

# Northern Ireland Research & Development Statistics 2013

30 December 2014

# Contents

	<b>Page</b>
Section 1: Context	3
Section 2: Main messages	5
Section 3: Total R&D Expenditure	6
Section 4: Business Expenditure on Research and Development (BERD)	9
4.1 Comparisons over time	9
4.2 Key Findings	9
4.3 Business Expenditure on Research and Development in 2013	14
4.4 Sectoral Breakdown	16
4.5 Non Capital Expenditure	19
4.6 Sources of Funds	21
4.7 Ownership Analysis	22
4.8 Employment on R&D	24
4.9 Tax Credits	25
4.10 Joint Projects	25
4.11 Information from other sources	26
Section 5: NI Higher Education and Government Expenditure on R&D	28
5.1 NI Higher Education Research & Development Expenditure	28
5.2 NI Government Research & Development Expenditure	29
Section 6: Background notes	30
6.1 Business Expenditure Research and Development Survey	30
6.2 Higher Education Research and Development Survey	36
6.2 Government Research and Development Survey	36
Section 7: Annex	37

## National Statistics

The United Kingdom Statistics Authority has designated these statistics as National