with a time series back to 2007. The most recent published surveys are:

- 'Business Expenditure on Research and Development 2015-2016 (BERD)' survey undertaken by the Central Statistics Office (CSO)

- ‘Research & Development in the Higher Education Sector 2014-2015 (HERD)’ survey undertaken by Department of Business, Enterprise and Innovation (DBEI).
- ‘R&D Budget 2017-2018’ (GOVERD) survey undertaken by the Department of Business, Enterprise and Innovation (DBEI).

All surveys are carried out using the definitions, rules and guidelines set out in the OECD Frascati Manual. This allows for a common dataset to be collected across all OECD and EU countries and facilitates international comparisons and benchmarking. All international comparison figures relate to the most recent data available for each country.

Data from these three surveys has been required since 2014 under:

- Commission Regulation (EC) No 995/2012 implementing Decision No 1608/2003/EC. This Regulation covers the production and development of Community statistics on science and technology. The surveys collect information about the research and development activities across all sectors of the economy.

In addition, this survey data is required for, and/or included in, the following reports:

- OECD ‘International data collection on resources devoted to research and development’.
- ‘Innovation 2020’: Ireland’s strategy for research and development and science and technology. This data is used by the Innovation 2020 Implementation Group to track progress on the Strategy’s targets.

## Report indicators

1. Government Budget Allocations for R&D - (GBARD) - Chapter 1

**Government Budget Allocations for R&D (GBARD)**
This title was introduced in the 2015 Frascati Manual – p.36. This indictor was previously entitled Government Budget Appropriations and Outlays for R&D (GBAORD).

**Frascati Manual 2015, OECD**

GBARD is all the funding allocated by Government to R&D to be performed in all sectors of the economy e.g. within the higher education sector, by businesses or by Government Agencies.

2. Gross Expenditure on R&D (GERD) and Personnel in All sectors - Chapters 2+3

This chapter includes total expenditure and personnel engaged on R&D in the country by all sectors of the economy. Collectively, the expenditure and personnel in the government, business and the higher education sectors. This GERD indicator includes all expenditure from all sources (public and private) spent on R&D performed in these sectors.

3. Government Sector R&D (GOVERD) - Chapter 4

GOVERD is R&D performed in-house in Government departments or agencies. This chapter takes a more detailed look at R&D performed in the Government Sector. Indicators include R&D expenditure and personnel employed in the Government sector.

**Acknowledgement**

The Department of Business, Enterprise and Innovation would like to thank and acknowledge the time and attention of the many respondents to our survey:

**'R&D Budget 2017-2018'**

For further information please contact:

Maurice Dagg,

Surveys Unit,

Strategic Policy Division,

Department of Business, Enterprise and Innovation,

23 Kildare Street,

Dublin D02 TD30.

Tel: 01 631 2856

# Chapter 1: Government Budget Allocations for R&D

**Government R&D Budget**

**(GBARD)**

**2018 allocation - €751.7m**

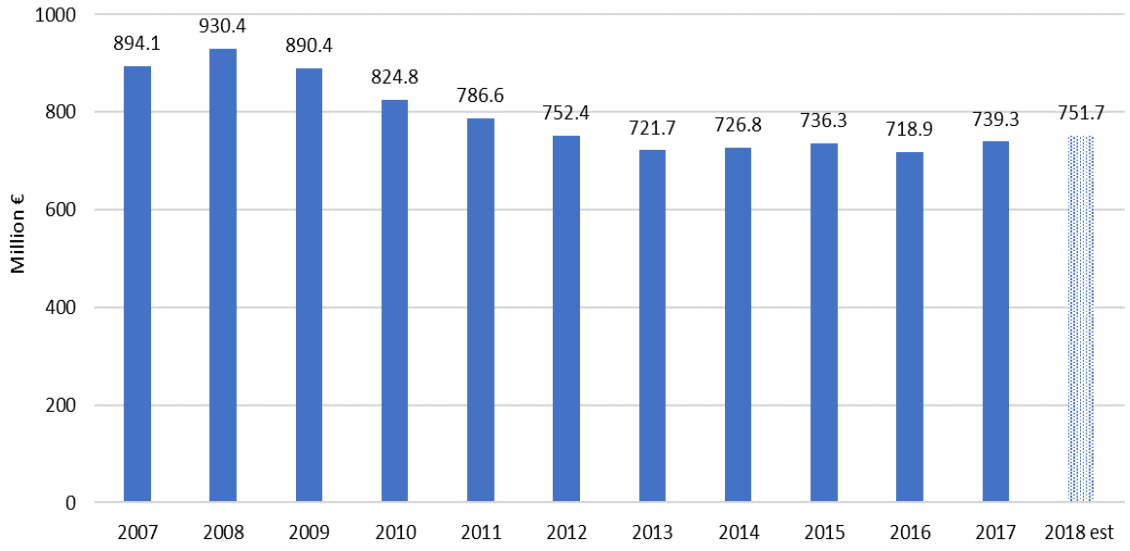
The internationally recognised indicator for benchmarking State-funded performance of R&D is the 'Government Budget Allocations for R&D' metric (GBARD). This data has been required since 2004 under Commission Regulation (EU) No 995/2012. In this chapter, total Government expenditure on R&D is charted and benchmarked against international comparators.

## 1.1 Government Budget Allocations for Research and Development (GBARD)

GBARD includes:

- Government funding for R&D programmes in the higher education sector administered by the Department of Education and Skills, the Higher Education Authority (HEA), Science Foundation Ireland (SFI) and others;
- Government funding for business sector R&D, administered through State agencies including IDA Ireland, Enterprise Ireland and others;
- Government funding for R&D performed in the public sector e.g. Teagasc, the Marine Institute and others; and
- Also included in GBARD are Government contributions to international R&D programmes or organisations solely or mainly concerned with R&D.

**Figure 1: GBARD trend in current prices, €m. (2007-2018)**

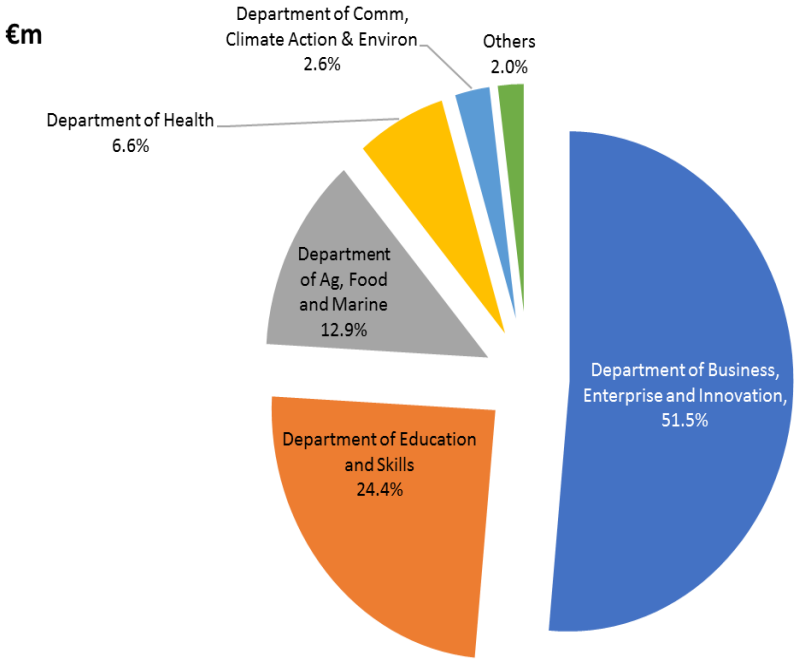


Government funding of R&D in 2017 was €739.3m and represents an increase of 2.8% over the outturn figure for 2016. It is estimated that expenditure will increase in 2018 by 1.7% to €751.7m. 2018 estimates are based on Government Department and Agency returns to the R&D Budget 2017-2018 Survey.

## 1.2 GBARD by Government Department

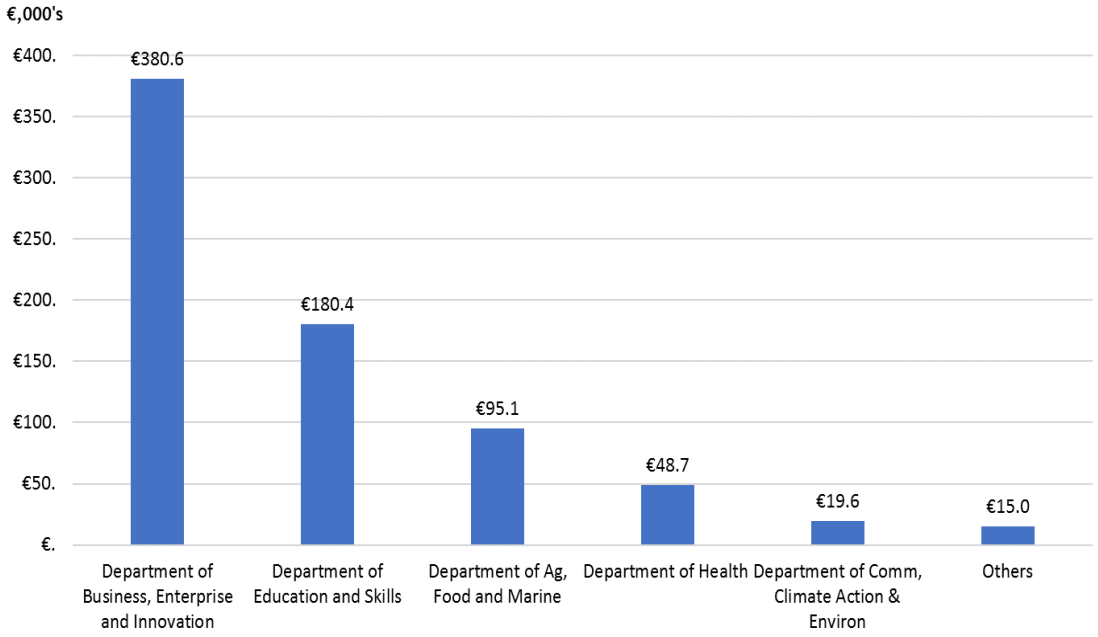
This chart shows the breakdown of GBARD by Government Department. The three largest funding Departments account for 88.7% of all Government investment in research and development.

**Figure 2: Percentage Breakdown of GBARD by Government Departments, 2017**




In 2017, the Department of Business, Enterprise and Innovation (DBEI) was responsible for the largest proportion of Government investment in R&D at €380.6m or 51.5% of total GBARD. The Department of Education and Skills had an R&D outturn in 2017 of €180.4m or 24.4% of GBARD. The Department of Agriculture, Food and the Marine invested €95.1m or 12.9% of total GBARD in 2017.

## Figure 3: Nominal Breakdown of GBARD by Government Departments, 2017




## Table 1: Main Government Departments/Agencies with Spending on R&D, 2017-2018

| Department/Agency | 2017 (€000's) | % of Total | 2018 est (€000's) | % of Total |
|---|---|---|---|---|
| Science Foundation Ireland | 173,304 | 23.4% | 172,250 | 22.9% |
| Higher Education Authority | 165,983 | 22.4% | 155,531 | 20.7% |
| Enterprise Ireland | 99,225 | 13.4% | 95,778 | 12.7% |
| Teagasc | 50,856 | 6.9% | 57,439 | 7.6% |
| IDA Ireland | 52,830 | 7.1% | 55,000 | 7.3% |
| Health Research Board | 43,659 | 5.9% | 48,537 | 6.5% |
| Irish Research Council | 34,150 | 4.6% | 34,050 | 4.5% |
| Dept of Business, Enterprise and Innovation | 27,208 | 3.7% | 23,946 | 3.2% |
| Dept of Agriculture, Food and the Marine | 25,458 | 3.4% | 24,629 | 3.3% |
| Bord Iascaigh Mhara | 10,022 | 1.4% | 15,365 | 2.0% |
| Marine Institute | 8,769 | 1.2% | 8,769 | 1.2% |
| Economic and Social Research Institute | 6,826 | 0.9% | 7,850 | 1.0% |
| Environmental Protection Agency | 7,400 | 1.0% | 11,352 | 1.5% |
| Sustainable Energy Authority of Ireland | 6,350 | 0.9% | 7,232 | 1.0% |
| Others | 27,306 | 3.7% | 33,935 | 4.5% |
| **Total** | **739,347** | **100.0%** | **751,663** | **100.0%** |

*** DBEI's total budget in Figure 3 above includes funds provided to SFI, Enterprise Ireland, IDA Ireland and the HEA's PRTLI programme.**

**** DAFM's total budget on previous page and Figure 3 includes funds provided to BIM, Teagasc & the Marine Institute. Marine Institute figures are imputed based on return to R&D Budget 2016-2017.**

Table 1 provides a breakdown of estimated R&D spending by the main administrating Government departments and agencies in 2018 alongside the outturn figures for 2017. A detailed summary of the main research programmes are set out in Appendix 5.

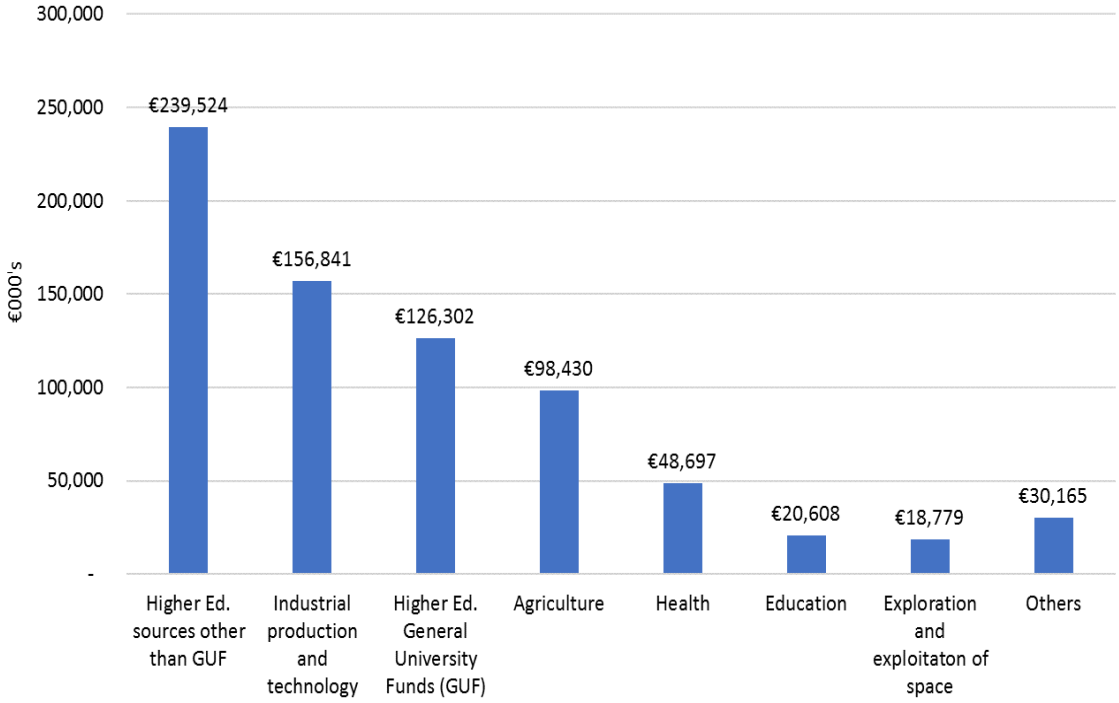
The largest public body funding R&D activities in 2017 was Science Foundation Ireland (SFI), with an outturn of €173.3m or 23.4% of Government support to R&D through research grants and other research supporting programmes. Allocated funding for SFI in 2018 decreased slightly to €172.3, which accounts for 22.9% of total Government spending on R&D.

The next largest funder of R&D activities was the Higher Education Authority (HEA). In addition to General University Funds (GUF), overall spending by the HEA includes expenditure on R&D programmes such as DBEI's Programme for Research in Third Level Institutions (PRTLI) that supports building institutional research capacity, enabling the establishment of research centres and facilitating joint research programmes and national initiatives. This element of the HEA budget has been reduced in 2018, with PRTLI expenditure going from €19.6m in 2017 to €1.9m in 2018 (p.82).

Together the top two funders accounted for 45.8% of all total state investment in R&D in 2017.

## 1.3 GBARD Classified by Area of Research

**Figure 4: GBARD by Areas of Research, 2017**



GBARD is classified here under NABS[4] and shows that almost one third of total funding for 2017 was allocated for R&D performed in the higher education sector.

**Table 2: GBARD classifications for Ireland 2017-2018**

| NABS Classifications | 2017 - €m | % of Total | 2018 - €m | % of Total |
|---|---|---|---|---|
| Higher Ed. - from sources other than GUF | 239.5 | 32.4% | 219.2 | 29.2% |
| Industrial production and technology | 156.8 | 21.2% | 155.3 | 20.7% |
| Higher Ed - General University Funds (GUF) | 126.3 | 17.1% | 131.2 | 17.5% |
| Agriculture | 98.4 | 13.3% | 109.5 | 14.6% |
| Health | 48.7 | 6.6% | 55.5 | 7.4% |
| Education | 20.6 | 2.8% | 23.5 | 3.1% |
| Exploration and exploitaton of space | 18.8 | 2.5% | 17.8 | 2.4% |
| Political and social systems, structures and processes | 11.3 | 1.5% | 14.1 | 1.9% |
| Energy | 6.5 | 0.9% | 8.3 | 1.1% |
| Environment | 7.4 | 1.0% | 11.4 | 1.5% |
| Transport, telecommunication and other infrastructures | 1.3 | 0.2% | 1.1 | 0.1% |
| Exploration and exploitaton of the earth | 3.7 | 0.5% | 4.7 | 0.6% |
| **Total** | **739.3** | **100.0%** | **751.7** | **100.0%** |

## 1.4 GBARD as a Percentage of GDP/GNP/GNI*

In order to compare state funding of R&D across countries, the OECD recommends using the GBARD indicator with data derived using the guidelines set out in the Frascati Manual.[5]

GBARD includes all funding for R&D from direct exchequer sources. It also includes funding for R&D in the humanities and social sciences.

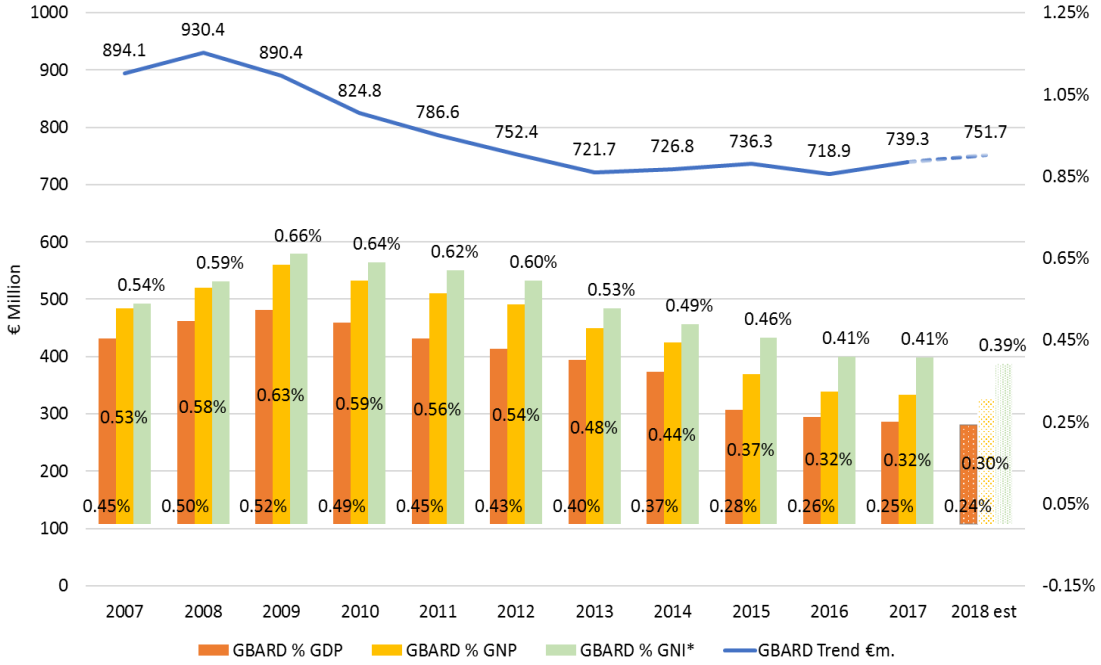
In Figure 5, the GBARD trend line shows that there has been an annual downward trend between 2008 and 2013 falling from €930.4 million to €721.7m.

Since 2014 levels of funding have been maintained, with the outturn figure falling slightly for GBARD in 2016 being €718.9m, before increasing again to €739.3m in 2017. In 2018, estimated funding has increased over 2017 by 1.7% to €751.7m.

[4] Nomenclature for the Analysis and comparison of Scientific programmes and Budget

[5] Frascati Manual 2015: Guidelines for Collecting & Reporting Data on Research and Experimental Development, OECD Publishing, Paris http://www.oecd.org/sti/inno/frascati-manual.htm

**Figure 5: GBARD trend (€m) and GBARD as a percentage of GDP/GNP/GNI* (2007-2018)**




The GBARD intensity rate (State R&D funding for R&D activities as a percentage of economic activity) fell over the past decade to 0.25% of GDP, 0.32% of GNP, and 0.41% of GNI* in 2017. It is projected to be 0.24%, 0.30% and 0.39% of GDP, GNP and GNI* respectively in 2018. 2018 figures are based on an estimated increase in GDP of 5.3% in current prices and of GNP and GNI* of 5.9% and an estimated increase in GBARD of 1.7%.[6]

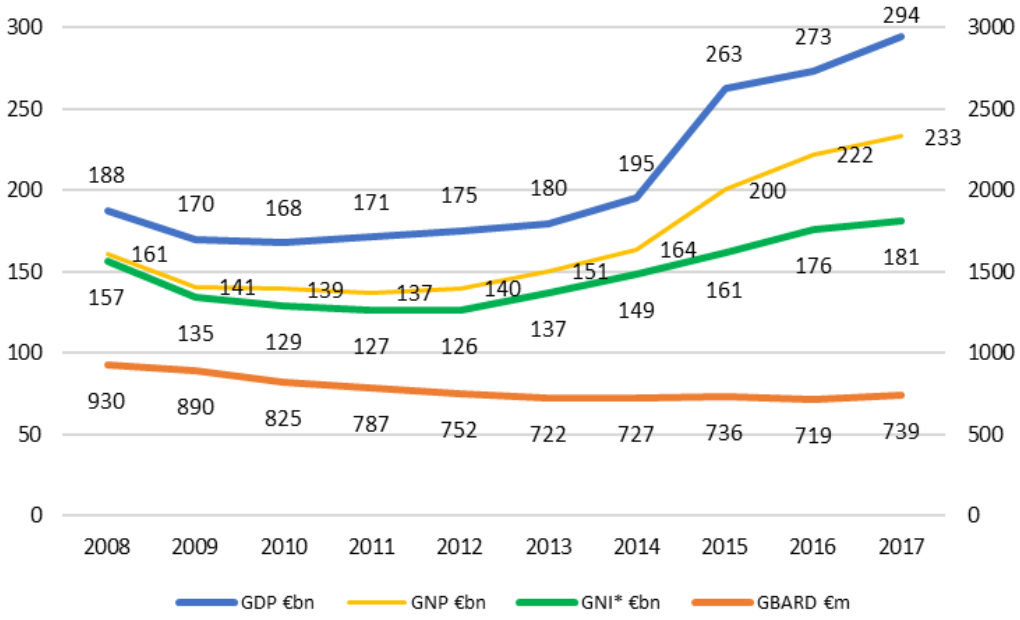
The declining trend in our GBARD intensity is due to two factors:

1. Our economy has grown quickly: GDP in current prices has increased by 56% between 2008 and 2017 and GNP and GNI* has increased by 45% and 15% respectively over the same period; and
2. GBARD has declined by 21% over the period 2008-2017.

Figure 6 shows the trend in GBARD, GDP and GNI* since 2008. The economy has grown particularly quickly following the downturn, with GNI* increasing by 43.6% between 2012-2017.

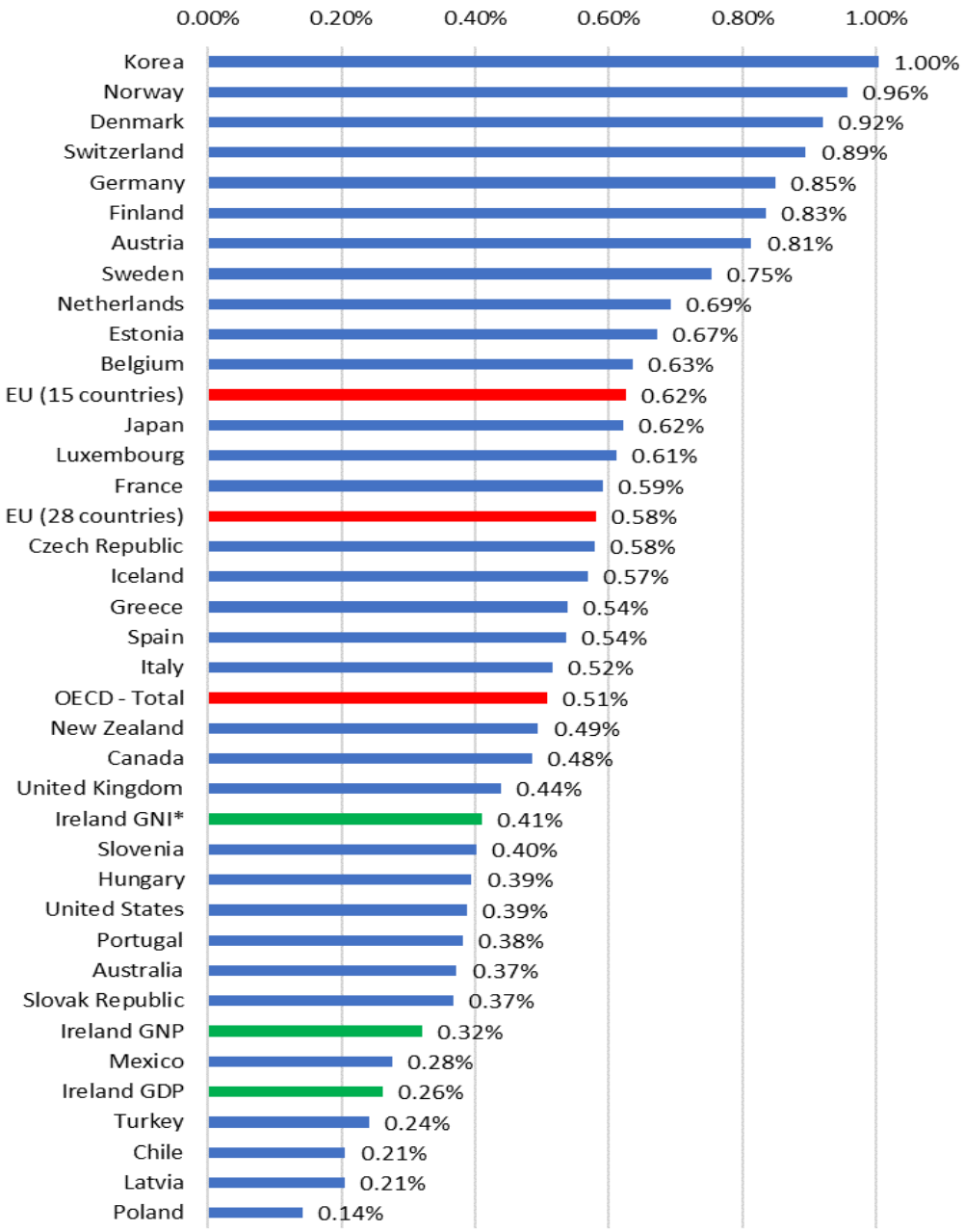
[6] Growth Rate of 5.3% for GDP in current prices is from Department of Finance Stability Programme Update. GNP and GNI* are forecast to grow at 5.9% in current prices for 2018. Estimates for the increase in GBARD are based on the responses to the R&D Budget Survey 2017-2018.

**Figure 6: Trend in GBARD, GDP, GNP and GNI* 2008-2017**



## 1.5 International Comparison of Civil GBARD as a Percentage of GDP and GNP, GNI* for Ireland

**Figure 7: International comparison of Civil GBARD as a percentage of GDP and of GNP/GNI* for Ireland (2016)**




**Source: OECD, Main Science and Technology Indicators. Note Civil GBARD excludes Military R&D.**

Korea, with Civil GBARD spending of 1.00% of GDP, is one of the strongest performing OECD countries.

In 2016, the rate of Civil GBARD as a percentage of GDP for Ireland amounted to 0.41% of GNI* or 0.26% of total GDP. In 2016, the rate of Civil GBARD as a percentage of GDP for EU28 countries was 0.58% and 0.51% for the OECD countries.

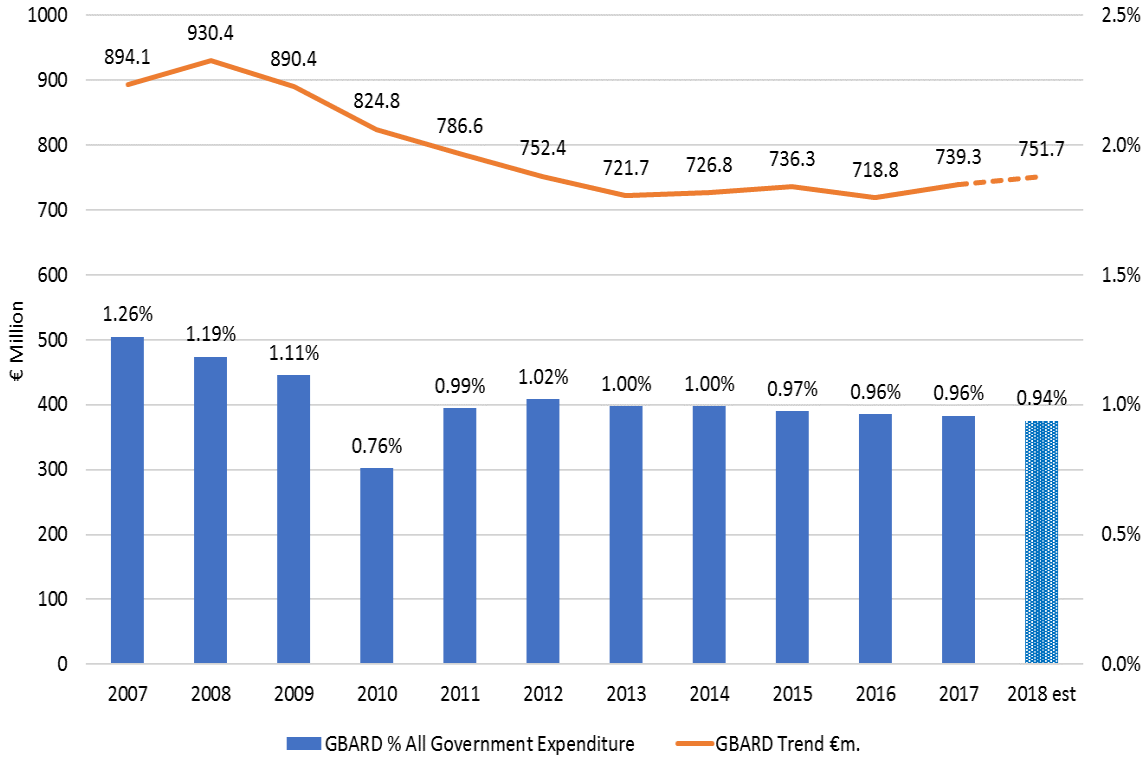
**Civil GBARD**

The GBARD figures used in these graphs are for 'civil' GBARD and are used for international comparisons as they exclude the defence portion of a Government's R&D budget. There is no allocation for defence purposes in the Irish GBARD figures.

## 1.6 GBARD as a Percentage of Total Government Expenditure

This Eurostat indictor measures the level of Government R&D funding as a percentage of total general Government expenditure.

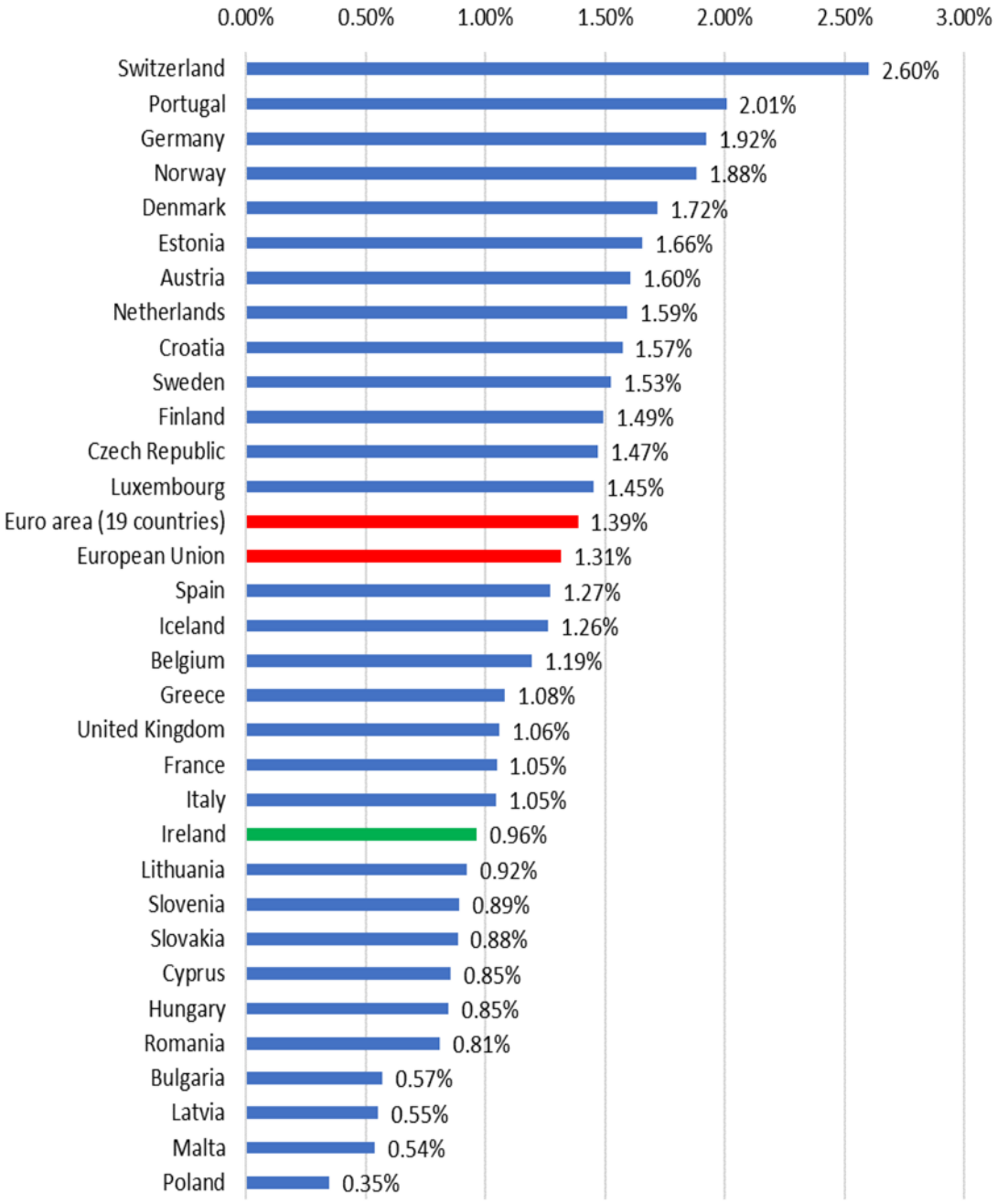
**Figure 8: GBARD as a percentage of Total Government Expenditure 2007-2018**




Levels of Government R&D expenditure as a percentage of all Government expenditure have remained around 1% since 2011. In 2017, 0.96% of total General Government Expenditure was spent on R&D and it is estimated to be 0.94% in 2018.[7]

[7] Estimate for Total General Government Expenditure in 2018 (€80,080 million) is taken from the Department of Finance Stability Programme Update, April 2018. Estimate for GBARD is based on the responses to the R&D Budget Survey 2017-2018.

**Figure 9: International comparison of Civil GBARD as a percentage of Total Government Expenditure, 2016**




**Source: Eurostat. Note Civil GBARD excludes Military R&D.**

For international comparison data is only available up to 2016. The EU28 average for 2016 was 1.31% of total Government expenditure spent on R&D and the Euro Area average was slightly higher at 1.39%, while Ireland's percentage was 0.96% for the same year. Therefore, Ireland is below the EU and Euro Area averages for this indicator.

# Chapter 2: Gross Expenditure on R&D (GERD)

**Gross Expenditure on R&D**

**(GERD)**

**2017 - €3.4bn**

Gross Expenditure on R&D (GERD) is estimated by surveying the performers of R&D by sector in Ireland and data is provided by the following surveys:

### Business Sector: (BERD – Business Expenditure on R&D)

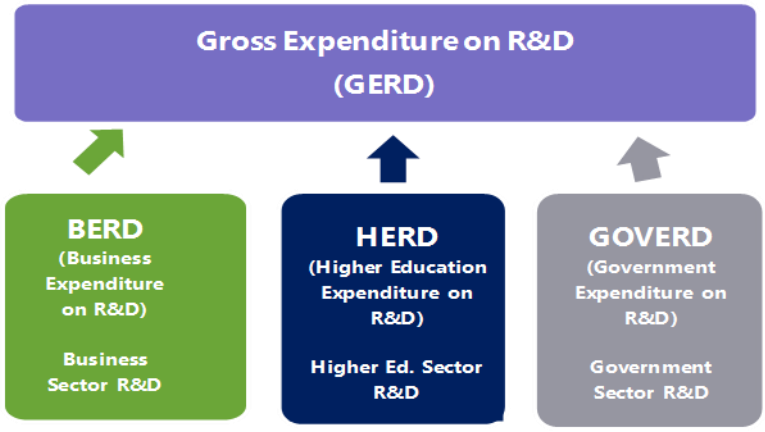
The Business Expenditure on Research and Development (BERD) Survey is a survey of the research and development activities of enterprises in Ireland and other EU Member States. Data is collected every two years by the Central Statistics Office (CSO) and results are available on the CSO website www.cso.ie.

### Higher Education Sector: (HERD – Higher Education R&D)

The Higher Education Research and Development (HERD) Survey is a survey of the research and development activities of third level institutions in Ireland and other EU Member States. Survey data is collected every two years by the Department of Business, Enterprise & Innovation and is made available on the DBEI website – www.dbei.gov.ie

### Government Sector: (GOVERD – Government R&D)

This data comes from the annual survey underpinning this report – 'The R&D Budget' survey. See Appendix 8 for copy of questionnaire and Chapter 4 for more detailed results.



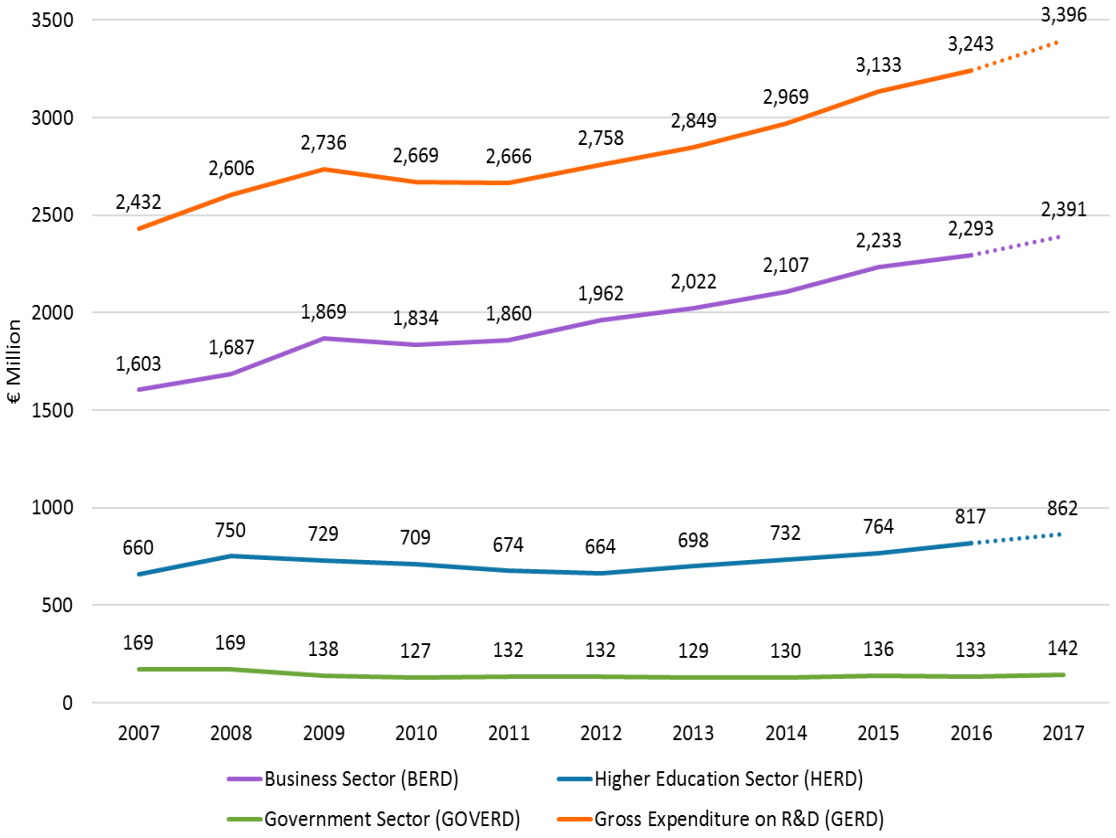

**Gross Expenditure on R&D (GERD)**

GERD is defined as the total expenditure (current and capital) on R&D carried out by all resident companies, research institutes, university and government laboratories, etc., in a country. It includes R&D funded from abroad but excludes domestic funds for R&D performed outside the domestic economy.

**OECD: Main Science & Technology Indicators**

## 2.1 Gross Expenditure on Research and Development (GERD) by Sector

**Figure 10: Gross Expenditure on Research and Development (GERD), (2007-2017) (Government + Business + Higher Education Sectors)**




**Note: HERD and BERD for 2017 are estimated figures based on the average of the previous two years growth rates.**

In 2017, Gross Expenditure on R&D (GERD) increased to an estimated €3,396m and is at its highest level in the 11 years of this time-series and represents a 40% increase over the 2007 figure of €2,432m.

GERD is the sum of R&D expenditure in the business, higher education and government sectors.

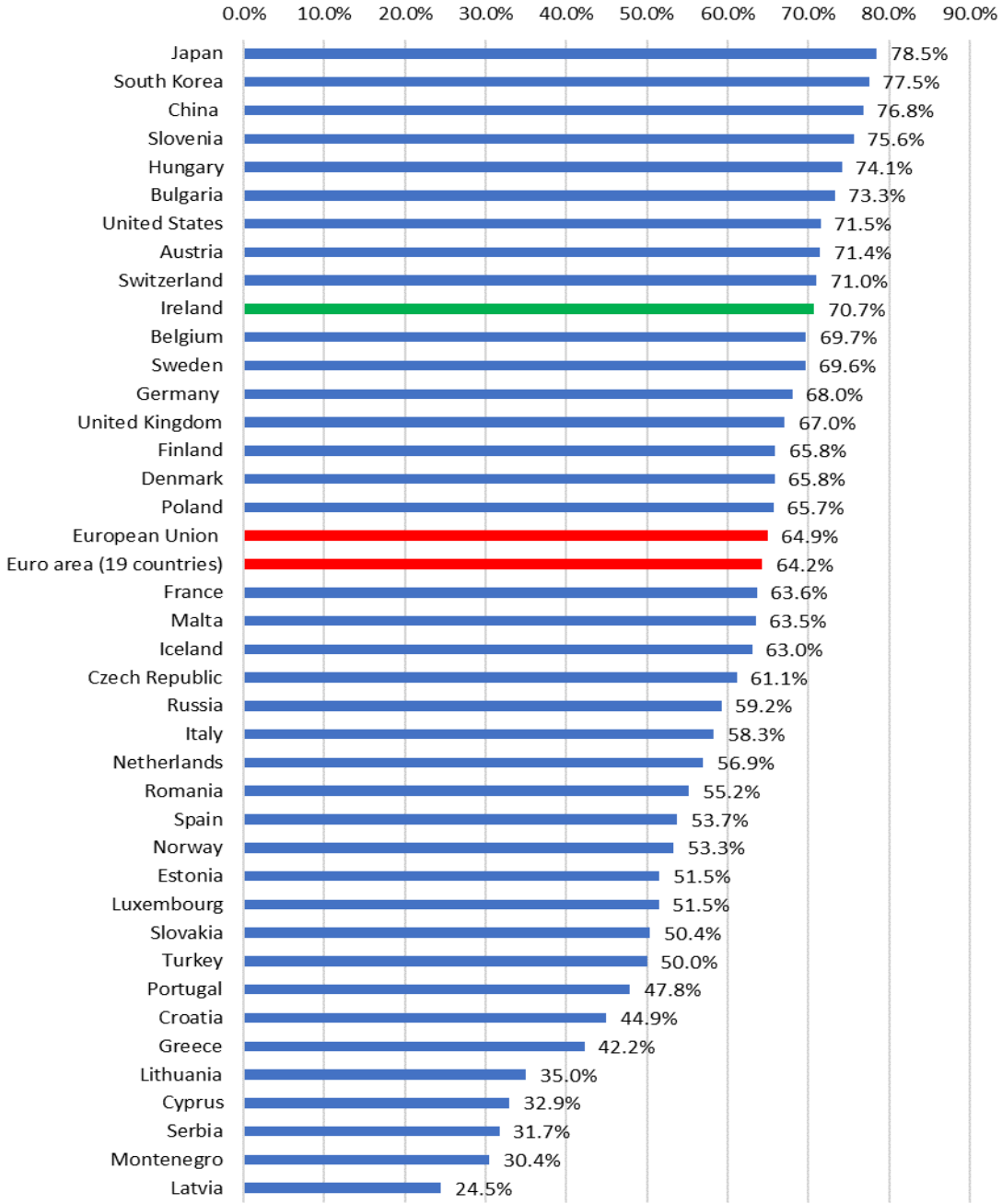
- The highest expenditure on R&D continues to be in the business sector where an estimated €2,391m was invested in research programmes in 2017.[8] Despite a reduction in spending in 2010 and 2011, there has been an upward trend in R&D expenditure in the business sector since 2007.
- The higher education sector has seen a decline in R&D expenditure between 2008 and 2012, however, since 2013 there has been a reversal of this trend with R&D expenditure reaching an estimated €862m in 2017.[9]

[8] The BERD Survey is undertaken by the CSO and is in the field with results expected in 2019.

[9] The HERD Survey is in the field with results expected at the end of 2018.

- The Government sector is the smallest sector with €142m of research being carried out in 2017 in government institutions e.g. Teagasc, The Marine Institute. (Government sector figures include an estimate for government funded Hospital performed R&D of €35 million).

**Figure 11: International comparison of share of GERD performed in the Business Sector, 2016 (or latest year)**

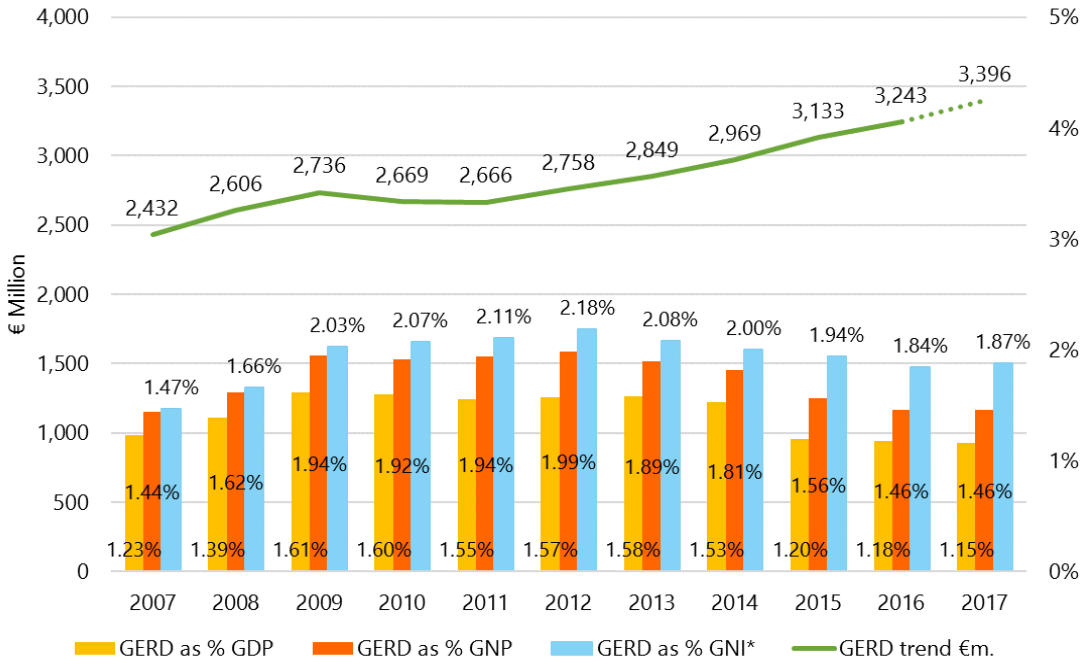



**Source: Eurostat**

70.7% of GERD in Ireland was performed in the business sector in 2016, compared with 64.9% for the EU average.

## 2.2 Gross Expenditure on Research and Development (GERD) and as a Percentage of GDP/GNP/GNI*

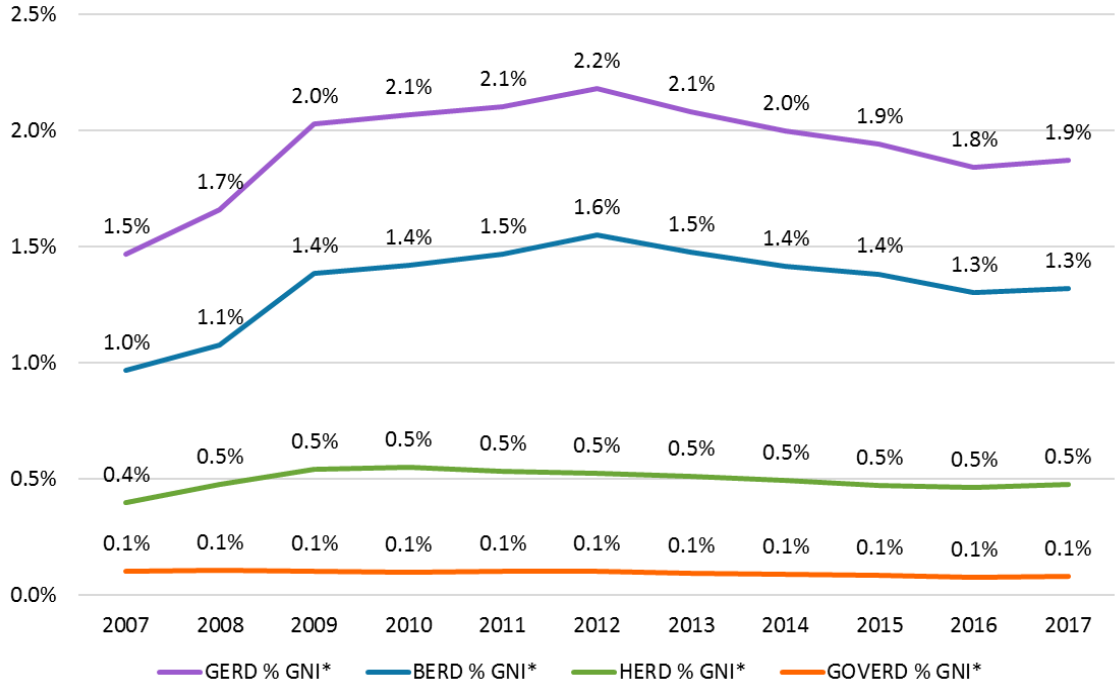
**Figure 12: Gross Expenditure on Research and Development (GERD) and as a percentage of GDP/GNP/GNI* (2007-2017)**




Gross Expenditure on R&D (GERD) expressed as a percentage of GDP, GNP and GNI* stood at 1.18%, 1.46% and 1.87% respectively in 2017.

As a percentage of both GDP, GNP and GNI*, GERD has been falling since 2012 when it reached a high of 1.57%, 1.99% and 2.18% respectively. The actual amount of R&D investment has increased over this period but GDP, GNP and GNI* levels have increased at a faster rate (see Appendix 2 on GDP, GNP and GNI*).

**Figure 13: Gross Expenditure on Research and Development (GERD) as a percentage of GNI* (2007-2017) by Sector**

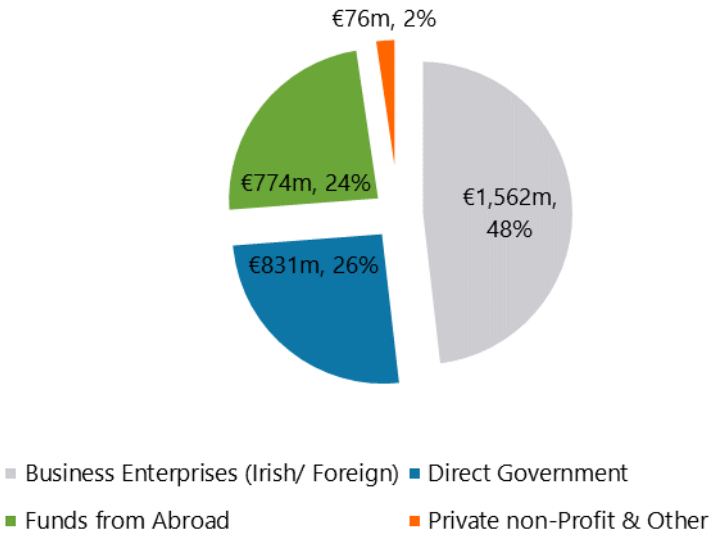



As a percentage of GNI*, expenditure in the business sector has fallen from 1.6% in 2012 to 1.3% in 2017. Refer to Appendix 2 for why GNI* is used here. As a percentage of GDP Ireland's GERD was 1.2%, BERD was 0.8%, HERD was 0.3% and GOVERD was 0.05% in 2017.

## 2.3 GERD - Source of R&D Funds

GERD is the sum of R&D expenditure in the business, higher education and government sectors, and this chapter examines the source of those R&D funds flowing into all those sectors of the economy.

**Figure 14: GERD – Source of Funds – 2016**




Almost half (48.2%) of R&D funding comes from business, with a total investment of €1,562m in 2016. In addition, there are also some funds from businesses included in the 'Funds from Abroad' source. The Government's investment in research and development in 2016 amounted to 25.6% of total expenditure at €830.7m.

**Figure 15: GERD – Source of Funds, 2006-2016**

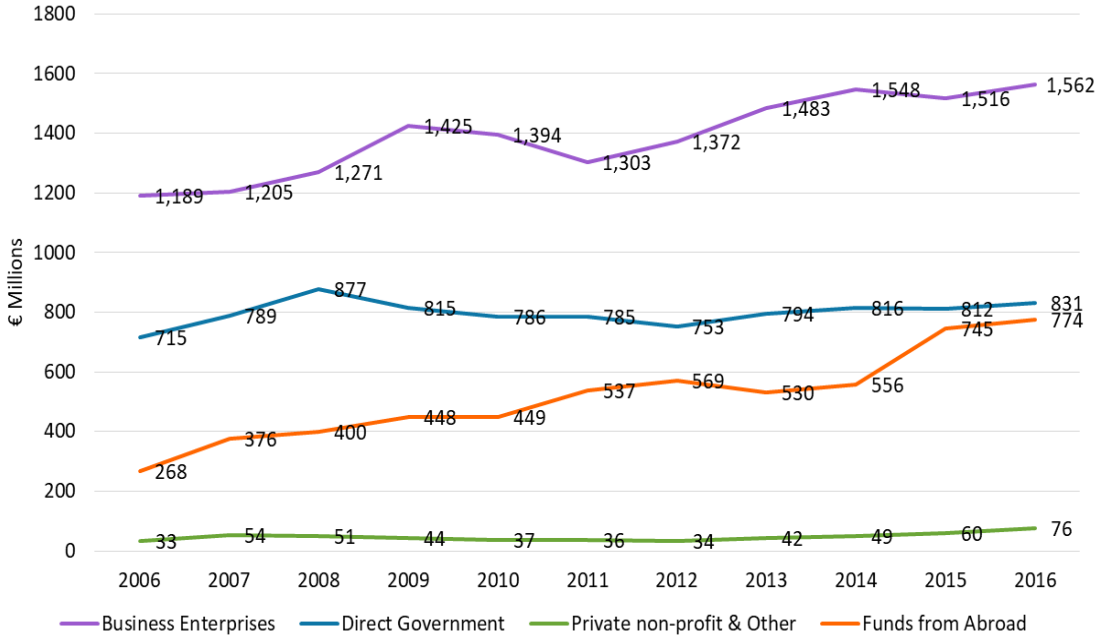



Figure 15 charts R&D funding sources since 2006 and shows the continuing importance of business funding. Since 2006, there has been an increase in R&D funding coming into the country from abroad.

**Source of Funds – definition**

**Funds from Business Enterprise Sector**: own enterprise; other enterprise in the same group; other enterprise.

**Funds from Government Sector**: direct government funding.

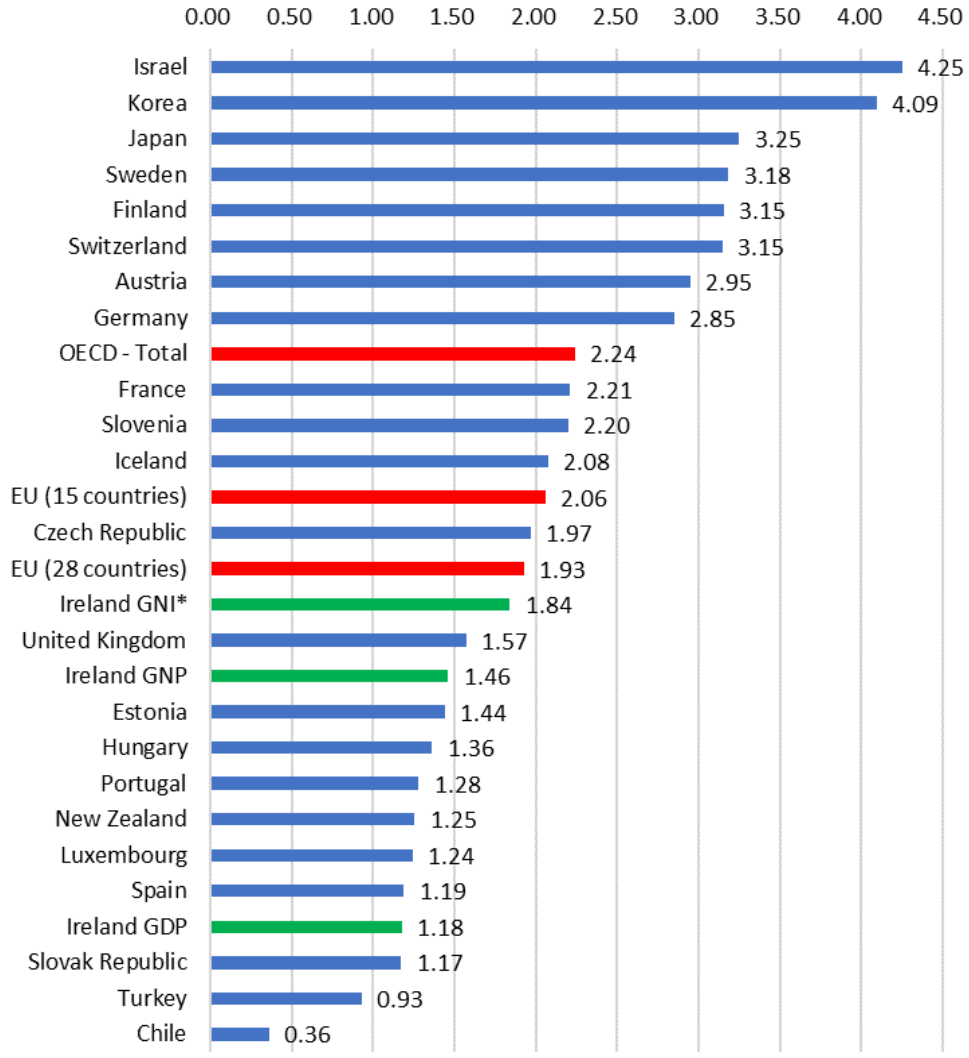
**Funds from Abroad:** (includes funds invested in R&D in this country but sourced outside the State) European Commission; business enterprise within the same group or other enterprises; other national governments; International organisations.

**Funds from Private Non-Profit Sector / Other** e.g. higher education.

**Frascati Manual, OECD 2015**

## 2.4 Civil GERD as a Percentage of GDP – International Comparison

**Figure 16: International comparison of Civil GERD* as a percentage of GDP and of GNP/GNI* for Ireland, 2016 or latest year**




**Source: OECD . *Estimated Civil GERD as a percentage of GDP (excludes defence expenditure).**

In Figure 16, Gross Expenditure on R&D (GERD) as a percentage of GDP, GNP and GNI* in Ireland is compared with Civil GERD as a percentage of GDP in countries where data is available. GERD in Ireland was 1.18% of GDP, 1.46% of GNP and 1.84% of GNI* in 2016.

In 2016, the estimated EU (28 countries) average for civil GERD as a percentage of GDP was 1.93% and 2.24% for the total OECD. Therefore, using GNI* as the comparator, we are just below the EU 28 average for this indicator and significantly below the OECD average.

**Europe 2020 Strategy**

"One of the key aims of the EU during the last couple of decades has been to encourage increasing levels of research investment, in order to provide a stimulus to the EU's competitiveness. The Europe 2020 strategy adopted in 2010 maintains a long-standing objective, namely, for the EU to devote 3.00 % of gross domestic product (GDP) to R&D activities; this is one of the five key targets of the Europe 2020 strategy."

**Eurostat – Statistics Explained**

# Chapter 3: R&D Personnel - All Sectors

**R&D Personnel**

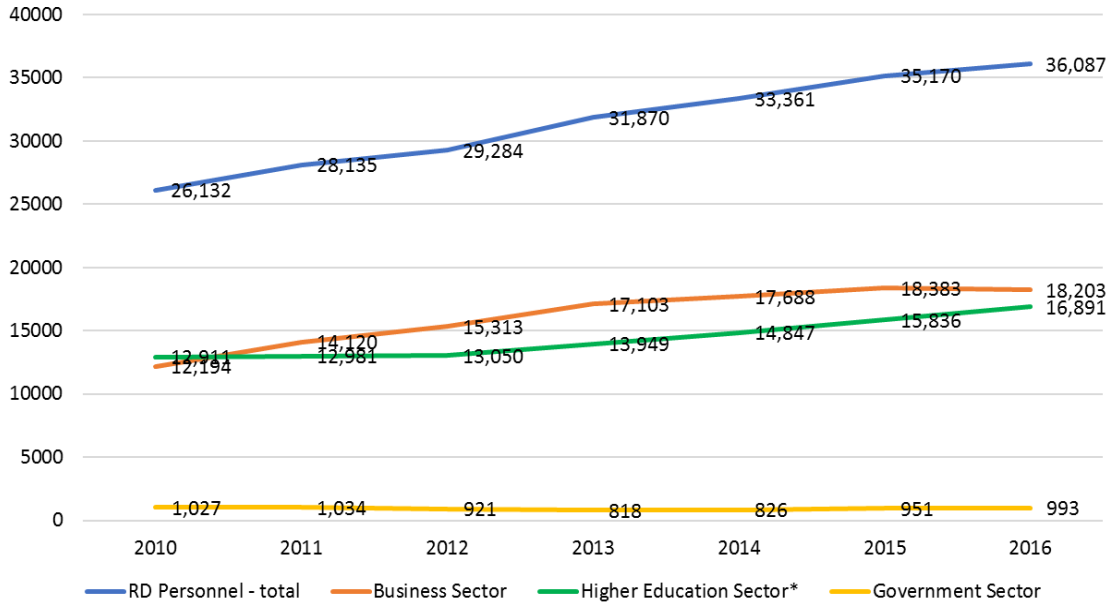
**(Full Time Equivalent)**

**2016 - 36,087**

This chapter combines the results of three surveys to provide an overall summary of the number of R&D personnel and researchers working in Ireland.

## 3.1 R&D Personnel (Full-Time Equivalent - FTE) by Sector

**Figure 17: R&D Personnel (FTEs) in Ireland by Sector, 2010-2016**




*** Higher Education R&D Personnel: there is a break in the series due to the inclusion of doctoral students in the numbers for the first time in 2014. The data has been revised back to 2010, hence, there is a break in the series from 2010. Inclusion of doctoral students is in line with the guidelines set out for collecting and reporting R&D data in the Frascati Manual 2015.**

There were a total of 36,087 personnel (full-time equivalents - FTEs) working in R&D across all the sectors of the economy in 2016.

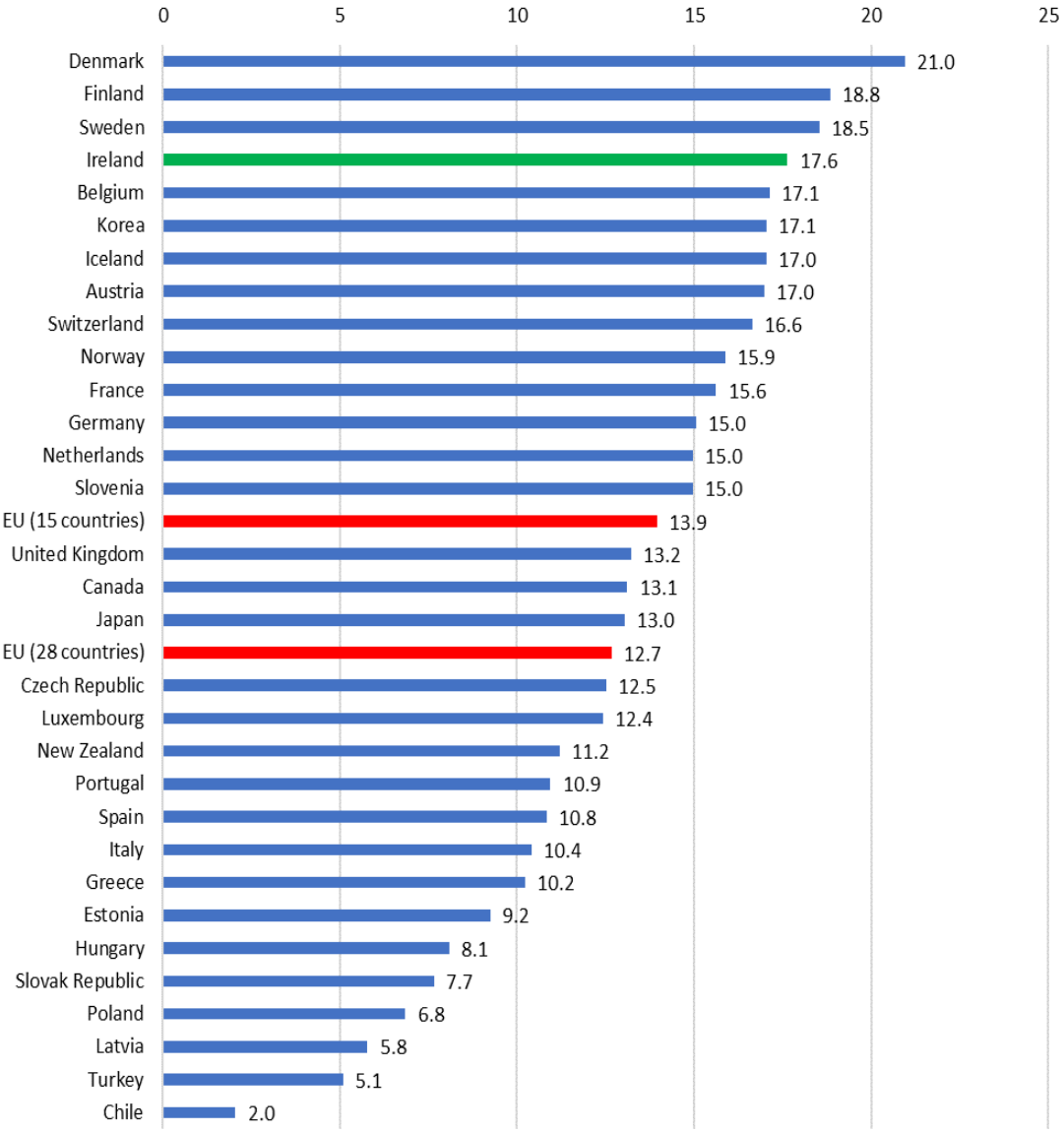
Of these R&D personnel over 50.4%, or 18,203, were working in the business sector. Between 2010 and 2015, the business sector has seen a steady increase in the number of R&D personnel, before declining slightly in 2016. The higher education sector has seen a steady increase since 2012.

**Full-Time Equivalents (FTEs) of R&D personnel - definition**

The Full-Time equivalent (FTE) of R&D personnel is defined as the ratio of working hours actually spent on R&D during a specific reference period (usually a calendar year) divided by the total number of hours conventionally worked in the same period by an individual or by a group.

**Frascati Manual, 2015: Paragraph: 5.49**

## Figure 18: International Comparison of R&D Personnel per Thousand Total Employment, 2016



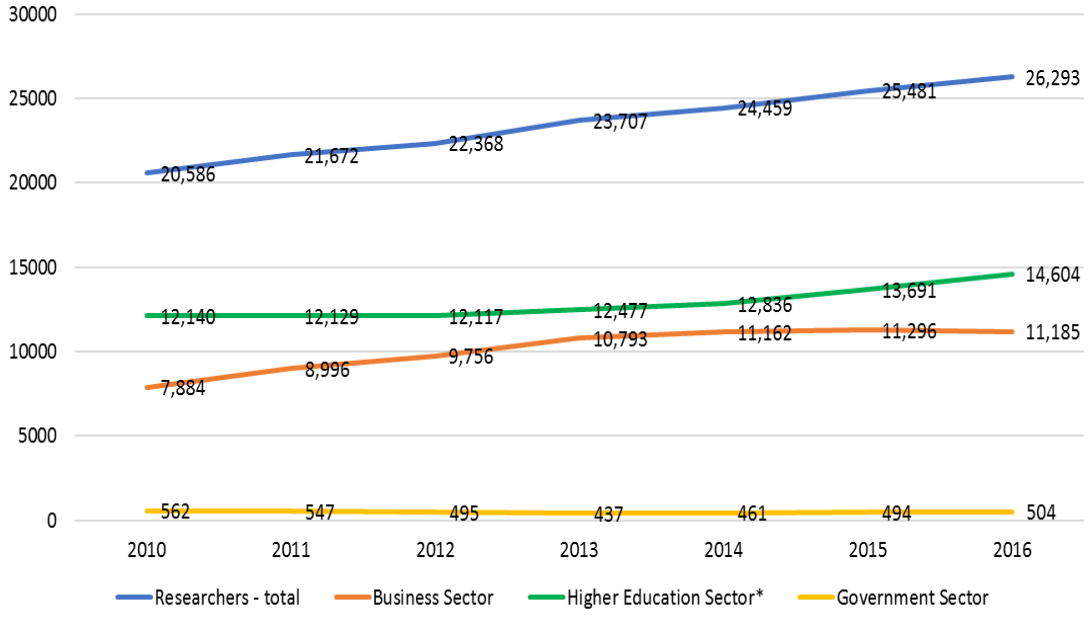

**Source: OECD, Main Science and Technology Indicators. FTE numbers for R&D personnel.**

Ireland employs 17.6 R&D personnel for every thousand people employed compared with 12.7 for the EU 28 average.

## 3.2 Researchers (Full-Time Equivalent - FTE) by Sector

The R&D personnel numbers include researchers, technicians and support staff. This graph focuses on researchers and reports the full-time equivalent numbers.

**Figure 19: Researchers in Ireland by Sector, 2010-2016**

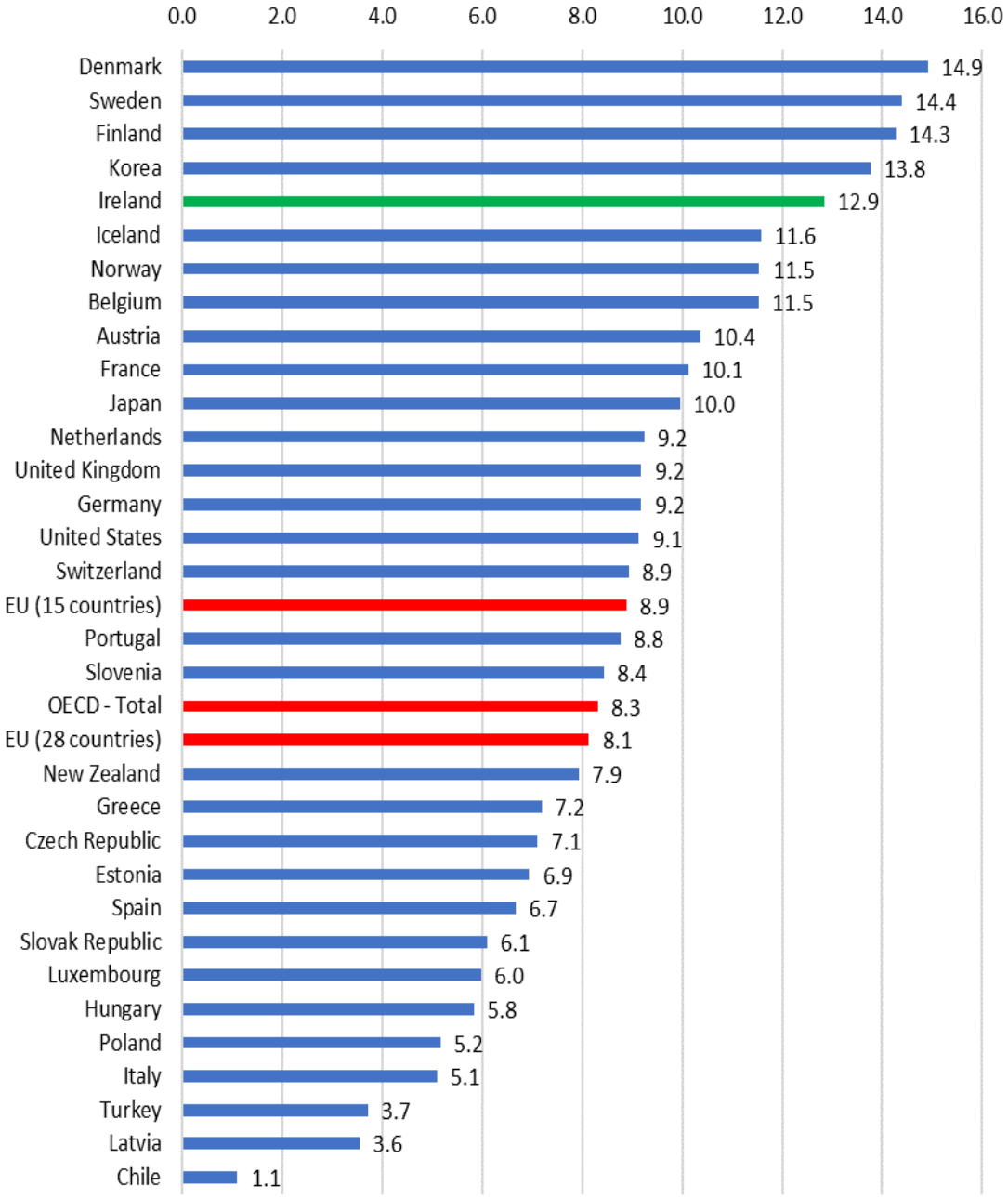



There were 26,293 researchers (FTEs) working across all sectors in 2016, with numbers increasing each year since 2010.

- The sector with the largest number of researchers is the higher education sector, with 14,604 researchers provisionally estimated to be employed in 2016.[10]
- The number of full-time equivalent researchers in the business sector is 11,185 researchers in 2016.
- A small number of researchers (504 in 2016) are employed directly in the Government sector. For more information of this sector, see Chapter 4.

[10] The HERD Survey 2016-2017 is in the field and will be completed at the end of 2018.

**Figure 20: International Comparison of Researchers per Thousand Total Employment, 2016**




**Source: OECD, Main Science and Technology Indicators. FTE numbers for researchers.**

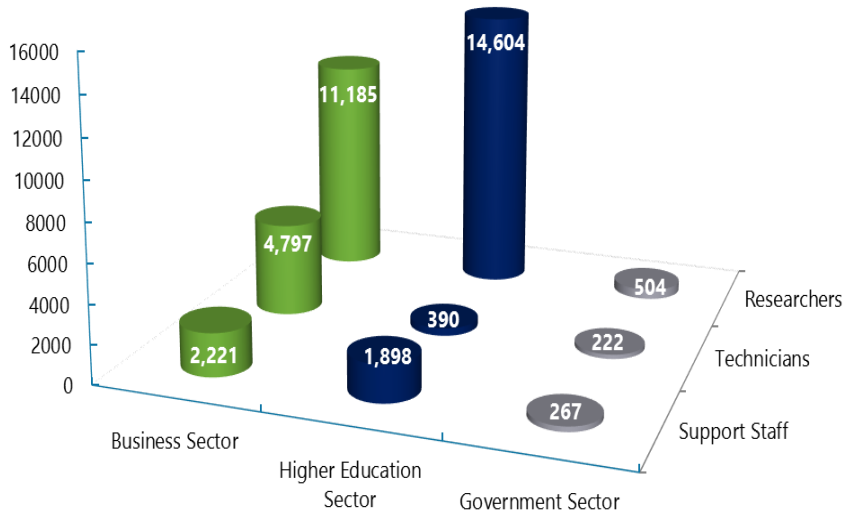
Ireland employs 12.9 researchers for every thousand employed compared with 8.3 for the OECD average and 8.1 for the EU 28 average.

## 3.3 R&D Personnel (FTEs) by Sector and Occupation

### Table 3: R&D Personnel (FTEs) by Sector and Occupation, 2016

| | Total R&D Personnel | | | |
|---|---|---|---|---|
| | **Support Staff** | **Technicians** | **Researchers** | **Totals** |
| Business Sector | 2,221 | 4,797 | 11,185 | **18,203** |
| Higher Education Sector | 1,898 | 390 | 14,604 | **16,891** |
| Government Sector | 267 | 222 | 504 | **993** |
| **Total** | **4,385** | **5,409** | **26,293** | **36,087** |

### Figure 21: R&D Personnel (FTEs) by Sector and Occupation, 2016




The majority (50.4%) of R&D Personnel are employed in the Business sector, a total of 18,203 FTEs.

The majority (61.4%) of Business Sector R&D personnel are researchers.

Similarly, in the higher education sector the majority (86.4%) of R&D personnel (FTEs) are researchers.

**Data Sources for R&D Personnel numbers**

**Business Sector: (BERD – Business Expenditure on R&D)**
Data is collected every two years by the Central Statistics Office (CSO) and results are available on the CSO website – www.cso.ie.

**Higher Education Sector: (HERD – Higher Education R&D)**
Data is collected every two years by the Dept. of Business, Enterprise & Innovation and results are available on the DBEI website – www.dbei.gov.ie.

**Government Sector: (GOVERD – Government R&D)**
This data comes from the annual survey underpinning this report: The R&D Budget 2017-2018 survey. See Chapter 4 for more details.

# Chapter 4: R&D Performed in the Government Sector

**Government Sector R&D**

**(GOVERD)**

**2018 - €117.0m**

This chapter examines in more detail R&D carried out specifically in the Government Sector.

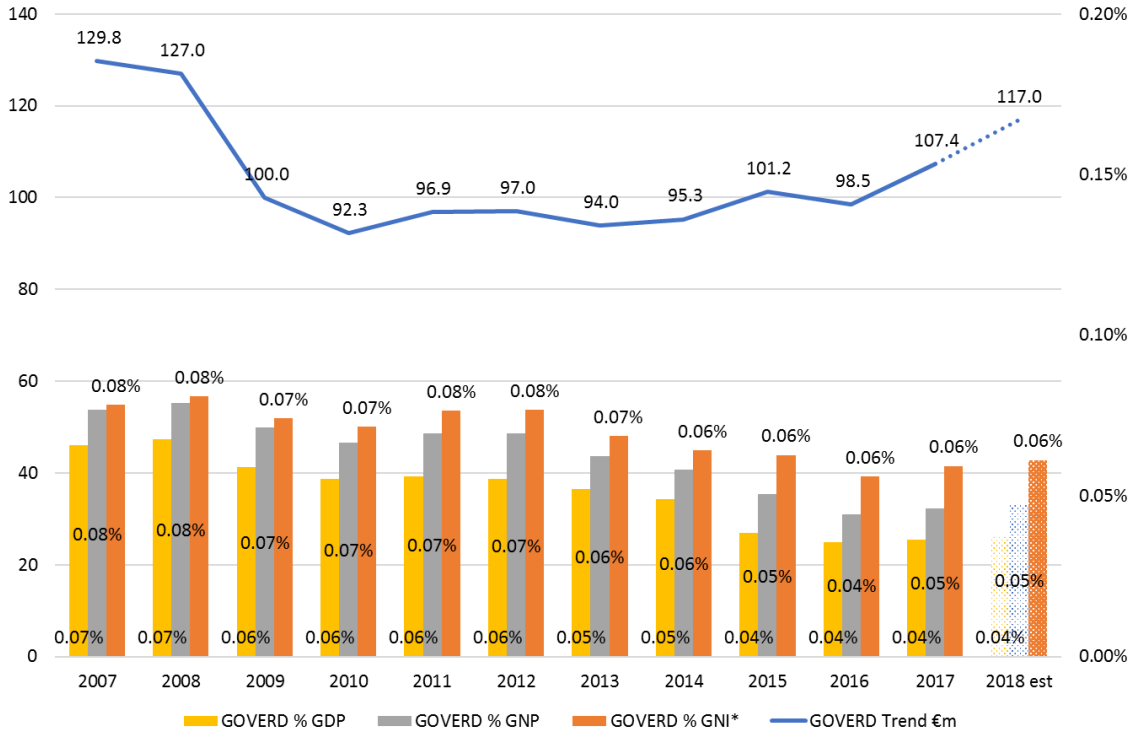
Data for this chapter comes from the results of the R&D Budget Survey. A copy of the questionnaire is attached to this report – Appendix 6.

## 4.1 Government Sector R&D (GOVERD)

Government Sector R&D (GOVERD) is the R&D carried out directly by Government Departments and State Agencies.

Research and Development carried out in the Government Sector represents less than 4% of the total Gross Expenditure on R&D (GERD) for Ireland. [11]

**Figure 22: GOVERD trend (€m) and GOVERD as a percentage of GNI* (2007-2018)**

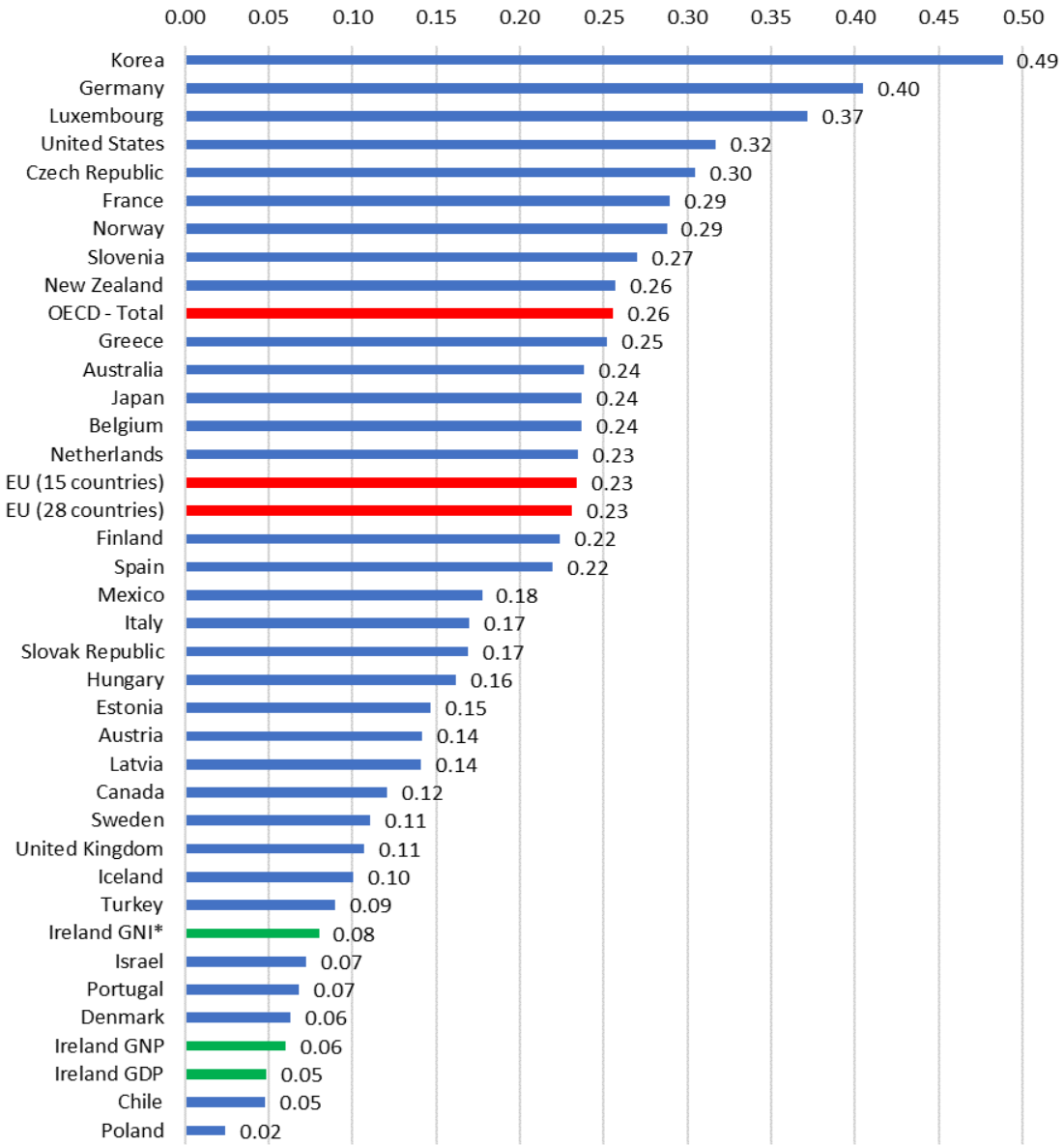



[11] GOVERD total in GERD - An additional estimate for state-funded hospital-performed R&D (€35m) is included in the GERD results. This is not included in the figures presented in the chart above, i.e. the figure of €117.0m for 2018 does not include the €35m hospital estimate.

Government Sector R&D amounted to €107.4m in 2017, an 9.0% increase on the previous year, and is anticipated to rise by another 8.9% in 2018 to €117.0m.[12]

When measured as a percentage of GNI*, expenditure on R&D in the Government Sector has remained at 0.06% of GNI* in 2017, due to the increase in GOVERD and increase in GNI*. GOVERD as percentage of GNI* is estimated to remain at 0.06% of GNI* in 2018.

**Figure 23: International Comparison of GOVERD as a percentage of GDP and of GNP and GNI* for Ireland, 2016**




**Source: OECD, Main Science and Technology Indicators. Figures for Ireland include Hospital R&D estimate of €35m, therefore, figures differ from Figure 22 above.**

[12] Estimates are based on Government Department and Agency returns to the R&D Budget 2017-2018 Survey.

At 0.08% of GNI*, GOVERD in Ireland is below the EU28 average (0.23%) and the OECD average (0.26%) in 2016. Figures for Ireland for international comparison include Hospital R&D estimate of €35m, therefore, figures differ from Figure 22 above.

## 4.2 Government Sector – R&D Performers

**Figure 24: Major Government Sector R&D performers in 2017**

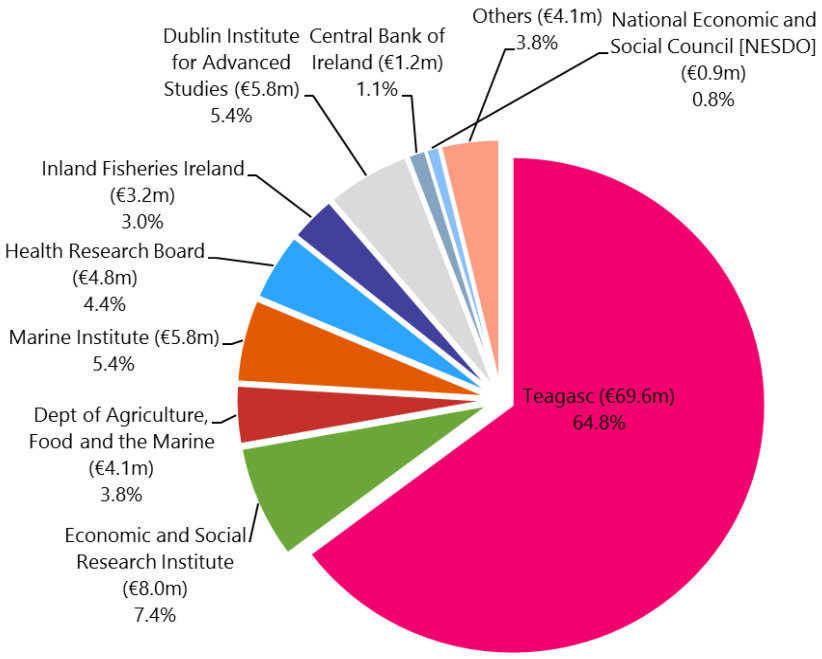



Figure 24 shows the main R&D performers in the Government Sector, i.e. R&D carried out by Government employees in Government agencies and departments.

As can be seen, Teagasc, the Irish agriculture and food development authority, continued to be the largest performer of Government R&D (GOVERD) in 2017, with expenditure of €69.6m. This represents 64.8% of total GOVERD, which was €107.4m in 2017. Teagasc supports science-based innovation in the agri-food and broader bio-economy sectors. A significant proportion of the Teagasc research spend is provided for through the annual grant-in-aid funding that comes directly from the Department of Agriculture, Food and the Marine.

Other major performers include the Economic and Social Research Institute at €8.0m (7.4%), the Marine Institute[13] at €5.8m (5.4%), the Health Reseach Board €4.8m (4.4%) and the Department of Agriculture, Food and the Marine at €4.1m (3.8%).

[13] Marine Institute figures are estimates based on their response to the R&D Budget 2016-17 Survey.

## 4.3 Government Sector by Type of Research and Fields of Science

**Table 4: GOVERD - Field of science classified by type of research, €m, 2017**

| Field of Science | In-house Basic €000's | In-house Applied €000's | In-house Exper. €000's | Total €000's |
|---|---|---|---|---|
| Agriculture, forestry and fisheries | 18,084 | 58,467 | 3,043 | 79,594 |
| Civil engineering | 5 | 86 | 1 | 92 |
| Earth and related environmental sciences | 77 | 1,242 | 337 | 1,655 |
| Economics and business | 908 | 9,183 | - | 10,091 |
| Educational sciences | - | 851 | 321 | 1,172 |
| Health sciences | - | 4,757 | - | 4,757 |
| Other Social Sciences | - | 620 | - | 620 |
| Physical sciences | 5,828 | - | - | 5,828 |
| Social & economic Geography | 91 | 420 | - | 511 |
| Veterinary science | - | 618 | 2,470 | 3,088 |
| **Total** | **24,993** | **76,243** | **6,173** | **107,408** |

Research being performed in the various Government departments and agencies is broken down by type of research and Field of Science in Table 4.

The majority of funds spent on research performed in the public sector is spent on applied research; this amounted to 70.9% or €76.2m out of a total spend of €107.4m in 2017.

Agricultural, Forestry and Fisheries science is the field of science in which most expenditure takes place. In 2017, €58.5m was spent on applied science in this area, with €18.1m on basic research, and another €3.0m spent on experimental development. The major performer of R&D in the Government Sector is Teagasc which, along with the Department of Agriculture, Food and the Marine, are engaged in the field of science of 'Agriculture, forestry and fisheries'. Other agencies working in this field are Bord Iascaigh Mhara, the Inland Fisheries Board and the Marine Institute.

**Types of Research**

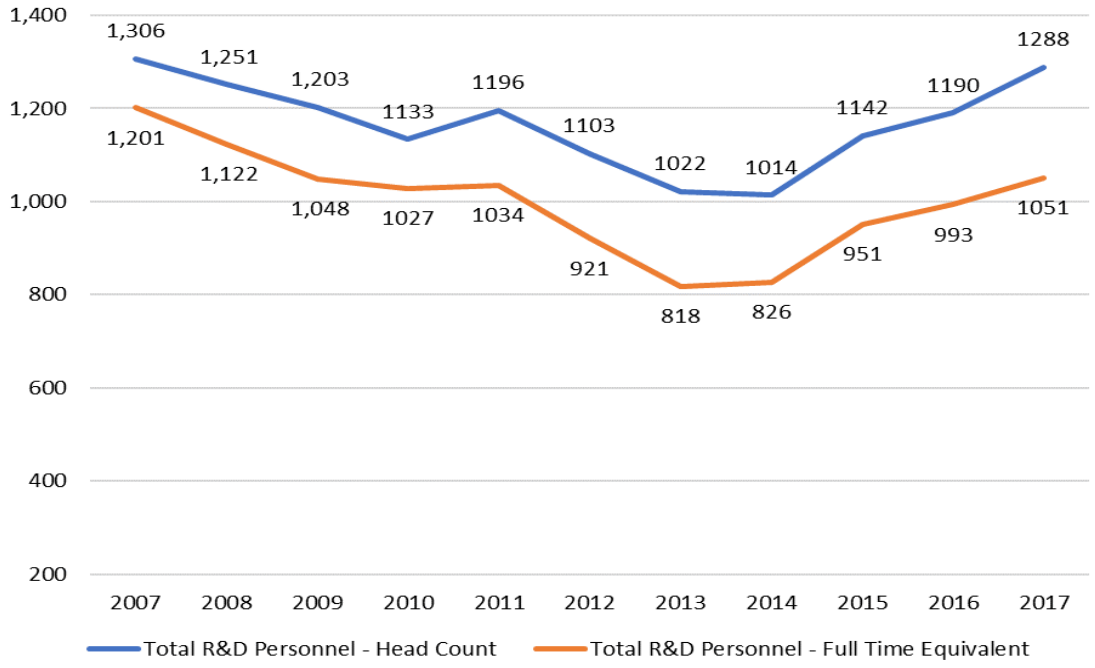
**Basic Research** – experimental or theoretical work undertaken primarily to acquire new knowledge, without any particular application or use in view;

**Applied Research** – original investigation undertaken in order to acquire new knowledge, primarily directed towards a specific practical aim or objective;

**Experimental Development** - systematic work, drawing on existing knowledge gained from research and practical experience that is directed at producing new materials, products and devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

## 4.4 Government Sector R&D Personnel

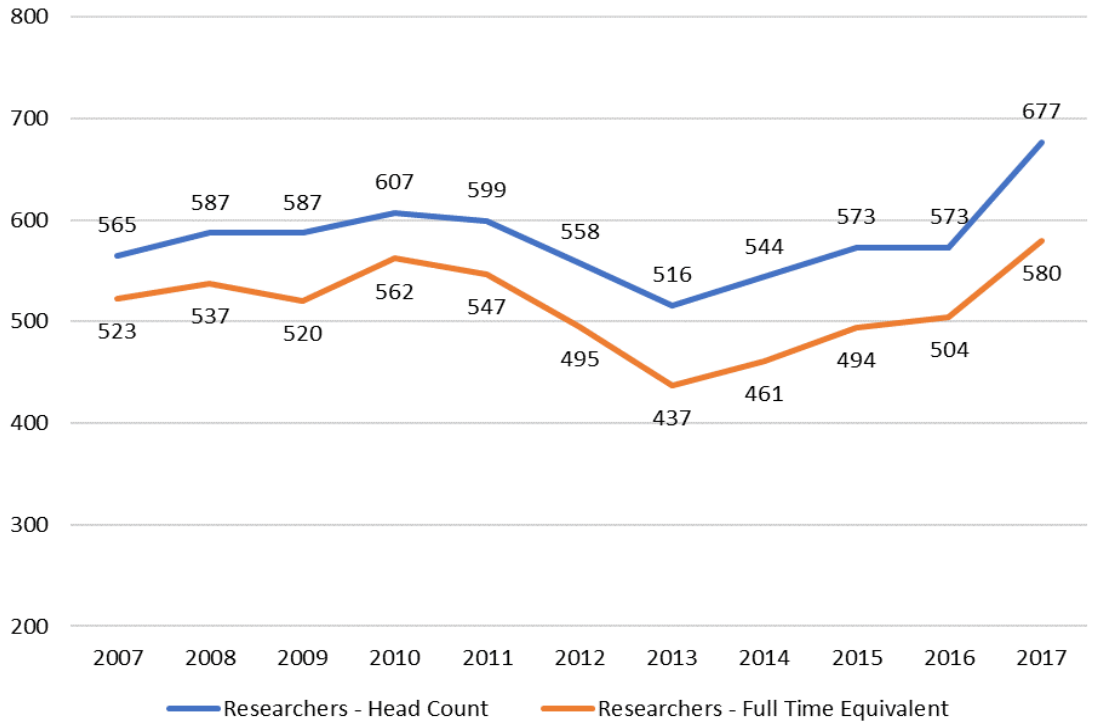
**Figure 25: Government Sector R&D Personnel (Head Count and Full Time Equivalent), 2007-2017**




The top line on Figure 25 traces the total number of R&D Personnel (Head Count) employed in the Government Sector since 2007. Numbers have fallen over the period of this time-series, though numbers since 2015 indicate a reverse in this trend. Total R&D personnel reached 1,288 in 2017.

The second trend line shows the Full-Time Equivalent (FTE) numbers for the same period - (see definition on page 34). The number of R&D Personnel FTEs has risen by 28.5% since 2013 to reach 1,051 in 2017.

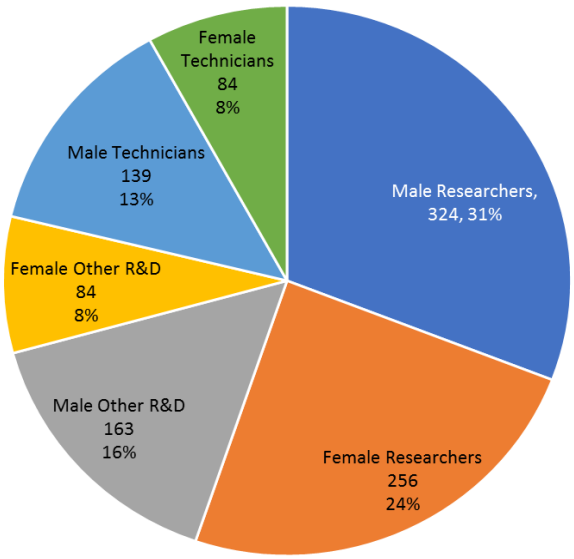
**Figure 26: Government Sector Researchers (Head Count and Full Time Equivalent), 2007-2017**




The R&D personnel numbers include technical, support, administrative and managerial staff. Figure 26 focuses on the researchers working in the Government Sector.

There were 677 researchers in the Government Sector in 2017, and the full-time equivalent number of researchers in 2017 was 580.

**Figure 27: Government Sector R&D Personnel (FTE) by Occupation, Gender, 2017**



### Table 5: Government Sector R&D Personnel (FTE) by Occupation, Gender, 2017

| 2017 | Government Sector R&D Personnel | | |
|---|---|---|---|
| Full-time Equivalent (FTE) | Male | Female | Total by Occupation |
| Researchers | 324 | 256 | **580** |
| Technicians | 139 | 84 | **223** |
| Other Support Staff | 163 | 84 | **247** |
| **Total by Gender** | **626** | **424** | **1051** |

**Note: Rounding can affect totals**

Figure 27 and Table 5 shows that the majority (580 or 55.2%) of R&D personnel in the Government Sector were researchers in 2017. The majority of researchers were male, numbering 324 out of that total of 580 researchers. These are the full-time equivalent numbers for researchers.

### Figure 28: Government Sector Researchers by gender and field of science, FTEs, 2017

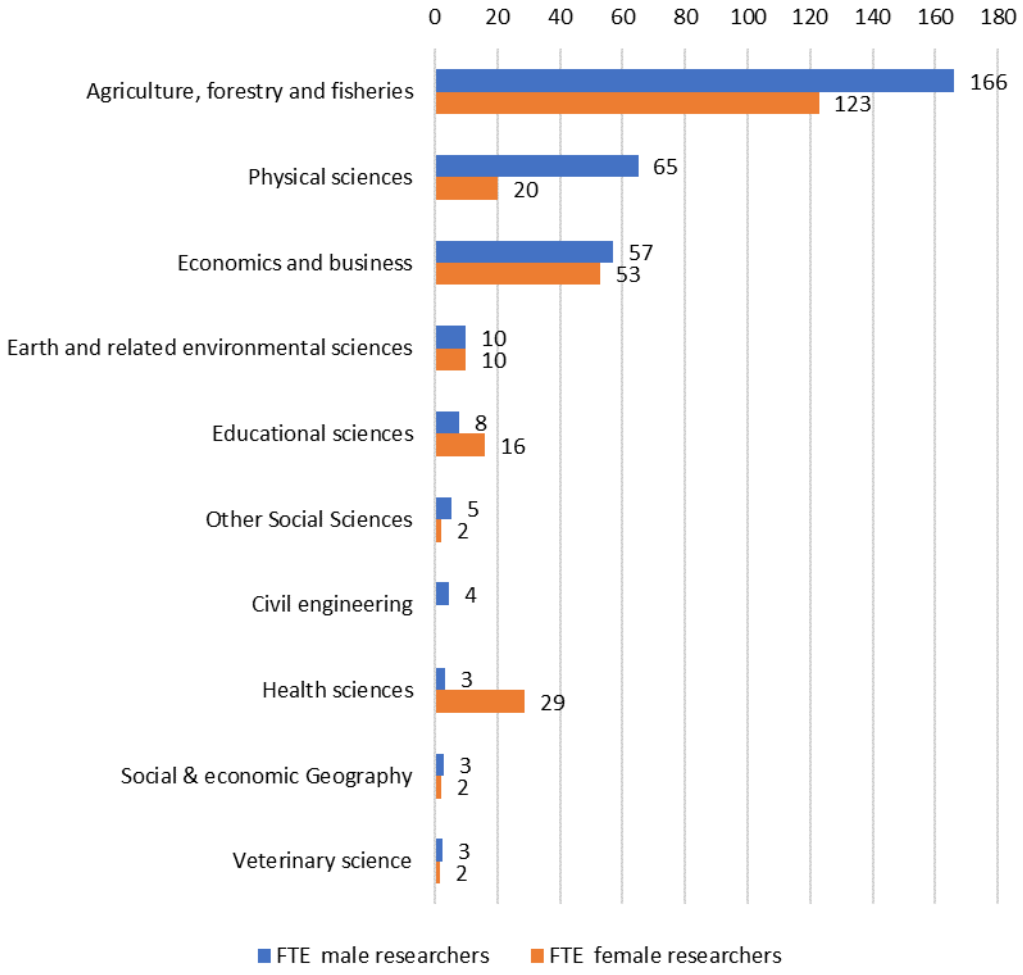


**Table 6: Government Sector Researchers by gender and field of science, FTEs, 2017**

| Field of Science | FTE male researchers | % of all male researchers | FTE female researchers | % of all female researchers |
|---|---|---|---|---|
| Agriculture, forestry and fisheries | 166 | 51.2% | 123 | 48.0% |
| Physical sciences | 65 | 20.0% | 20 | 7.8% |
| Economics and business | 57 | 17.6% | 53 | 20.7% |
| Earth and related environmental sciences | 10 | 3.1% | 10 | 3.9% |
| Educational sciences | 8 | 2.4% | 16 | 6.2% |
| Other Social Sciences | 5 | 1.6% | 2 | 0.7% |
| Civil engineering | 4 | 1.4% | | 0.0% |
| Health sciences | 3 | 1.0% | 29 | 11.2% |
| Social & economic Geography | 3 | 0.9% | 2 | 0.8% |
| Veterinary science | 3 | 0.8% | 2 | 0.6% |
| **Total** | **324** | **100.0%** | **256** | **100.0%** |

When analysed by the OECD standard fields of science, the data shows that the majority of the Government researchers work in the 'Agricultural, Forestry and Fisheries' field. Some 51.2% of all male researchers and 48.0% of female researchers are engaged in research and development works in this area. For male researchers, the next two largest areas of research are 'Physical sciences', with 20.0%, and 'Economics and business', with 17.6%. For females, the next two significant areas of research are 'Economics and business' with 20.7%, and the 'Health sciences' with 11.2%.

## Appendix 1: Methodological Notes on GBARD 2017 and 2018 Figures

The information given in this report for GBARD and GOVERD data relates to information supplied by 30 institutions in receipt of monies from the exchequer for the performance or support of research and development.

1. Expenditure data for specific programmes refer to the 2017 outturn costs of programmes and to expected expenditure in 2018.
2. Programmes are attributed to the institution most directly involved - that is to those actually operating them, but not necessarily funding them. An example of the latter is the Department of Business, Enterprise and Innovation which funds, but does not operate or manage research programmes.

Apportionment problems arise in the third level sector, mainly from the monies distributed by the Higher Education Authority (HEA) and the Department of Education and Skills through its recurrent core funding – general university funds (GUF). This core grant is allocated as a block grant to cover core teaching and research activities within institutions - the internal allocation of funds between teaching and research are a matter for each institution.

**General University Funds (GUF) – core grant**

- The allocation of the core grant is determined on a formula basis. The allocation is based on a standard per capita amount in respect of weighted EU student numbers in four subject price groups. Student numbers in the four groups are weighted to reflect the relative cost of the subject groups. A further weighting is given for research students.
- 5% is also top-sliced from the aggregate grant for all higher education institutions (HEIs) exclusive of the grant in lieu in tuition fees. This top-sliced amount is allocated as follows:
  - 75% in proportion to the proportion of Ph.D. and Masters research degrees awarded
  - 25% in proportion to the proportion of research income per academic staff member earned by each institution.

  This top-slice does not oblige HEIs to spend this amount on research – the internal allocation of the core grant is still a matter for each institution.

General University Funds - weighting:

| Subject Price Group | Subject Group Weighting |
|---|---|
| Clinical stages of undergraduate medicine | 2.3 |
| Undergraduate dentistry, veterinary | 4 |
| Laboratory-based subjects (Science, Engineering, Pre-clinical Medicine & Dentistry) | 1.7 |
| Postgraduate Research | 1.6 x 3 (i.e.4.8) |
| Subjects with a studio, laboratory or fieldwork element | 1.3 |
| Postgraduate Research | 1.3 x 3 (i.e. 3.9) |
| All other subjects | 1 |
| Postgraduate Research | 1 x 3 (i.e. 3) |

**Institutes of Technology – core grant**

- Annual funding provided by the State via the HEA for the purposes of funding the recurrent activities of Institutes of Technology (IoTs).
- This core grant is allocated as a block grant to cover core teaching and research activities within institutions - the internal allocation of funds as between teaching and research is at present a matter for each institution. A funding model similar to the funding model used for the University sector is used for the IoTs.

The model follows the principles of the Recurrent Grant Allocation Model (RGAM), whereby funding follows students, with provisions made for broad differences in the costs of the type of education being pursued by the student. There are some differences in the weightings attached to research in the IoT sector. The weightings are summarised below.

Institutes of Technology - weighting:

| Subject Price Group | Weighting |
|---|---|
| Laboratory-based subjects (Science, Engineering, Pre-clinical Medicine & Dentistry) | 1.7 |
| Postgraduate Research | 1.8 (i.e. 1.8 x 1.7 = 3.06) |
| Subjects with a studio, laboratory or fieldwork element | 1.3 |
| Postgraduate Research | 1.8 x (i.e. 1.8 x 1.3 = 2.34) |
| All other subjects | 1 |
| Postgraduate Research | 1.8 x 3 (i.e. 1.8 x 1 = 1.8) |

## Appendix 2: Note on GDP, GNP and GNI*

### Background

Globalisation presents significant challenges in terms of measuring economic activity. While this is the case in most advanced economies, the issues are particularly acute in an Irish context, given the large multinational footprint.

For policy-makers, there are additional challenges, most notably related to interpreting the real-time information embedded in standard, internationally recognised metrics such as Gross Domestic Product (GDP) and Gross National Income (GNI). Movements in these aggregates have become increasingly disconnected from actual trends in living standards in Ireland.

New Irish-specific measures of activity – most notably 'modified Gross National Income' or GNI* – attempt to control for (part of) the impact of globalisation on Irish macro-economic statistics.

### From GDP to GNI*

GDP measures the total output of the economy in a period i.e. the value of work done by employees, companies and self-employed persons. This work generates incomes - the total income remaining with Irish residents is the GNP and it differs from GDP by the net amount of incomes sent to or received from abroad. In Ireland's case, the amount belonging to persons abroad has exceeded the amount received from abroad, due mainly to the profits of foreign-owned companies, and therefore, GNP is less than GDP.

Gross National Income (GNI) is a very similar concept to that of GNP – the main difference between the two aggregates is that GNI adjusts domestic incomes for subsidies from and taxes paid to the EU.

Modified GNI (or GNI*) is defined as GNI less the effects of the profits of re-domiciled companies and the depreciation of intellectual property products and aircraft leasing companies.

Because the modified GNI aggregate is a better approximation of the **size** of the Irish economy, it is an important indicator for fiscal purposes, especially for 'ratio analysis' where it provides significant added value. For example, the Department of Finance has frequently highlighted the shortcomings of the debt-to-GDP ratio as a measure of the debt burden. Now that the modified measure is available, the Department of Finance supplements the Government's European budgetary requirements with debt-to-GNI* figures. Similarly, in this report, R&D expenditures as a percentage of GNI* are calculated to see the trend over time and to provide a more reliable benchmark against other countries. This is in addition to the calculations as a percentage of GDP and GNP.

In 2017, GNI* was approximately 61.5% of GDP in Ireland.

See full explanatory note on GDP and GNI* from the Department of Finance here: https://www.finance.gov.ie/wp-content/uploads/2018/05/180504-GDP-and-Modified-GNI-Explanatory-Note-May-2018.pdf

### GDP, GNP & GNI* current prices

| €m | 2014 | 2015 | 2016 | 2017 | % change 2014-2017 | % change 2016-2017 |
|---|---|---|---|---|---|---|
| GDP (current prices) | 195,293 | 262,466 | 273,238 | 294,110 | 50.6% | 7.6% |
| GNP (current prices) | 163,886 | 200,423 | 222,156 | 233,149 | 42.3% | 4.9% |
| GNI* (current prices) | 148,628 | 161,382 | 175,827 | 181,182 | 21.9% | 3.0% |

**Source: Central Statistics Office, www.cso.ie**

# Appendix 3: Definition of Research & Development

**Research and Experimental Development**

2.5 Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society and to devise new applications of available knowledge.

2.6 A set of common features identifies R&D activities, even if these are carried out by different performers. R&D activities may be aimed at achieving either specific or general objectives. R&D is always aimed at new findings, based on original concepts (and their interpretation) or hypotheses. It is largely uncertain about its final outcome (or at least about the quantity of time and resources needed to achieve it), it is planned for and budgeted (even when carried out by individuals), and it is aimed at producing results that could be either freely transferred or traded in a marketplace. For an activity to be an R&D activity, it must satisfy five core criteria.

2.7 The activity must be:

- novel
- creative
- uncertain
- systematic
- transferable and/or reproducible.

2.8 All five criteria are to be met, at least in principle, every time an R&D activity is undertaken whether on a continuous or occasional basis.

Frascati Manual 2015, P.44-45

## Appendix 4: Acronyms

| Acronym | |
|---|---|
| **BERD** | Business Expenditure on R&D |
| **DAFM** | Department of Agriculture, Food and the Marine |
| **DIAS** | Dublin Institute for Advanced Studies |
| **DBEI** | Department of Business, Enterprise and Innovation |
| **EPA** | Environmental Protection Agency |
| **ESRI** | Economic and Social Research Institute |
| **FOS** | Field of Science |
| **FTE** | Full Time Equivalent |
| **GBARD** | Government Budget Allocations for R&D |
| **GDP/GNP** | Gross Domestic Product / Gross National Product |
| **GERD** | Gross Expenditure on R&D |
| **GNI*** | Modified Gross National Income |
| **GOVERD** | Government Expenditure on R&D |
| **GUF** | General University Funds |
| **HEA** | Higher Education Authority |
| **HERD** | Higher Education Expenditure on R&D |
| **HC** | Head Count |
| **HRB** | Health Research Board |
| **IRC** | Irish Research Council |
| **NESC** | National Economic and Social Council |
| **OECD** | Organisation for Economic Co-operation & Development |
| **OPW** | Office of Public Works |
| **PRTLI** | Programme for Research in Third Level Institutions |
| **SEAI** | Sustainable Energy Authority of Ireland |
| **SFI** | Science Foundation Ireland |
| **TII** | Transport Infrastructure Ireland |

## Appendix 5: Government Departments and Agencies included in the 2017-2018 R&D Budget Survey

| Government Departments | Associated Agencies |
|---|---|
| **Department of Agriculture, Food and the Marine** | Bord Iascaigh Mhara<br>Marine Institute<br>Teagasc |
| **Department of Culture, Heritage and the Gealthact** | Údarás na Gaeltachta |
| **Department of Communications, Climate Action & Environment** | Environmental Protection Agency<br>Inland Fisheries Ireland<br>Sustainable Energy Authority of Ireland |
| **Department of Education and Skills** | Dublin Institute for Advanced Studies<br>SOLAS<br>Higher Education Authority<br>Irish Research Council |
| **Department of Health** | Health Research Board |
| **Department of Housing, Planning, Community and Local Government** | Met Éireann |
| **Department of Business, Enterprise and Innovation** | Enterprise Ireland<br>IDA Ireland<br>Inter*Trade*Ireland<br>Science Foundation Ireland |
| **Department of Public Expenditure and Reform** | Economic and Social Research Institute |
| **Department of the Taoiseach** | National Economic and Social Council |
| **Department of Transport, Tourism and Sport** | Transport Infrastructure Ireland |
| **Offices** | Central Bank & Financial Services Authority of Ireland<br>Office of Public Works |

## Appendix 6: Government Departments and Agencies Total R&D Expenditure

| Total R&D | 2017 (000's) | 2018 est (000's) |
|---|---|---|
| Central Bank | 1,226 | 1,226 |
| Department of Agriculture, Food and the Marine | 115,387 | 124,803 |
| Department of Business, Enterprise and innovation | 380,572 | 357,569 |
| Department of Culture, Heritage & Gaeltacht | 2,463 | 2,000 |
| Department of Education and Skills | 182,108 | 191,797 |
| Department of Health | 48,777 | 55,603 |
| Department of Public Expenditure & Reform | 7,957 | 8,286 |
| Department of Social Protection | 782 | 2,334 |
| Department of the Taoiseach | 908 | 934 |
| Department of Transport, Tourism and Sport | 983 | 800 |
| Dept of Comm, Climate Action & Environment | 19,955 | 26,072 |
| Dept of Housing, Planning, Community and Local Government | 1,511 | 3,011 |
| Office of Public Works | 265 | 250 |
| **Total** | **762,893** | **774,684** |

**Note: These figures are for Total R&D spend by Government Department/Agency from all all sources including EU, Irish enteprises, foreign enterprises, etc. Therefore, they differ from the GBARD figures presented in the report, which only cover Ireland's Government Budget allocations for R&D. Appendix 7 provides a more detailed breakdown of the Government Departments and Agencies Total R&D expenditure.**

# Appendix 7: Government Departments & Agencies' R&D Programmes

## Department of Agriculture, Food and the Marine

The Department of Agriculture, Food and the Marine (DAFM) is a multi–functional organisation which provides a wide range of services directly and through specialist state agencies operating under its aegis.

Its mission is to lead the sustainable development of the agri-food and marine sector and to optimise its contribution to national economic and social development and the natural environment. The Department operates a number of testing centres and laboratories, in the areas of, veterinary diagnostics and research; meat control; seed testing; plant variety testing; cattle performance testing; pesticide control and dairy products control. DAFM engages in a broad range of R&D activities and these are outlined below with corresponding figures for the 2017 expenditure outturn and the 2018 expenditure allocation.

It should be noted that the figures below refer only to research expenditure by DAFM itself, as the agencies under DAFM's responsibility (Teagasc and the Marine Institute) complete their own separate returns.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| **RESEARCH AND DEVELOPMENT FUNDED IN HOUSE** | **€000's** | **€000's** |
| **R&D-Related Veterinary Laboratory Activities**<br>Operation of a central veterinary research laboratory at Backweston, Celbridge, Co. Kildare, regional veterinary research laboratories at Cork, Limerick, Sligo, Athlone and a testing laboratory in Waterford. | **2,877** | **2,516** |
| **Longtown Farm**<br>Longtown Farm provides support for diagnostic procedures and National Reference Laboratory functions in DAFM Veterinary Laboratories. It enables the study of endemic infectious diseases and also facilitates collaborative studies with universities and state research bodies. | **211** | **225** |
| **Improvement of Crops**<br>Improving the quality of crops and crop products through the use of the highest quality varieties and seeds. The main activities leading to achievement of this objective include the operation of two stations/farms at Fermoy in Co. Cork and Backweston in Co. Dublin, where plant varieties are evaluated, the operation of a potato laboratory at Raphoe in Co. Donegal and the carrying out of trials in farmers' fields throughout the country. | **1,008** | **1,093** |
| **RESEARCH AND DEVELOPMENT PERFORMED ELSEWHERE** | | |
| **Institutional Food Research – Competitive Funding Programme** | | |

| | | |
|---|---|---|
| In its implementation of the **Food Institutional Research Measure** (FIRM), the Department is involved in the management of competitive tendering by food research producing organisations for grant aid to support of food research in priority areas. It monitors the progress of successful projects, payment of grant aid and evaluation of the programme. | **9,600** | **8,562** |
| **Agricultural Production Research- Competitive Funding Programme**<br>The **Research Stimulus Fund** encourages co-operative research in agricultural production. This involves management of competitive tendering by research institutions for grant aid to support agricultural research projects in priority areas, monitoring of progress of successful projects, payments of grant aid and evaluation of the programme. | **6,800** | **7,006** |
| **CoFoRD- Competitive Funding Programme.**<br>The Programme of Competitive Forest Research for Development supports the economic, environmental and social goals of forest policy through funded research aimed at developing national forest research capacity and competence. | **1,800** | **1,850** |
| **TB Research Programme**<br>DAFM through ERAD Division funds applied research into areas relevant to the eradication of bovine tuberculosis (TB). The main beneficiaries include UCD for Centre for Veterinary Epidemiological Research Analysis (CVERA) along with the TB Diagnostics and Immunology Research Laboratory, Trinity College Dublin and University College Cork for other specific TB related research initiatives/projects | **1,670** | **2,000** |
| **Improvement of Livestock**<br>Improving the quality of livestock and livestock products through adoption of better breeding and selection practices carried out in Irish Cattle Breeding Federation (ICBF) / Sheep Ireland. The main activities leading to achievement of these objectives are operation of on-farm and central testing stations; recording schemes; collaboration with and support for research in animal breeding at research institutions and at the Irish Equine Centre, Co. Kildare which undertakes R&D activities relating to equines. | **1,435** | **1,270** |
| **Genetic Resources**<br>The Department of Agriculture, Food and the Marine's grant aid scheme for the conservation of genetic resources for food and agriculture has been in place since 1996. The Scheme has an annual call for projects aimed at supporting the conservation and sustainable use of genetic resources for food and agriculture. Projects are evaluated by an advisory committee, representing broad national stakeholder interests. | **57** | **107** |

## Department of Agriculture, Food and the Marine (cont.)

### Bord Iascaigh Mhara

BIM is the Irish State agency with responsibility for developing the Irish Sea Fishing and Aquaculture industries. BIM was established under the Sea Fisheries Act 1952. BIM's mission is "to promote the sustainable development of the Irish seafood industry at sea and ashore and support its diversification in the coastal regions so as to enhance its contribution to employment, income and welfare both regionally and nationally".

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| **Aquaculture Development Programme**<br>The approval of the Irish Seafood National Programme enabled the roll out of BIM Schemes aimed at assisting trials on innovative technology in commercial aquaculture to improve competitiveness; to establish the economic and technical feasibility of new sites and species; to assist measures for the improvement of environmental sustainability, fish health and welfare and product quality; to promote occupational health and safety and skills and to harmonise aquaculture into coastal and rural communities. | €'000<br>820 | €'000<br>4,000 |
| **Business Development & Innovation Programme**<br>BIM invested in category management projects that drive growth and competitiveness in the main commercial seafood categories. Significant projects were aimed at:<br>▪ Developing technology for boarfish products.<br>▪ Utilising white fish by-products and improving product quality.<br>▪ Developing domestic Irish seafood trade.<br>▪ Investigating the market<br>Seafood Development Centre<br>The Seafood Development (SDC) services cover market opportunity identification, New Product Development (NPD) and product concept development, branding and labelling advice, sensory panels, pilot testing, equipment and product scaling-up.<br>Technology reference projects were developed covering innovations/NPD from a range of Irish seafood companies. There was a particular focus on developing technological innovation as well as NPD innovation within the seafood sector.<br>The SDC made significant investment in pilot facilities including a new breading cooking line to generate a range of new products including boarfish, blue whiting and combinations with other fish species. | 3,281 | 5,600 |
| **Fisheries Development Programme**<br>In addition to its suite of grant aid schemes which assist the fleet in the areas of safety, quality, hygiene and certification, the Fisheries Development Programme includes:<br>▪ Cod Recovery and Discard Reduction: Trials were carried out in the Irish Sea to investigate the interaction between square mesh panels and the Swedish grid.<br>▪ Fisheries Interactions with Protected Species: Monitoring and management of bycatch of protected species including cetaceans, seals, elasmobranchs and birds. | 3,162 | 5,200 |

- Waste Management: A total of fifty tonnes of old monofilament nylon fishing nets were recycled.
- Fisheries in Natura 2000 sites: Fisheries Development Division coastal staff gathered information on inshore fisheries to facilitate a risk assessment of marine natural 2000 sites.
- International Certification of Irish Seafood: BIM, working closely with industry, facilitated 82 vessels and three onshore facilities achieve certification to the Responsibly Sourced Standard (ISO 65, EN45011) during the year.
- Traceability of Seafood (E-LOCATE): Administered by BIM on behalf of the Sea Fisheries Protection Agency (SFPA). 15 projects implementing state of the art traceability and labelling networks were approved. These projects will facilitate the global identification of Irish seafood and will allow for the quantification of responsibly caught and certified seafood products.
- Economics: Data Collection Framework: BIM continued, to collect economic data from the fishing fleet, aquaculture and processing sectors. The Annual Economic Report was prepared for the Scientific, Technical and Economic Committee for Fisheries (STECF).
- Sentinel Vessel Programme: The BIM Sentinel Vessel Programme continues to gather performance data from inshore fishing vessels (less than 10 metres in length) from 88 vessels, from selected fisheries within the inshore fleet.
- North Western Waters Regional Advisory Council (NWWRAC): The Secretariat of the NWWRAC is hosted by BIM in Dun Laoghaire.

## Department of Agriculture, Food and the Marine (cont.)

### Marine Institute (Estimate)

The Marine Institute has the general functions "to undertake, to co-ordinate, to promote and to assist in marine research and development and to provide such services related to marine research and development that in the opinion of the Institute will promote economic development, create employment and protect the marine environment" (Marine Institute Act, 1991). The key services delivered by the Marine Institute include:

1. **Research**

The Marine Institute's activities, in relation to marine research, fall into three main areas:

- Research Performer: The Marine Institute undertakes research (both applied and experimental development) through its operational programmes and also through leading and participating in many national and international research projects.
- Research Funder: The Marine Institute manages the *National Marine Research Programme,* which provides funding to the Irish marine sector through competitive calls. Funding is provided for marine research that addresses national strategic priorities as stated in the *Sea Change Strategy 2007-2013, Harnessing Our Ocean Wealth – An Integrated Marine Plan for Ireland,* the Report of the Research Prioritisation Steering Group and *Innovation 2020 Ireland's Strategy for Research and Development, Science and Technology*.
- Research Promoter, Coordinator and Catalyst: The Marine Institute co-ordinates and promotes marine research, bringing together industry, higher education institutions and government bodies to support the development of Ireland's knowledge economy and the marine sector.

2. **Monitoring, Data Collection and other Technical Services**

The Institute carries out statutory and non-statutory monitoring and data collection to underpin the development of the marine sector and the sustainability of the marine environment and resource aimed at:

- Food safety monitoring (e.g. biotoxins, residues, microbiology);
- Managing fisheries resources (including migratory stocks);
- Understanding and monitoring the marine environment and climate change (e.g. hazardous substances, nutrients, phytoplankton);
- Supporting environmental directives (e.g. EU Marine Strategy Framework and Water Framework Directives and Natura Legislation); and
- Monitoring & auditing impact of marine economic activity.

3. **Provision and Formulation of Scientific, Technical and Strategic Policy Advice**

The Marine Institute provides advice to a range of national and international agencies and departments which supports both national and EU policy decisions across all marine sectors. This includes the formulation of EU Marine Science Policy & Programme Development.

## 4. Sectoral Development

The Marine Institute provides a number of services related to the development of Ireland's vast marine resource. Specifically, the Irish Maritime Development Office (IMDO) is dedicated to the development and promotion of the shipping and maritime transport sector.

In addition, the Institute liaises closely with national development agencies in order to maximise the economic potential of existing marine sectors (e.g. marine food) and emerging marine sectors (e.g. marine biotechnology, green technologies and renewable ocean energy).

The Marine Institute has developed world-class marine research infrastructure including: HQ & Laboratory Complex (54 labs) in Oranmore, Co. Galway; an Aquaculture & Catchment Management Research Facility in Newport, Co Mayo; two multi-purpose National Research Vessels, a remotely operated vehicle (ROV); Ocean Energy Test & demonstration sites in Galway and Mayo; and a range of specialist scientific equipment and data management facilities.

**Marine Institute figures presented below are estimates based on their return to the R&D Budget 2016-17 Survey.**

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| The Marine Institute is a significant research performer - competing for and securing funds from both national and international (EU FP/H2020 and INTERREG) funding sources. This research supports the provision of government services, including the provision of policy advice; underpins the competitiveness and market accessibility to Irish seafood production (fisheries and aquaculture) through a range of scientific research assessment and monitoring programmes spanning fisheries resources, marine environment monitoring and marine food safely. In addition to the Institute's direct participation in externally funded research projects, the Institute also participates in marine research via in-kind contribution e.g. through the provision of research facilities/infrastructure for projects that are complementary to the Institute's core activities.<br><br>The Marine Institute's research programme activity is classified in accordance with our five service areas, as follows:<br>▪ Fisheries Ecosystem Advisory Services<br>▪ Marine Environment and Food Safety Services<br>▪ Ocean Science and Information Services<br>▪ Irish Maritime Development Office<br>▪ Office of the CEO /Corporate Services<br>▪ Policy, Innovation and Research Support Services (from 2015) | €'000<br><br>4,556 | €'000<br><br>5,806 |
| **Marine Research Sub-Programme**<br><br>The Marine Institute administers on a competitive basis the national marine research funding programme. Research funding is awarded on a competitive basis for 'applied' marine-related R&D in line with the objectives set out in national strategies. The Institute administers and manages the following categories of funding:<br><br>▪ Project-Based Awards: Strategic Research Projects, Applied Research Projects, Demonstration Projects and Desk/Feasibility Studies;<br>▪ Researcher Awards: Strategic Research Appointments, Research Capacity/Competency Building, Post-Doctoral Fellowships and PhD Scholarships;<br>▪ Industry-Led Research Awards: Company Awards and Collaborative Awards; and<br>▪ Infrastructure Awards: Infrastructure Acquisition and Access to Infrastructure, e.g. Shiptime onboard the National Research Vessels. | 5,283 | 4,546 |

## Department of Agriculture, Food and the Marine (cont.)

### Teagasc

Teagasc, the Agriculture and Food Development Authority, is the leading organisation in the fields of agriculture and food research in Ireland undertaking innovative research in four main areas:

- Animal and Grassland
- Crops, Environment and Land Use
- Rural Economy and Development
- Food

Teagasc has an excellent track record of delivering high quality research that makes an impact on the industry and engages closely with industry and other stakeholders in setting priorities for its research. Teagasc partners with many other research providers, particularly Irish Universities in conducting research and works closely with many industry organizations, such as the Irish Cattle Breeding Federation, Bord Bia, Animal Health Ireland and Enterprise Ireland in delivering on shared priorities.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| **Animal & Grassland Research and Innovation Programme**<br><br>The aim of the Teagasc Animal and Grassland research and Innovation Programme is to increase the profitability, competitiveness and sustainability of Irish livestock production through research and innovation. The programme incorporates all animal (dairy cows, cattle, sheep and pigs) and grassland science, livestock systems research into a single programme thus positioning Teagasc as one of the leading international authorities on pasture-based systems of animal production.<br><br>The objective of the animal component of the programme is to generate and procure new knowledge to support innovation in the key areas of Irish livestock production including breeding, nutrition, growth, reproduction, health, product quality, labour efficiency and facilities that will underpin the future profitability, competitiveness and sustainability.<br><br>The objective of the grassland component of the programme is to generate and procure evidence-based knowledge to support innovation in the key areas of Irish grass production including grass breeding, growth, fertilisation, utilisation, nutritional value, and develop grazing systems that will underpin the profitability, competitiveness and sustainability of the sector and enhance food security.<br><br>**Crops, Environment and Land Use Programme**<br><br>The aim of the Teagasc Crops, Environment and Land Use programme is to develop and transfer cost-effective crop production systems, along with evidence-based knowledge to support and underpin the development of an environmentally sustainable, competitive and profitable agri-food sector. This will be achieved by focusing on:<br><br>▪ Crop science: to develop cost effective crop production systems, including crops for energy and bio-processing, which improve competitiveness, profitability and product quality, and minimise impact on the environment. | €'000<br><br>69,555 | €'000<br><br>74,457 |

- Forestry development: develop forests and forest management systems that maximize the potential of farm forestry from economic, social and environmental perspectives
- Horticulture research: to provide evidence based knowledge to support the competitiveness of the commercial horticulture sector.
- Environmental research: to provide evidence based knowledge to support and underpin the development of an environmentally sustainable, competitive and profitable agri-food sector through research projects and initiatives in nutrient efficiency, greenhouse gas and climate change, water quality, agricultural catchments, soils, biodiversity and environmental products and services.

**Rural Economy and Development Programme**

The aim of the Teagasc Rural Economy and Development Programme is to help decision making by stakeholders of Teagasc through research and knowledge transfer activities.

Advanced social science investigation tools are utilised to understand the linkages between the various forces affecting the agri-food and rural economy to improve the quality of life in rural Ireland. An important focus is placed on policy relevant research that will help policy makers to design and implement better public policy.

The specific objectives of this programme are to:

- Collect timely, quality information in an efficient manner to support decision making by our stakeholders.
- Undertake research to interpret trends and changes in markets and policy to enable each of our stakeholders to make better decisions.
- Provide advice, training and tools to support our stakeholders in making decisions that enable their business to be more effective.
- Understand who adopts technology, why potentially beneficial technologies are not adopted and how adoption can be increased.

This is achieved through the implementation of research projects and initiatives in the areas of agriculture, trade and environmental policy analysis, farm and food economics, spatial analysis, surveys, innovation and rural development and environmental economics.

**Food Programme**

The Teagasc Food Programme undertakes scientific research leading to the establishment of technological platforms that can be exploited by the Irish Food Processing Industry by adding value and ensures the safety and quality of food products.

The Teagasc Food Programme is a highly-applied research programme which has earned an international reputation based on its quality and scientific output.

The programme achieves its objectives through the delivery of research and innovation projects in the areas of food safety, cheese, fermented & other dairy products, food ingredients, meat products, prepared consumer foods, food & health, market studies and technical services and training.

Long term the Teagasc Food Programme aims to:

- Improve and develop the safety and clean green image of Irish food products
- Expand and increase dairy product research to serve the expected increase in national milk yield

| | | |
|---|---|---|
| ▪ Provide technology and knowledge to the meat processing industry to serve the economic increase in the meat sector.<br>▪ Support innovation, growth and export capability in the SME sector | | |

## Department of Business, Enterprise and Innovation

### Innovation, Research and Development Programmes (IRDP)

The science, technology and innovation and enterprise agendas pursued by the Department of Business, Enterprise and Innovation and its Agencies are focused on creating and supporting long-term sustainable jobs.

The Innovation, Research and Development Programmes/ Policy Units (IRDP) are responsible for

- Advising the Minister on general STI activities and directing and coordinating the R&D programmes of the agencies.
- Developing, promoting and co-ordinating Ireland's Science, Technology and Innovation policy, through the ongoing implementation of Innovation 2020, Ireland's Strategy for Research and Development, Science and Technology and in particular, through research prioritisation. This involves a more targeted investment in science, technology and Innovation, which will further enhance the effectiveness and impact of our research investment to deliver high quality, sustainable employment.
- Providing research funding to (SFI) and consequential policy issues arising from Ireland's investments through SFI.
- Providing funding to:
  - provide RDI supports for Irish companies;
  - deliver programmes to increase the level of collaborative R&D activity between industry and third level sector researchers and
  - deliver programmes to accelerate the commercialisation of State funded research
- Funding a number of smaller R&D programmes, such as the Discover Science & Engineering, which is delivered by Science Foundation Ireland, with the aim of increasing the numbers of students choosing science as a career and promoting science literacy generally.
- Developing and co-ordinating Ireland's input to EU research policies and programmes. IRDP is responsible for the funding of, and is represented on, the policy formulation committees of the following five Inter-Governmental S&T Organisations:
  - European Space Agency (ESA)
  - European Molecular Biology Conference (EMBC)
  - Co-operation in Science and Technology Programmes (COST)
  - EUREKA
  - European Molecular Biology Laboratory (EMBL)
- Overseeing the Programme for Research in Third Level Institutions (PRTLI), which supports the provision of top-class research infrastructure (buildings, laboratories and

cutting edge equipment) as well as human capital development, through Structured PhD/Emergent Technology programmes across Ireland's HEIs.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| **International Programmes** | €000's | €000's |
| **European Space Agency (ESA)**<br>A principal objective of Ireland membership of the ESA is to promote opportunity for high technology industry in Ireland. The greater part of Ireland's contribution is returned as industrial contracts involving collaboration between enterprises in the Member States. | 18,779 | 17,814 |
| **European Molecular Biology Conference (EMBC)**<br>Since 2000, Irish researchers have been successful in obtaining 10 long-term fellowship awards, as well as 11 short-term fellowships and one young investigator's award; further promoting Ireland's standing within the European scientific community. | 200 | 202 |
| **EUREKA**<br>Eureka is a European research initiative designed to ensure that the technological gap with other countries is narrowed. It promotes joint research between firms in different countries. | 29 | 33 |
| **European Molecular Biology Laboratory (EMBL)**<br>EMBL is an Inter-Governmental Research Organisation whose mission is the development of molecular biology throughout Europe. Membership of EMBL complements Ireland's significant investment in the biotechnology area by presenting opportunities for research training, networking and enhanced international collaboration. | 1,160 | 1,248 |
| **COST**<br>COST is an EU-funded programme that enables researchers to set up their interdisciplinary research networks in Europe and beyond. They provide funds for organising conferences, meetings, training schools, short scientific exchanges or other networking activities in a wide range of scientific topics. By creating open spaces where people and ideas can grow, we unlock the full potential of science. | 0 | 11 |
| **CECAM (Centre Européen de Calcul Atomique et Moléculaire)**<br>It is an organization devoted to the promotion of fundamental research on advanced computational methods and to their application to important problems in frontier areas of science and technology. As the name suggests, the traditional focus of CECAM has been atomistic and molecular simulations, applied to the physics and chemistry of condensed matter. Over the last twenty years, powerful advances in computer hardware and software have supported the extension of these methods to a wide range of problems in materials science, biology and medicinal chemistry. | 30 | 30 |

| | | |
|---|---|---|
| **National Programmes** | | |
| **Tyndall National Institute**<br><br>Tyndall National Institute, UCC is one of Europe's leading centres for Information, Communications and Technology research and development. It is the largest facility of its kind in Ireland. Tyndall, formally known as the National Microelectronics Research Centre, was established in 2004 to provide a critical mass of researchers that would support the growth and development of a smart knowledge based economy in Ireland. | 6,902 | 4,500 |
| **The Programme for Research in Third Level Institutions (PRTLI)**<br><br>PRTLI supports building strategic institutional research capacity, enabling the establishment of research centres and facilities, and joint research programmes and national initiatives. The programme is also taking the lead in the establishment of Structured PhD Programmes as the standard mechanism for education of PhDs, producing PhDs with the skill sets to work both in the public and private sectors. PRTLI is concerned with building a sustainable, long-term and broadly-based research capability in third level institutions. The aim is to help to accelerate the development of critical mass in their existing strengths and to develop new areas consistent with their institutional strategies and plans for research.<br><br>This Programme is administered by the Higher Education Authority (HEA) on behalf of Department of Business, Enterprise and Innovation.<br><br>These figures include spend on ICHEC and E-Journals. | 26,400 | 14,300 |
| **Irish Universities Association** | 108 | 108 |

## Department of Business, Enterprise and Innovation (cont.)

### Enterprise Ireland

The application of research and innovation to business is critical to the success of the Irish economy. Enterprise Ireland provide supports for both companies and researchers in Higher Education Institutes to develop new technologies and processes that will lead to job creation and increased exports.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| | €'000 | €'000 |
| **RESEARCH AND DEVELOPMENT** | | |
| **R&D Fund**<br>EI provides assistance for significant investment in R&D initiatives which arise as part of a company's strategic development. The R&D Fund is designed to provide support for research, development and technological innovation relevant at all stages of company development, and will enable companies to progress from undertaking an initial research project to high level innovation and R&D activity. | 49,535 | 50,045 |
| **Small Business Research Initiative (SBIR)**<br>SBIR is a mechanism which enables public sector bodies to connect with innovative ideas and technology businesses to provide innovative solutions to specific Public Sector challenges and needs. | 34 | 500 |
| **Technology Centres**<br>EI supports the establishment and maintenance of centres where the research agenda is directed by groups of companies who work together with higher level researchers to perform medium term commercially relevant research. | 21,569 | 17,384 |
| **Commercialisation Fund**<br>This programme supports academic researchers to take the outputs of research with commercial potential and bring it to a point where it can be transferred into industry. | 18,949 | 17,087 |
| **Innovation Partnerships**<br>These are aimed at harnessing the strengths of the third level sector to work in partnership with companies on specific R&D projects. | 9,138 | 10,762 |
| **TOTAL** | 99,225 | 95,778 |

## Department of Business, Enterprise and Innovation (cont.)

### IDA Ireland

IDA Ireland has national responsibility for securing new investment from overseas in manufacturing and international services and for encouraging existing foreign enterprises to expand their businesses. With a staff of 250 people and headquarters in Dublin, IDA Ireland has 21 overseas offices.

Activities include the international and national promotion of Ireland as a location for overseas investment and the provision of financial incentives for the attraction of new overseas investment into Ireland, as well as the expansion of its existing client base of almost 1,000 companies. As part of its brief to develop overseas companies already in Ireland, IDA Ireland focuses on encouraging these companies to locate additional or higher order functions in Ireland, e.g. a research and development unit.

IDA Ireland is committed to supporting its clients to establish and grow R&D activities in Ireland. The objective is to ensure that its client companies are focused on activities for which Ireland is a cost-effective location and thus help to secure their competitiveness and strategic importance within the overall company.

There are no administrative costs associated with science and technology activities as no separate staff are assigned to administer research and development grants.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| | €'000 | €'000 |
| The IDA Research, Development & Innovation (RD&I) Support programme is designed to support companies at all stages of RD&I and enable them to move from start-up R&D, through developing capacity and adding competence, to a fully integrated RD&I function.<br>Support levels are tied to an assessment of strategic objectives, in conjunction with commercial and technical assessments. | 52,830 | 55,000 |

## Department of Business, Enterprise and Innovation (cont.)

### InterTradeIreland

Inter*Trade*Ireland is the only organisation which supports SMEs across the island to develop North/South trade and business development opportunities for the mutual benefit of both economies.

"We encourage better use of our collective resources to accelerate trade and business growth across the island and create an environment where it is easier to do business. We achieve this through co-operative business, policy and research programmes, partnerships and networks."

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| **INNOVA** | €'000 | €'000 |
| INNOVA supports cross-border R&D collaboration between companies, with the support of public research organisations where required. | | |
| INNOVA assists companies to create new products, processes or services or significantly improve existing ones. | 2,323 | 2,544 |

## Department of Business, Enterprise and Innovation (cont.)

### Science Foundation Ireland

Science Foundation Ireland (SFI), the national foundation for excellence in scientific research, funds oriented basic and applied research in the areas of science, technology, engineering, and mathematics (STEM) which promote and assist the development and competitiveness of industry, enterprise and employment in Ireland. The Foundation also promotes and supports the study of, education in and engagement with STEM, and an awareness and understanding of the value of STEM to society and to the growth of the economy in particular.

SFI's strategic plan, Agenda 2020, contains four primary objectives:

- To be the best science funding agency in the world at creating impact from excellent research demonstrating clear value for money
- To be the exemplar in building partnerships that fund excellent science and drive it out into the market and society
- To have the most engaged and scientifically informed public
- To represent the ideal modern public service organisation staffed in a lean and flexible manner, with efficient and effective management

SFI helps to link researchers in partnership across academia and industry through a number of mechanisms such as the SFI Research Centres, SFI Partnership programme and the SFI Industrial Fellowship programme, to address crucial research questions, to foster the development of new and existing Ireland-based technology companies to create innovative products leading to job creation, to attract industry that could make an important contribution to Ireland and its economy, and to expand educational and career opportunities in Ireland in science and engineering.

SFI recognises the importance of supporting early- and mid-career researchers as highlighted in Agenda 2020. The goal of career development programmes is to prepare/develop researchers for future careers in academia or in the industry sector. One of our key objectives is to increase the level of early-career researcher support and to that end, SFI provides a number of schemes for early- and mid-career investigators.

SFI operates a number of programmes not all of which are active every year. SFI continuously reviews the funding mechanisms in place to ensure that the appropriate structures and opportunities are available for the research community to enable performance of excellent science with impact.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| SFI operates a suite of programmes not all of which are active every year.<br><br>**SFI Partnership Programme**<br>SFI will engage with partners to co-support outstanding initiatives which will build research strength in Ireland. The programme will fund projects or people (for a limited time) to aid development and retention of talented researchers, foster industrial collaborations and develop capacity in areas of emerging importance.<br><br>**SFI Research Centres**<br>SFI Research Centres link scientists and engineers in partnerships across academia and industry to address crucial research questions, foster the development of new and existing Ireland-based technology companies, attract industry that could make an important contribution to Ireland and its economy, and expand educational and career opportunities in Ireland in science and engineering. They are structured on a hub & spoke model consisting of a number of targeted projects undertaken in partnership with industry that connect into a central hub containing the platform research and core operations. Research Centres Programme calls may be open or themed – generally rotating between the two formats in sequential calls.<br><br>**SFI Spokes Programme - Research Centres**<br>To promote the further development of SFI Research Centres to incorporate new areas of research, new industrial and academic collaborators. The Spokes Programme includes both a rolling component and a fixed deadline component. Proposals will be accepted at any time (rolling call) if 50% or more of the costs are paid for in cash by the industry partners.<br><br>**SFI / EI Technology Innovation Development Award (TIDA)**<br>The TIDA Feasibility Study programme is designed to enable researchers to focus on the first steps of an applied research project which may have a commercial benefit if further developed. Researchers who have the scientific and technical capability to produce novel technologies and who are keen to develop a better understanding of the commercialisation process are especially encouraged to apply for this award. Convergent applications from researchers within different disciplines are also encouraged.<br><br>**SFI Investigators Programme (IvP)**<br>SFI's Investigator Programme supports the development of world class research capability and human capital in areas of science, engineering and mathematics that demonstrably support and underpin enterprise competitiveness and societal development in Ireland. To this end, SFI funds outstanding people with innovative ideas and strategic partnerships, recognising that excellence remains a paramount criterion in the research it funds. Investigator Programme calls may be open or themed – generally rotating between these two formats on an annual basis.<br><br>**SFI Research Professorship Programme** | €'000<br><br>173,304 | €'000<br><br>172,250 |

The recruitment of world leading scientists and engineers will build the national research and enterprise base, and enhance Ireland's reputation as a centre of excellence for research. The SFI Research Professorship Programme is intended to support national strategic priorities by assisting research bodies in their recruitment of world-leading researchers for Professorial Chairs, or similar research leadership positions in targeted scientific areas. The programme may also act as a mechanism to support the recruitment of individuals that possess a strong industry background, as well as directorship roles in established research centres within Ireland.

**SFI Starting Investigator Research Grant (SIRG) Programme**

The SFI Starting Investigator Research Grant (SIRG) Programme provides an opportunity for excellent early-career investigators to carry out independent research and gain important experience on which to build their future research careers.

**SFI Career Development Award (CDA)**

SFI's Career Development Award Programme supports excellent early- and mid-career investigators who are already in an independent academic position and who obtain their salary either from the organisation with which they are employed or from an alternative funding source. The award provides an opportunity to extend research activities by allowing teams to be built or expanded.

**President of Ireland Future Research Leaders**

This programme is a recruitment-only programme designed to attract to Ireland outstanding new and emerging research leaders in both scientific and engineering domains, where candidates may have both academic and/or industry relevant backgrounds with a focus on research excellence with impact. Candidates are expected to address current gaps in leadership, methodologies and skill sets in specific discipline areas (including, but not limited to advanced manufacturing, bioprocessing, agri-food, cyber-security, smart cities, energy and marine research).

**SFI President of Ireland Young Researcher Award**

The President of Ireland Young Researcher Award (PIYRA) is Science Foundation Ireland's most prestigious award to recruit and retain outstanding young researchers. This programme emphasises the importance that Science Foundation Ireland places on the early development of research careers. The award recognises outstanding engineers and scientists who, early in their careers, have already demonstrated or shown exceptional potential for leadership at the frontiers of knowledge.

**SFI-Royal Society University Research Fellowship**

This scheme is for outstanding scientists in the Republic of Ireland who are in the early stages of their research career and have the potential to become leaders in their field. The scheme provides the opportunity to build an independent research career. The scheme covers all areas of the life and physical sciences, including engineering, but excluding clinical medicine and any researcher addressing a direct biomedical question.

**SFI ERC Support Programme**

The SFI ERC support programme supports the Irish host institutions of awardees of the ERC Starting and Advanced Grant schemes. This programme will assist Irish host institutions in providing the appropriate support to ERC awardees. Awards may also be made when an ERC awardee moves to an Irish institution during the course of their ERC award. This programme will increase the benefits for institutions and applicants of applying to the ERC award schemes, increase Irish participation in the ERC programmes, increase

institutional support of ERC awardees and increase Ireland's success rate in the ERC award schemes.

**SFI Discover Programme**

The SFI Discover Programme will support national and regional projects in STEM education and outreach in Ireland with the aim of engaging and scientifically informing the general public. The Programme will fund both large scale national and regional projects as well as smaller local events concerning public engagement, education and outreach and STEM careers awareness.

**SFI Industry Fellowship Programme**

To promote the exchange of people at all levels between academia and industry (both SME and MNC). Fellowship funding is provided across the entire academic salary scale for awards up to 1 year full time or 2 years' part time (renewable competitively).

**SFI ERC Development Programme**

This programme supports researchers who have submitted a proposal to the ERC, been deemed fundable, but not funded due to a lack of programme budget. The objectives of the ERC Development Programme are to encourage unsuccessful ERC applicants, either Irish based or willing to relocate to an Irish Institution for their resubmission, to resubmit to the ERC in a future call, to encourage new submissions to the ERC from Irish-based investigators, and to increase success in obtaining funding through ERC award schemes.

**SFI Conferences and Workshops**

SFI's Conferences and Workshops Programme provides support for the organisation of national and international meetings that enable Irish research bodies to contribute to international scientific debate, encourage industry- informed research, and foster academic-industrial collaborations to build a competitive advantage for Ireland. There are different award types within the Conference and Workshop Programme, namely Conferences, Exceptional Conferences, Workshops, and Conference Bids.

**US-Ireland R&D Partnership Programme**

The Governments of the United States of America, Ireland and the Northern Ireland Executive have come together for a unique initiative to advance scientific progress in fields that will have a significant impact on the health, well-being and economic prosperity of all their citizens. The "US-Ireland R&D Partnership" links scientists and engineers in partnerships across academia and industry to address crucial research questions; fosters new and existing industrial research activity that could make an important contribution to the respective economies: and expands educational and research career opportunities in science & engineering.

**SFI-HRB-Wellcome Trust Biomedical Research Partnership**

The Wellcome Trust, in partnership with SFI and the HRB, will fund biomedical and clinical research in the Republic of Ireland under the auspices of the SFI- HRB-Wellcome Trust Biomedical Research Partnership. In line with their strategic research agendas, SFI and the HRB will co-fund with the Wellcome Trust successful biomedical and clinical science applications under the following Trust funding schemes: Investigator Awards, Fellowships, including Principal Research Fellowships (PRFs) and Strategic Awards.

| | | |
|---|---|---|
| Full details of all programmes can be found on the SFI website **– https://www.sfi.ie/** | | |

## Department of Culture, Heritage and the Gaeltacht

### Údarás na Gaeltachta

Údarás na Gaeltachta was established under the Údarás na Gaeltachta Act, 1979 and came into operation on 1st January 1980 to replace Gaeltarra Éireann which was dissolved by the same act.

The objectives of an t-Údarás are as follows:

- to encourage the preservation and extension of the Irish language in the Gaeltacht;
- to attract suitable native and foreign manufacturing projects to the Gaeltacht;
- to establish, develop and manage productive employment enterprises in the Gaeltacht;
- to participate in industries as an equity partner and to provide services to assist new industries in becoming established.

Údarás encourages investment in the Gaeltacht through a range of incentives for new enterprises and through support and assistance for existing businesses.

The organisation supports businesses in developing new markets, technologies, products and strategic alliances through research and development.

Gaeltacht companies span a range of commercial sectors, including tourism, fish processing and aquaculture, renewable energy, food, life sciences, ICT, niche manufacturing, audio visual and digital media, arts and crafts.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| Research is funded by enterprises along with grants of up to 60% subject to a maximum of €126,973 for any one project. | €'000 | €'000 |
| Eligible costs include R&D salaries, directly related additional overheads, the cost of capital assets to the extent and for the period of their use in the research project, costs of contractual research, technical knowledge and patents bought or licensed from outside sources, other operating expenses including costs of materials, supplies, travel and subsistence and other similar costs directly related to the research activity. | 2,463 | 2,000 |

## Department of Communications, Climate Action and Environment

The Mission Statement of the department is “to promote the sustainable development, management and regulation of the communications, energy, marine and natural resources sectors in support of national economic and social policy objectives”.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| | €’000 | €’000 |
| **INFOMAR (Integrated Mapping for the Sustainable Development of Ireland’s Marine resource)**<br>The objectives of the INFOMAR Programme is on continuing the seabed surveying to completion by mapping of Ireland’s valuable but complex shallow inshore waters, the development of a state of the art data-store and the development of outputs based on the data acquired | 150 | 150 |
| **EPOS Project ICT** | 143 | 183 |
| **General Geoscience Research**<br>The Geoscience Initiatives are a series of co-ordinated actions managed by GSI and aimed at local authorities to support infrastructural development planning and environmental protection.<br>Short calls including Tellus and Land Mapping | 463 | 690 |
| **Fulbright Commission and other partnerships** | 1,228 | 1,939 |

## Department of Communications, Climate Action and Environment (cont.)

### Environmental Protection Agency

The Environmental Protection Agency (EPA) is an independent public body established in July 1993 under the Environmental Protection Agency Act, 1992. Its sponsor in Government is the Department of the Communication, Climate Action and Environment (DCCAE). The EPA is a statutory body responsible for protecting the environment in Ireland and ensuring that development is sustainable. It regulates and police activities that might otherwise cause pollution and ensure there is solid evidence on environmental trends so that necessary actions can be taken. The EPA has the role of coordinating environmental research in Ireland and supports R&D activities (mainly via its Annual Competitive Research Calls) in a range of environmental areas. The EPA Research Programme aims to identify pressures, inform policy and develop solutions.

**Environmental Research Programme 2014-2020**

The EPA published its Research Strategy for the period 2014-2020, a process which involved substantial stakeholder engagement (over 600 stakeholders attended seven workshops). The research programme is based around “three pillars” (climate, water and sustainability), representing the key research priorities associated with delivering a protected Irish environment.

**Climate:** The Climate Change Research Pillar is directed at addressing specific knowledge gaps of direct relevance to the National Climate Change Strategy prepared by the Department of Communications, Climate Action and Environment.

**Water:** The EPA Research Programme has a strong focus on policy and is driven by national regulations and European directives. A sustained Water Research Programme is an essential component of Ireland’s role in protecting its water resources and meeting its requirements under water-related EU directives, the United Nation’s Sustainable Development Goals and national polices. The overall aim of the water pillar is to support relevant water policy and to protect our water environment, contributing to achieving excellent water quality in Ireland.

**Sustainability:** The EPA Research Programme has a strong focus on policy and is driven by national policy and strategy, European Directives and International Policy commitments, such as the UN Sustainable Development Goals. The EPA recognises the importance of Ireland’s role and the role of research in advancing the Sustainable Development Goals to protect the planet from degradation, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations.

**EPA Research Activities 2017**

In 2017, the EPA committed €7.5 million to fund new projects on the following topics: Water, Climate, Green Enterprise and Sustainability. The 2017 Research Calls opened on 5th May 2017, with a total of 106 applications received resulting in 31 awards:

| Call | Proposals Received | Awards Made | Funding Committed |
|---|---|---|---|
| Climate 2017 | 15 | 5 | €1,147,286 |
| Water 2017 | 30 | 7 | €2,378,041 |
| Sustainability 2017 | 17 | 10 | €1,984,998 |
| UN SDG 2017 | 17 | 6 | €1,190,428 |
| Green Enterprise 2017 | 27 | 3 | €156,659 |
| **TOTALS:** | **106** | **31** | **€6,857,413** |

Additional projects were awarded resulting from strategic partnerships at national and international level (i.e. Joint Transnational Calls via the Water & Climate Joint Programming Initiatives; IRC-EPA Scholarships; SFI-EPA Investigator Programme; Fulbright-EPA awards), as well as awarding projects from their Reserve Lists from previous calls:

The EPA Co-Funds Environmental research with various different Agency bodies and collaborates with a number of EU research programme initiatives.

The EPA Research programme has an active communications programme. Communication and dissemination activities arising from EPA-funded research are strongly encouraged and monitored throughout the lifetime of funded projects. In addition, EPA-funded projects must comply with an Open Access and Open Data policy for all the outputs arising from the projects.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| | €'000 | €'000 |
| EPA Research Activities | 7,524 | 11,600 |

## Department of Communications, Climate Action and Environment (cont.)

### Inland Fisheries Ireland

Inland Fisheries Ireland (IFI) was formed on 1st July, 2010 following the amalgamation of the Central Fisheries Board and the seven former Regional Fisheries Boards into a single agency.

Inland Fisheries Ireland is responsible for the conservation, protection, management, development and promotion of the inland fisheries resource (including sea angling) across the country. Ireland has over 70,000 kilometres of rivers and streams and 144,000 hectares of lakes all of which fall under the jurisdiction of IFI.

IFI also has a role in the provision of advice to the Minister and stakeholders in relation to the Inland Fisheries Resource. It is the role of IFI's R&D function to provide data and analysis on the status of rivers, fish species and habitats to support IFI management in development of policies and in offering advice relating to the inland fisheries natural resource.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| **Programme Monitoring**<br><br>Ongoing activity includes assessing the biological potential of freshwater lakes and rivers for fishery development; many of these databases are used to design riverine rehabilitation programmes.<br><br>Surveys of estuaries and inshore marine areas to locate habitats of popular marine sport fish and surveys of stocks of such fish; evaluating the progress of current development programmes in terms of fish numbers, etc. checking on conditions of fishing waters i.e. measuring trophic/nutrient status and pollution hazards which might threaten the State's investments in fisheries; water sampling and analysis for pollution control and prosecutions.<br><br>Current work being carried out by the Research and Development Division includes:<br><br>1. The Mulkear LIFE project, a European Commission funded LIFE Nature project working on the restoration of the Lower Shannon Special Area of Conservation for Atlantic Salmon, Sea Lamprey and European Otter.<br><br>2. Eel Monitoring Programme, to monitor eel population recovery in Ireland following the imposition of a new national eel stock management regime.<br><br>3. OPW Environmental River Enhancement Program (EREP), designed to examine environmental impacts of OPW channel maintenance programme on fisheries habitat, fish populations and other river corridor biota and to develop more environmentally sensitive maintenance strategies.<br><br>4. Celtic Sea Trout Project – Ireland/Wales Interreg programme to understand and describe sea trout stocks in the Irish Sea and thereby to enhance sea trout fisheries and strengthen their contributions to quality of life, to rural economies and to national biodiversity. | €'000<br><br>3,325 | €'000<br><br>3,514 |

## Deparment of Communications, Climate Action and Environment (cont.)

### Sustainable Energy Authority of Ireland (SEAI)

Sustainable Energy Authority of Ireland established under the Sustainable Energy Act 2002, has a mission to play a leading role in transforming Ireland into a society based on sustainable energy structures, technologies and practices.

This encompasses environmentally and economically sustainable production, supply and use of energy, in support of Government policy across all sectors of the economy. Its remit relates mainly to improving energy efficiency, advancing the development and competitive deployment of low carbon sources of energy and combined heat and power, and reducing the environmental impact of energy production and use, particularly in respect of greenhouse gas emissions. SEAI is financed by Ireland's EU Structural Funds Programme and co-funded by the Irish Government and the European Union and manages programmes aimed at:

- supporting Government decision-making through advocacy, analysis and evidence
- driving demand reduction and providing advice to all users of energy
- driving the decarbonisation of energy supply
- raising standards in sustainable energy products and services
- building markets based on quality, confidence and proven performance
- fostering innovation and entrepreneurship
- improving the coherence of Irish energy research and development

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| Sustainable Energy Ireland's research, development and demonstration (RD&D) programme is designed to assist the development of a least-cost path to CO2 reduction and sustainable energy in Ireland. It has programmes active in the areas of built environment, industry, renewables, and transport. | €'000 | €'000 |
| SEAI's Sustainable Transport Programme demonstrates the technical and economic feasibility of sustainable technologies in Ireland by supporting a number of RD&D studies into the integration of renewable energy technologies into transport systems. | 6,350 | 7,850 |
| The Ocean Energy Programme was established to advance the deployment of ocean energy technologies in Ireland by increasing the capacity for research and development both with academic institutions and commercial entities developing devices in Ireland. | | |
| SEAI's Renewable Energy RD&D Programme was established to support the acceleration of uptake of renewable energy solutions and new renewable technologies. | | |
| SEAI's Microgeneration programme assesses the technical, financial and regulatory issues surrounding the deployment of small and micro generation technologies in Ireland. | | |

## Department of Education and Skills

Funding is available to all Universities and Institutes of Technology to support the development of their research capabilities, to support outstandingly talented individual researchers, and to encourage co-operation within institutions and between institutions.

This funding is primarily aimed at developing research capacity in the higher education system through the development of high quality 4th level education. Funding is provided for PhD students and early-stage postdoctoral researchers under the Irish Research Council. Funding for these programmes is made available through the Higher Education Authority (HEA). Dedicated funding is also provided through HEAnet to ensure that high quality internet services are available to students and researchers in higher education institutions. These are essential supporting services for the research system as a whole and benefit all research funding agencies.

The education related elements of the regional operational programmes, which is funded through the Department of Business, Enterprise and Innovation, also supports Research and Development activities in the higher education sector through the Strategy for Science, Innovation and Technology.

Expenditure and programmes run by the Higher Education Authority and the Dublin Institute for Advanced Studies are listed elsewhere in this Report.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| | €'000 | €'000 |
| **Education Research Centre (ERC)**<br>There are three main international studies managed by the ERC and funded directly by the Department of Education and Skills. They are:<br>▪ Programme for International Student Assessment (PISA) - an OECD international study of 15 year olds' performance in reading, mathematics and science.<br>▪ Trend in International Mathematics and Science Study (TIMSS) - In 2015, Ireland is taking part in TIMSS (Trends in International Mathematics and Science Study) – a study involving 46 countries at primary level and 41 countries at post-primary.<br>▪ Progress in International Reading Literacy Study (PIRLS) - PIRLS is the world's largest study of reading achievement at primary level, and takes place every five years. | 778 | 1,018 |
| **The European University Institute (EUI)**<br>The EUI Florence is a postgraduate institute established by the Member States of the European Union whose functions include advanced teaching, research and providing a forum for the exchange of ideas and experience. The main teaching activity is the PhD programme, leading to the doctorate of the Institute, on topics related to its research programme in the fields of history, economics, law and political and social sciences.<br>The Institute's Centre for Advanced Studies is the research arm of the Institute and offers Jean Monnet Fellowships for post-doctoral research. | 205 | 350 |

| | | |
|---|---|---|
| **National Anti-Bullying Research Centre** | 74 | 75 |
| **Research into the fundamental areas of continuing professional development provision for school leaders** | 82 | 27 |
| **Development of a research-based framework for evaluation of Continuing Professional Development (CPD) in the area of Wellbeing.** | - | 60 |
| **Research into functions of Teaching Council and/or Continuum of Teacher Education from Initial Teacher Education to Lifelong learning.** | 90 | 90 |

## Department of Education and Skills (cont.)

### Dublin Institute for Advanced Studies

The Dublin Institute for Advanced Studies is a statutory corporation established in 1940 under the Institute for Advanced Studies Act, 1940. The Institute has three constituent schools – the School of Celtic Studies, the School of Theoretical Physics and the School of Cosmic Physics. Each school has an independent governing board. The Institute, through the constituent schools, pursues fundamental research and trains students in advanced methods of original research.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| **The School of Theoretical Physics**<br>The School pursues research in the general areas of theoretical physics and mathematics.<br><br>Particular areas of expertise are: theoretical particle physics, quantum field theory, quantum gravity, quantum mechanics, quantum information theory, quantum and classical statistical mechanics, disordered systems, geometry and topology, non-commutative geometry and infinite-dimensional algebras, lie groups and algebras, C*-algebras, functional analysis, and probability. | €'000<br><br>958 | €'000<br><br>1,019 |
| **The School of Cosmic Physics**<br>The School of Cosmic Physics has two research sections, one in Geophysics and one in Astronomy/Astrophysics:<br><br>The Geophysics Section at DIAS works on a range of Earth Science problems supported by various geophysical methodologies. They range from purely academic investigations of deep Earth structure to academic/applied studies in the following areas:<br>▪ Deep Earth structure.<br>▪ Shallow structure of the Earth using seismic, gravity & electromagnetic methods.<br>▪ The oceans and land-ocean coupling.<br><br>The Geophysics section studies the physical and geological structure of the Earth as well as its evolution in time. The three principle research activities are electromagnetism, global modelling and seismology.<br><br>Some other ongoing initiatives:<br>Participation in the Irish Centre for Research in Applied Geosciences, DIAS will lead the Geophysics Research platform. DIAS is a founding member of Ireland's participation in the European Plate Observing System, EPOS.<br><br>In the Astronomy and Astrophysics Section the main areas of research are high-energy astrophysics, star formation, space instrumentation and computational astrophysics.<br><br>DIAS continues to be involved in both the testing and software development for the Mid Infrared Instrument (MIRI), one of the four main instruments on board the James Webb Space Telescope (JWST). The section is also actively involved in development of a number of interferometer projects with support from Science Foundation Ireland. | 3,704 | 5,322 |

| | | |
|---|---|---|
| **School of Celtic Studies**<br><br>The School of Celtic Studies is dedicated to the study of Celtic languages throughout history, both written and spoken, as well as related history of cultural, social and legal issues. Employing both academic staff as well as scholars, we publish books and other online resources, our journal Celtica, and host events such as our annual conference Tionól. | 1,166 | 1,246 |

## Department of Education and Skills (cont.)

### SOLAS

The Government's Public Service Reform Plan continued to inform the work of SOLAS as part of on-going realignment of its business processes to carry out its mandate as effectively as possible. Developments relating to the Office of Government Procurement, e-government and data protection were noteworthy in that regard.

These developments formed part of a larger reform programme across the education sector where there were developments in areas such as early childhood education, teacher education, Junior cycle reform including the introduction of a new mathematics curriculum for both the Junior and Senior cycles and the Literacy and Numeracy Strategy 2011-2020.

The SOLAS Skills and Labour Market Research Unit (SLMRU) continues to provide a data gathering, analytical and research resource to support the work of the National Skills Council.

The Department of Education and Skills (DES) has established a network of regional Skills Fora. There are nine Fora organised around the 8 Nomenclature of Territorial Units for Statistics (NUTS) 3 regions, with the Border region divided into two. SOLAS' Skills and Labour Market Research Unit (SLMRU) supported the setup of these Fora and continues to work closely with DES in relation to on-going developments in that regard.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| | €'000 | €'000 |
| The SOLAS Skills and Labour Market Research Unit assists in the development of SOLAS through providing research inputs at corporate level. Its main areas of work include; labour market and skills research evaluation/customer surveys. It also maintains a National Skills Database and provides regular reports for the Expert Group on Future Skills Needs. | | |
| The SOLAS Strategy Programme Office commissions research on national FET programmes and related subject matter as part of a DES-led detailed Plan relating to the implementation of the FET Strategy 2014-2019. | 600 | 1,061 |

## Department of Education and Skills (cont.)

### Higher Education Authority

The Higher Education Authority (HEA) which is under the aegis of the Minister for Education and Skills, is a corporate body with perpetual succession, established in May 1972 under the provisions of the Higher Education Authority Act, 1971. The HEA has the following general functions:

- furthering the development of higher education
- assisting in the co-ordination of State investment in higher education and preparing proposals for such investment
- promoting the attainment of equality of opportunity in higher education
- promoting the democratisation of the structure of higher education.

The HEA is financed by a grant-in-aid from the Department of Education and Skills out of a total vote for third level and further education. The Programme for Research in Third Level Institutions was transferred to the Department of Business, Enterprise and Innovation in 2010. Besides the Exchequer grant (via the HEA), universities, institutes of technology and other institutions receive non-Exchequer monies, i.e. non-exchequer fees, research grants and other income.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| **Universities - Recurrent (Core) Funding**<br>This refers to the annual funding provided by the State via the HEA for the purposes of funding the recurrent activities of higher education institutions (HEIs). This core grant is allocated to cover core teaching and research activities within institutions **-** the internal allocation of funds as between teaching and research are at present a matter for each institution.<br>The allocation of the core grant is determined on a formula basis. The allocation will be based on a standard per capita amount in respect of weighted EU student numbers in four broad subject price groups. Student numbers in the four groups are weighted to reflect the relative cost of the subject groups (see Appendix 1). A further weighting is given for research students and 5% is also top-sliced from the aggregate grant for all higher education institutions, exclusive of the grant in lieu of tuition fees. This top-sliced amount is allocated as follows –<br>▪ 75% in proportion to the proportion of Ph.D. and Masters research degrees awarded<br>▪ 25% in proportion to the proportion of research income per academic staff member, earned by each institution. This top-slice does not oblige HEIs to spend this amount on research – the internal allocation of the core grant is still a matter for each institution. The top-slice instead represents recognition of the research activities that take place in HEIs. | €'000<br>111,568 | €'000<br>118,617 |
| **Institutes of Technology - Recurrent (Core) Funding**<br>This refers to the annual funding provided by the State via the HEA for the purposes of funding the recurrent activities of Institutes of Technology (IoTs). This core grant is allocated to cover core teaching and research activities within institutions - the internal allocation of funds as between teaching and research are at present a matter for each | 10,913 | 10,552 |

| | | |
|---|---|---|
| institution. A new funding model has been developed for the IoTs and follows the principles of the RGAM (see Appendix 1). | | |
| **HEAnet**<br>HEAnet is Ireland's National Education and Research Network, providing high quality Internet Services to over 150,000 students and staff in Irish Universities, IoT's and other educational and research organisations. Established in 1983 by the seven universities with the support of the HEA to promote the interchange of information electronically within third level education, it now plays a critical role in establishing Ireland as a global centre of excellence in internet activity. HEAnet provides a high-speed national network with direct connectivity for its community to other networks in Ireland, Europe, the USA and the rest of the world. | €7,956 (Recurrent - €7.956m, Capital - €0m) | €10,133 (Recurrent - €8.133m, Capital - € 2m) |
| **Irish Aid Programme for Strategic Co-operation**<br>Irish Aid is the official development assistance programme of the Irish Government targeting the reduction of poverty, inequality and exclusion in developing countries.<br>The Programme of Strategic Cooperation (PSC) is administered by the Higher Education Authority (HEA) on behalf of Irish Aid. The PSC seeks to enhance the potential of higher education and research institutions to contribute to the achievement of the Millennium Development Goals (MDGs) through facilitating collaborative partnerships within and between Higher Education Institutes and research institutes in Ireland and in countries benefiting from Irish Aid support. | €0.00 | €0.00 |
| **E-Journals - the Irish Research eLibrary***<br>IReL the Irish Research eLibrary is a nationally funded electronic research library, initially conceived to support researchers in Biotechnology and Information Technology in mid-summer 2004, and following on from the success of this, expanded in 2006 to support research in the Humanities and Social Sciences.<br>IReL delivers quality peer-reviewed online research publications journals, databases and index & abstracting services, as well as ebooks - direct to the desktop of researchers wherever they are located. The benefits of IReL are available to all students and staff in the universities, RCSI and the Institutes of Technology, which is particularly important in instilling a research culture at undergraduate level.<br>** Co-funded by the Department of Business, Enterprise and Innovation (DBEI)* | €10,025 | €10,025 |
| **The Irish Centre for High-End Computing (ICHEC)***<br>The Irish Centre for High-End Computing (ICHEC), founded in 2005, is Ireland's national high performance computer centre. Its mission is to provide High-Performance Computing (HPC) resources, support, education and training for researchers in third-level institutions and through technology transfer and enablement to support Irish industries large and small to contribute to the development of the Irish economy.<br>** Co-funded on a 50% basis by the Department of Business, Enterprise and Innovation (DBEI) - these figures are also recorded on P.65.* | €2,061 | €2,322 |
| **The Programme for Research in Third Level Institutions ***<br>The Programme for Research in Third Level Institutions (PRTLI) supports building strategic institutional research capacity, enabling the establishment of research centres and facilities, and joint research programmes and national initiatives. The programme is also taking the lead in the establishment of Structured PhD Programmes as the standard mechanism for education of PhDs, producing PhDs with the skill sets to work both in the public and private | €19,639 (Recurrent – €0.105m Capital– | €1,878 (Recurrent –€0m Capital– €1.878m) |

| | | |
|---|---|---|
| sectors. The HEA manages this component of PRTLI in partnership with the Irish Research Council.<br><br>** Funded by the Department of Business, Enterprise and Innovation (DBEI) and administered by the HEA - these figures are also recorded on P.63.* | €19.534 m) | |
| **HEA General Capital Programme**<br><br>The HEA's General Capital funding is provided via the Department of Education and Skills. While the PRTLI Capital Programme provides funding for research related building, equipment and infrastructure projects, the HEA's General Capital programme provides funding for undergraduate (teaching and learning) related building, equipment and associated infrastructure projects. Currently the HEA allocates General Capital funding to the universities, other designated institutions and the Institutes of Technology. The HEA's General Capital funding enables the construction of new teaching and student services buildings, refurbishment projects, infrastructure development, property acquisition and procurement of equipment.<br><br>For the purposes of the DBEI annual information request, the expenditure recorded as General Capital relates to those projects which may be regarded as having a science related aspect to their function. | €3,821 | €2,004 |

## Department of Education and Skills (cont.)

### Irish Research Council

The Irish Research Council ('the Council') was established in March 2012. The Council was formed through the merger of the Irish Research Council for Humanities and Social Sciences (IRCHSS) and the Irish Research Council for Science, Engineering and Technology (IRCSET) and the Council. The Irish Research Council has been charged with providing a strong voice for the promotion and support of emerging researchers in Ireland across the diversity of disciplines. It plays a vital role in enhancing the provision of highly skilled human capital, and maximises the potential of inter-disciplinary research and enhance collaboration with enterprise. The Council recognises the importance of research and scholarship for all aspects of cultural, economic and societal development and aims to demonstrate how creativity, excellence, curiosity, relevance and impact can go hand in hand for Ireland's benefit by funding the best and the brightest researchers in Ireland. Through its membership of HERA (www.heranet.info), Norface (www.norface.org), the European Science Foundation (www.esf.org ) and Science Europe (www.scienceeurope.org), the Council is committed to integrating Irish research in European and international networks of expertise. IRC is also the National Delegate and the National Contact Point for the Humanities and Social Sciences Framework Programme 7 (FP7) and H2020. They are also the joint national delegates to the ERC.

The mandate of the Council is:

- To fund excellent research within, and between, all disciplines, and in doing so to enhance Ireland's international reputation as a centre for research and learning.
- To support the education and skills development of excellent individual early stage researchers and cultivate independent researchers and thinkers, whilst offering a range of opportunities which support diverse career paths.
- To enrich the pool of knowledge and expertise available for addressing Ireland's current and future challenges, whether societal, cultural or economic, and deliver for citizens through collaboration and knowledge exchange with government departments and agencies, enterprise and civic society.
- To provide policy advice on postgraduate education and on more general research matters to the HEA and other national and international bodies.

The Irish Research Council manages a suite of inter-linked research schemes, funding scholars at various career stages from postgraduate study to senior research project based awards. For early stage researchers these include the Government of Ireland Postgraduate Scholarships and Government of Ireland Postdoctoral Fellowships, which fund research at pre- and post-doctoral levels. The Government of Ireland Research Projects Grants Scheme funds world-class, innovative research undertaken on an extended or group project basis. The Council manages and monitors all awards funded under these schemes on an annual basis.

They have also established a number of programmes in partnership with employers, specifically the Enterprise Partnership Scheme, the Employment Based Postgraduate Programme and the ELEVATE Postdoctoral Programme. These programmes allow researchers to experience the realities of the workplace alongside completing their research.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| Arts, Humanities & Social Sciences (AHSS) and Science, Technology, Engineering and Maths (STEM) | €'000<br>34,150 | €'000<br>34,050 |

## Department of Health

The Department of Health was established under the Ministers and Secretaries Act (Amendment), 1946. The mission of the Department of Health is "in partnership with the providers of health care, and in co-operation with other Government departments, statutory and non-statutory bodies, to protect, promote and restore the health and well-being of people by ensuring that health and personal social services are planned, managed and delivered to achieve measurable health and social gain and provide the optimum return on resources invested".

The role of the Department of Health is to support the Minister and the democratic process by:

- Formulating policy underpinned by an evidence-based approach and providing direction on national health priorities ensuring that quality and value for money are enhanced through the implementation of an evidence-based approach underpinned by monitoring and evaluation.
- Protecting the interests of patients and consumers and supporting practitioners and professionals to practice to the highest standards by providing a prudent and appropriate regulatory framework.
- Providing effective stewardship over health resources by demanding accountability for achieving outcomes including financial, managerial and clinical accountability, and by providing the frameworks, including enhanced service planning at national level, to improve the overall governance of the health system.
- Fulfilling our obligations in relation to EU, WHO, Council of Europe and other international bodies and the continued implementation of the co-operation agenda decided by the North-South ministerial council.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| | €'000 | €'000 |
| **National Cancer Registry Board**<br>The National Cancer Registry Board was established in June 1991, under the Health (Corporate Bodies) Act, 1961.<br>Its functions are inter alia, to research and analyse information relating to the incidence and prevalence of cancer and related tumours in Ireland and to promote and facilitate the use of data collected in approved research projects and in the planning and management of services. | 5,038 | 6,986 |

## Department of Health (cont.)

### Health Research Board

The Health Research Board (HRB) is a statutory agency under the aegis of the Department of Health. As the lead agency in Ireland responsible for supporting and funding health research, information and evidence, we are motivated and inspired by our vision – Healthy people through excellent research and applied knowledge.

The HRB's Strategic Business Plan 2016-2020 clearly outlines how we hope to achieve our mission, working in partnership with other organisations. The HRB's strategy objectives are:

- Focus Area 1: Address major health challenges
- Focus Area 2: Support healthcare interventions
- Focus Area 3: Address the research needs of the Irish health and social care system
- Enabler A: Support exceptional researchers and leaders
- Enabler B: Build a strong enabling environment
- Enabler C: Enhance organisational performance

The In-house R&D Expenditure of the Health Research Board encompasses two Directorates:

- The Research Strategy and Funding Directorate
- The Health Information and Evidence Directorate

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| **Focus Area 1: Address major health challenges** | €'000 | €'000 |
| <u>Objectives</u><br>Support high-quality, investigator-led internationally competitive research<br>Develop and implement co-funding opportunities with international agencies and institutions<br><u>Expected Outcomes</u><br>Production of high-quality research that contributes to the evidence base and thinking on current and emerging global health challenges<br>Leveraged expertise and coordination through increased networking of health researchers nationally and internationally<br>Enhancement of Ireland's reputation for high-quality health research<br>Active contribution of HRB-funded research to new solutions, innovations and advances in tackling major health challenges. | 8,917 | 11,479 |
| **Focus Area 2: Support healthcare interventions** | | |

| | | |
|---|---|---|
| Objectives<br>Support the design, conduct and evaluation of intervention studies<br>Facilitate coordination, enabling mechanisms and national and international collaborations that improve the volume, quality, relevance and impact of trials and intervention studies in Ireland<br>Expected Outcomes<br>Increased capacity, skills and methodologies to test and evaluate new models of healthcare delivery<br>More intervention-focused health research in Ireland, resulting in better outcomes for individuals, and increased quality and safety in the healthcare system.<br>Availability of robust data on cost, feasibility and acceptability of proposed healthcare initiatives | 11,161 | 10,385 |
| **Focus Area 3: Address the research needs of the Irish health and social care system** | | |
| ObjectivesSupport research that addresses questions of national relevance for clinical and population health practice and for health services management, and translation of the research results into policy and/or practice.<br>Provide high-quality, timely and relevant data for policy, service planning and research through the HRB's national health information systems (NHIS)<br>Promote and support evidence synthesis and knowledge translation activities in order to help policy-makers, service planners and providers make evidence – based decisions<br>Expected Outcomes<br>Timely, relevant and high-quality research, data and information that address the needs of policy makers and decision makers in Ireland<br>Evidence to support the development of national clinical guidelines<br>Research data and evidence to support the transformation programme<br>Close liaison and cooperation between the research producers and evidence users, facilitating evidence-based decision making and robust evaluation of implementation | 12,539 | 12,516 |
| **Enabler A: Support exceptional researchers and leaders** | | |
| Objectives<br>A.1 Attract the best people into health research by supporting excellent Ph.D. training programmes<br>A.2 Provide opportunities for career development for postdoctoral researchers and emerging investigators<br>A.3 Work with higher education institutions, hospital groups and the Health Service Executive to identify, develop and support leaders in health research.<br>A.4 Work with national and international partners to facilitate training and exchange opportunities that address the skills gaps.<br>Expected Outcomes<br>Strategic and coordinated approach to the production of a highly skilled research workforce to ensure that research and evidence are integrated into policy and practice.<br>More people working in a healthcare setting are trained and active in research, resulting in better quality care and outcomes and a more attractive work environment. | 7,861 | 9,434 |
| **Enabler B: Build a strong enabling environment** | | |

| | | |
|---|---|---|
| <u>Objectives</u><br>B.1 Work with the Department of Health and key stakeholders to shape the national research agenda in relation to health and social care<br>B.2 Provide leadership to shape the review, conduct and governance of research<br>B.3 Contribute to, and benefit from, international developments in policy, regulation and legislation relevant to health research and healthcare in Ireland<br>B.4 Invest in research infrastructure to promote the excellence, critical mass and coordination, in order to support HRB strategic focus areas and the wider health community<br>B.5 Support Irish health researchers to participate in Horizon 2020 and other European research programmes<br><u>Expected Outcomes</u><br>Quality and excellence, critical mass, and coordination within the health family and for health within the wider R&D ecosystem, both in Ireland and at a European level.<br>Improved collaboration with other agencies and departments ensuring that the value of the health research is recognised<br>Clinical research infrastructure embedded in the health system<br>A culture that recognises patients and the public as partners of the health research process<br>Research and data are included in all new national health relevant strategies | 3,259 | 4,381 |

## Department of Housing, Planning and Local Government

The mission of the Department of Housing, Planning & Local Government is to pursue sustainable development. In pursuing this mission their goals are to:

- contribute to national recovery through the timely delivery of our policies and programmes especially in support of job creation;
- contribute to public service reform;
- ensure good quality housing in sustainable communities;
- protect and improve water resources and the quality of drinking water;
- achieve a high-quality environment with effective environmental protection;
- support and enable democratic and responsive local government;
- promote and support the development of communities and the community and voluntary sector;
- ensure that planning and building in our regions and communities contributes to sustainable and balanced development; and
- monitor, analyse and predict Ireland's weather and climate.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| **Local Government Management Agency**<br>Research & Development in LGMA related to developing ICT systems underpinning the work of the LGMA and local authorities<br>Including:<br>Open Source<br>e-Returns Application<br>Building Control Management System | €'000<br><br>150 | €'000<br><br>200 |
| **Economics Research conducted by Strategic and Business Support Unit** | 91 | 91 |
| **Housing Agency** | 420 | 420 |
| **Esri Ireland: To deliver the capability of making applications and submissions online to Local Authorities** | 140 | 210 |
| **Housing Economics Research Collaboration Programme between the Department of Housing, Planning and Local Government and the Economic and Social Research Institute** | 200 | 200 |

| | | |
|---|---|---|
| **Innovation Fund** | 3 | 320 |
| **Other Research Projects** | 498 | 882 |

## Department of Housing, Planning and Local Government (cont.)

### Met Éireann

Met Éireann, Ireland's National Meteorological Service, is the leading provider of weather information and related services in the State. Its mission is to monitor, analyse and predict Ireland's weather and climate and to provide a range of high quality meteorological and related information to the public and to specific customers in, for example, the aviation and agricultural sectors. As a scientific and technical organisation, it strives to utilise the latest technological and scientific advances in order to improve the efficiency, effectiveness and accuracy of its forecasts.

Met Éireann will further enhance its research role through increased participation in national and international research programmes in collaboration with other national meteorological services, agencies and academia and by greater engagement in funding opportunities such as Horizon 2020.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| Research is carried out in various fields of meteorology and climatology.<br><br>The primary thrust of the research effort is towards the development of computer models for weather analysis and prediction and participation in an international research collaboration called HIRLAM (High Resolution Limited Area Modelling), together with Norway, Sweden, Finland, Denmark, Spain, the Netherlands and Iceland.<br><br>Met Éireann continued to contribute to the work in the area of Climate Services by conducting climate reanalysis and contributing to ERACS and AEC-Earth Projects.<br><br>Work is continuing in the areas of climate data rescue, homogenisation methods of climate series and climate data analysis.<br><br>Atmospheric dispersion modelling is underway to provide an emergency capability for forecasting the transport of noxious materials released into the atmosphere. This research work provides support for the EPA and the Department of the Agriculture, Food and the Marine.<br><br>Development work is also ongoing in the area of NWP post-processing and also in the area of Forecaster Workstation and Automatic Weather Observations. | €'000<br><br>695 | €'000<br><br>609 |

## Department of Public Expenditure and Reform

### Economic and Social Research Institute (ESRI)

The Economic Research Institute was established in 1960 by a group of senior academics and public servants, led by the late Dr T.K. Whitaker. He identified the need for independent research to support economic policymaking in Ireland, and persuaded the Ford Foundation to provide seed funding for its establishment. The statistician, Dr R.C. Geary was appointed as its first Director.

Since its establishment, the Institute has endeavoured to bring together the complementary expertise of its researchers to investigate the great social and economic challenges facing Irish society, and through its evidence has been a key contributor in the political and cultural dialogue around every major policy debate since its foundation.

The Institute's importance in providing authoritative, independent research to inform public policy is widely recognised. This public good role is supported by an annual grant-in-aid from the Department of Public Expenditure and Reform; the grant has accounted for an average of 30 percent of the Institute's income over the lifetime of the last Research Strategy.

Most of the rest of the funds needed to sustain the research of the ESRI comes from research programmes in partnership with government agencies and departments, commissioned research projects mostly by public bodies and competitive research programmes (e.g. EU Framework programmes, IRC, HRB, SFI). Membership subscriptions also contribute to the Institute's income.

The ESRI is a company limited by guarantee, answerable to its Members and governed by a Council made up of interested individuals drawn from the academic, public and private sectors. The Institute's constitution stresses its independence, and the practice is to publish all research that reaches an appropriate academic standard.

The ESRI is audited by the Comptroller & Auditor General and is subject to the rules that apply to state organisations in relation to prompt payments, disclosure, risk management and tax clearance.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| | €'000 | €'000 |
| **RESEARCH & DEVELOPMENT** | | |
| During 2017 and 2018 the Institute undertook research projects in macroeconomics; internationalisation and competitiveness; energy and environment; communications and transport; labour markets and skills; migration, integration and demography; education; taxation, welfare and pensions; social inclusion and equality; health and quality of life; children and young people and behavioural economics. | 7,957 | 8,286 |

## Department of the Taoiseach

### The National Economic and Social Council

The National Economic and Social Council (NESC) was established in 1973 and advises the Taoiseach (Prime Minister) on strategic policy issues relating to sustainable economic, social and environmental development in Ireland. NESC is financed by a grant from the Department of the Taoiseach. The Department of Communications, Climate Action and the Environment provides NESC with funding (Environment Fund) to integrate a sustainable development perspective into its work.

The members of the Council are appointed by the Taoiseach for a three-year term and represent business and employers' organisations, trade unions, agricultural and farming organisations, community and voluntary organisations, and environmental organisations; and include heads of Government departments and independent experts.

The composition of the NESC Council means that it plays an important and unique role in bringing different perspectives from civil society together with Government. This helps NESC to analyse the challenges facing Irish society and to develop a shared understanding among its members of how to tackle these challenges.

NESC employs a total of 17 staff. Its research encompasses a wide range of topics in the areas of economic, social and environmental policy with recent research including social developments, housing, the circular economy, climate change and environmental sustainability.

For more information check www.nesc.ie.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| During 2017, NESC published one report, and two research papers:<br>▪ Moving towards the Circular Economy;<br>▪ Valuing Nature; Perspectives and Issues; and<br>▪ Nature's Values: From Intrinsic to Instrumental.<br>They also published a secretariat paper on infrastructure policy in the UK.<br>Work accounted for in 2018 Work Programme budget includes:<br>▪ Moving from Welfare to Work, and the Quality of Support Services<br>▪ Land Use, Land Value and Urban Development<br>▪ Climate Change: Governance for Low Carbon Transition | €'000<br>908 | €'000<br>934 |

## Department of Transport, Tourism and Sport

### Transport Infrastructure Ireland – TII

To support the activities of Transport Infrastructure Ireland (TII) required to manage road and rail infrastructure, TII organises a research programme covering all technical areas of interest to TII. The aim of the programme is to promote practical measures that will contribute to reducing costs, enhancing quality and encouraging innovation with regard to TII's functions. The research commissioned by TII provides the information needed in the development of the standards and technical documentation that is required to provide a safe and efficient transport network.

The TII Research Strategy provides the framework for the procurement of both short-term 'commercial' research in response to our business needs and for longer-term fundamental research projects through universities and research institutes. This longer-term research is vital as road infrastructure is a valuable asset with a very long service life. Effective management requires looking well ahead at potential advancements in order to anticipate and exploit technological developments in good time so that they can be implemented through our standards and specifications.

The TII Research Strategy covers the general areas of expertise of the organisation including planning, construction, maintenance and operations and focusses on achieving an appropriate balance between economy, safety, durability and sustainability. The Strategy is structured around the following broad policy themes:

- Materials;
- Standards and specifications;
- Environment and sustainable construction;
- Safety;
- Value for money;
- Transportation and land use;
- Heritage.

The research programme is developed on an annual basis in response to current research needs as identified by individual staff members and other stakeholders. The programme is closely aligned to TII's overall strategic goals in relation to safety, accessibility and sustainability. The annual research programme reflects changes in priorities and new areas of interest as the function of TII evolves. A key element of each research project is the development of an implementation plan to ensure that the research results are disseminated and implemented in a practical and timely way. Once identified, the individual research projects are generally procured using a competitive tendering process to ensure value for money. The research outputs are used:

- To provide and/or improve standards, specifications and procedures;
- To identify and encourage innovation; and
- To assist in the professional development of staff.

Full details of the TII Research programme are provided on the TII website at http://www.tii.ie/technical-services/research/.

### CEDR Transnational Research Programme

TII is a member of the Conference of European Directors of Roads (CEDR), an organisation which brings together the road directors of 27 European countries. The aim of CEDR is to contribute to future developments of road engineering as part of an integrated transport system under the social, economical and environmental aspects of sustainability and to promote co-operation between the national road administrations. The website www.cedr.eu contains a full description of the structure and activities of CEDR.

One of the aims of CEDR is to encourage innovation in the management of a sustainable European transport system and has established a Working Group (WG) Innovation to monitor European research activities and advise the CEDR Board on issues relating to research. WG Innovation responsibilities include the organisation of collaborative research programmes, dissemination of research results and influencing EU Research Programmes to support CEDR members in current and future situations. TII has been actively involved in developing the procedures used for the CEDR collaborative programmes and has participated in all the annual calls organised since its inception in 2008. TII also managed the CEDR Calls in 2012, 2013 and 2015.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| | €'000 | €'000 |
| TII Research Programme | 363 | 650 |
| CEDR Transnational Road Research Programme | 620 | 150 |

## Offices

### Central Bank & Financial Services Authority of Ireland

The Central Bank Reform Act, 2010, created a new single unitary body – the Central Bank of Ireland - responsible for both central banking and financial regulation. The new structure replaces the previous related entities, the Central Bank and the Financial Services Authority of Ireland and the Financial Regulator.

The high-level goals of the Central Bank of Ireland are to:

- Contribute to Eurosystem effectiveness and price stability
- Contribute to financial stability
- Ensure proper and effective regulation of financial institutions and markets
- Ensure that the best interests of consumers of financial services are protected
- Provide independent economic advice and high quality financial statistics
- Ensure efficient financial services infrastructure to the economy: payment and currency
- Maximise operational efficiency and cost effectiveness

The Bank continued to monitor, analyse and project short-term developments in the Irish and Euro-area economies during 2016-17. It also conducted research into longer-term structural issues.

The Bank co-operated with other Eurosystem national central banks and the ECB in these areas through its participation in ESCB committees and working groups. This work assisted the governor of the bank and other members of the ECB governing council in formulating policy.

The Bank also assessed macroeconomic conditions and considered policy issues in a domestic context, with a view to supporting policies aimed at maintaining low inflation and sustaining long-term growth in the Irish economy.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| | €'000 | €'000 |
| Main areas of economic research include: economic intelligence and forecasting, inflation and competitiveness, monetary issues, econometric modelling, public finances, structural issues, housing market, productivity and growth. | 1,226 | 1,226 |

## Office of Public Works (OPW)

The main focal points of OPW activity are Flood Risk Management and Estate Portfolio Management comprising Property Services and Heritage Services. In addition, a number of services are provided by the Office as shared/agency services on a repayment basis to central Government Departments and Offices.

OPW employs specialist and professional staff in all aspects of architecture, engineering, valuation, quantity surveying and related disciplines. In-house resources are supplemented as required by the contracting of services from private sector companies.

Over 90% of construction, maintenance and conservation work is contracted from the private sector.

In the course of their work, OPW's professional staff in the Estate Portfolio Management area carry out research and development of new building methodologies including the area of sustainability practice and specialist conservation and restoration techniques. As part of the Flood Risk Management programme, professional staff invest time and resources in environmental hydraulic and hydrological research and development.

| Research and Development Programmes | 2017 Outturn | 2018 Budget |
|---|---|---|
| | €'000 | €'000 |
| Environmental Studies including:<br>▪ river habitat & species surveys and mapping system<br>▪ managing ecological impacts of river works<br>▪ suspended sediment in river research<br>▪ European protected site research | 265 | 250 |
| Other research projects include:<br>1. research programme on suitable mortars for historic portland stone buildings<br>2. historic building study – Episcopal Palace of St Sepulchres | | |

# Research & Development Funding and Performance in the State Sector 2018

This Survey provides details of the allocations and outturns by government on research and development activities. This data is required under Commission Regulation (EC) No 995/2012 implementing Decision No 1608/2003/EC of the European Parliament and of the Council concerning the development of statistics on science and technology.

Commission Implementing Regulation (EU) No 995/2012 of 26th October 2012

**This is a request for details of the expenditure ALLOCATION in 2018 on research and development in your organisation**

**Please return by: Friday 19th May 2018**

## Research and Development

Research and experimental development (R&D) comprises of creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications. (Frascati Manual, OECD 2002)

Frascati Manual - OECD 2002 [Standard Practice for Surveys on Research and Experimental Development]

## In-House Research & Development Expenditure ALLOCATION in 2018

**Agency Name:**

**Section 1: Research and Development - IN-HOUSE (performed within your organisation) Expenditure (€'000)** [If no R&D is performed In-House please go to Section 4]

| | In-House R&D programme name | Detailed current expenditure (€'000) | Detailed capital expenditure (€'000) | Total Expenditure (€'000) | Region: Estimate by NUTS 2 S.& E. | Region: Estimate by NUTS 2 B.M.W | Type of in-house Research Activity % (see detailed note below): Basic | Applied | Experimental Development | Irish Sources of Funding (as recorded under Total Expenditure in column E): Irish Government (€'000) Current | Irish Government (€'000) Capital | Irish Enterprises (€'000) Current | Irish Enterprises (€'000) Capital | Higher Education (€'000) Current | Higher Education (€'000) Capital | Private non-profit (€'000) Current | Private non-profit (€'000) Capital | Foreign Sources of Funding (as recorded under Total Expenditure in column E): European Commission (€'000) Current | European Commission (€'000) Capital | Foreign Enterprises (€'000) Current | Foreign Enterprises (€'000) Capital | International Organisations (€'000) Current | International Organisations (€'000) Capital | Other Sources (€'000) Current | Other Sources (€'000) Capital |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 0 | % | % | % | % | % | | | | | | | | | | | | | | | | |
| 2 | | | | 0 | % | % | % | % | % | | | | | | | | | | | | | | | | |
| 3 | | | | 0 | % | % | % | % | % | | | | | | | | | | | | | | | | |
| 4 | | | | 0 | % | % | % | % | % | | | | | | | | | | | | | | | | |
| 5 | | | | 0 | % | % | % | % | % | | | | | | | | | | | | | | | | |
| 6 | | | | 0 | % | % | % | % | % | | | | | | | | | | | | | | | | |
| | Total | 0 | 0 | 0 | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Definition:** Types of in-house Research Activity

**Basic :** Experimental or theoretical work undertaken primarily to acquire new knowledge, without any particular application or use in view.

**Applied :** Original investigation undertaken in order to acquire new knowledge, primarily directed towards a specific practical aim or objective.

**Experimental Development :** Systematic work, drawing on existing knowledge gained from research and practical experience, that is directed to producing new materials, products and devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

## In-House Research & Development Personnel in 2018

**Agency Name:**

**Section 2: In-House Personnel engaged in Research & Development Within your Organisation - by occupation** (Headcount and % Research Time )

Please note that this section refers only to personnel involved in R&D performed within your organisation as recorded in Section 1.

| | R&D Programme Name (Please record the staff working by Programme as recorded in Section 1) | Researchers | | | | Technicians | | | | Other R&D Personnel | | | | Total R&D Personnel | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Male | | Female | | Male | | Female | | Male | | Female | | Male | Female |
| | | Headcount | Time Use (%) | Headcount | Time Use (%) | Headcount | Time Use (%) | Headcount | Time Use (%) | Headcount | Time Use (%) | Headcount | Time Use (%) | Headcount | Headcount |
| 1 | | | | | | | | | | | | | | 0 | 0 |
| 2 | | | | | | | | | | | | | | 0 | 0 |
| 3 | | | | | | | | | | | | | | 0 | 0 |
| 4 | | | | | | | | | | | | | | 0 | 0 |
| 5 | | | | | | | | | | | | | | 0 | 0 |
| 6 | | | | | | | | | | | | | | 0 | 0 |
| | Total | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 |

**Section 3: In-House Personnel engaged in Research & Development Within your Organisation by qualification** (Headcount & % Research Time )

| | R&D Programme Name (Please record the staff working by Programme as recorded in Section 1) | PhD holders ISCED 2011 - level 8 | | | | Other University Degrees/ 3rd level diplomas ISCED 2011 - levels 7,6,5 | | | | Other Qualifications ISCED 2011 - levels 4,3,2,1 | | | | Total R&D Personnel | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Male | | Female | | Male | | Female | | Male | | Female | | Male | Female |
| | | Headcount | Time Use (%) | Headcount | Time Use (%) | Headcount | Time Use (%) | Headcount | Time Use (%) | Headcount | Time Use (%) | Headcount | Time Use (%) | Headcount | Headcount |
| 1 | | | | | | | | | | | | | | 0 | 0 |
| 2 | | | | | | | | | | | | | | 0 | 0 |
| 3 | | | | | | | | | | | | | | 0 | 0 |
| 4 | | | | | | | | | | | | | | 0 | 0 |
| 5 | | | | | | | | | | | | | | 0 | 0 |
| 6 | | | | | | | | | | | | | | 0 | 0 |
| | Total | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 |

| Definition: Time Use (%) | |
|---|---|
| The following activities are deemed as **"research activities"** for the purpose of this survey | The following activities are **not** deemed as **"research activities"** for the purpose of this |
| include | omit |
| Personal research or team research | Teaching |
| Writing research proposals or research reports | General administration |
| Supervision of PhD students | Supervision of non-PhD students |
| Other research based activities including administration and planning | Other non-research based activities or external activities |

## External Research & Development Expenditure ALLOCATION in 2018

**Agency Name:**

**Section 4: Research and Development - Funded by your organisation but Performed Elsewhere (not in-house) (€'000)**

| | R&D programme name<br>(see note below on Transnationally Co-ordinated Research) | Name of organisation where this R&D is performed | Detailed current expenditure (€'000) | Detailed capital expenditure (€'000) | Total Expenditure (€'000) |
|---|---|---|---|---|---|
| 1 | | | | | 0 |
| 2 | | | | | 0 |
| 3 | | | | | 0 |
| 4 | | | | | 0 |
| 5 | | | | | 0 |
| 6 | | | | | 0 |
| 7 | | | | | 0 |
| 8 | | | | | 0 |
| 9 | | | | | 0 |
| 10 | | | | | 0 |
| | | | 0 | 0 | 0 |

**Transnationally Co-ordinated Research**

Also include on this list all funding to 'transnationally coordinated research projects' - these fall into three categories:

1. Inter-governmental or European Commission bodies that carry out R&D activity with own dedicated research facilities i.e. CERN, ILL, EMBL, JRC, ESO, ESRF.
2. Europe-wide transnational public R&D programmes e.g. European Space Agency, Eureka, EMBC etc.
3. Bilateral or multilateral public R&D programmes established between Member State governments e.g. HIRLAM

**An Roinn Gnó, Fiontar agus Nuálaíochta**
Department of Business, Enterprise and Innovation

**23 Sráid Chill Dara, Baile Átha Cliath 2, D02 TD30**
23 Kildare Street, Dublin 2, D02 TD30
T +353 (0)1 631 21 21 / 1890 220 222
info@dbei.gov.ie
www.gov.ie

October 2018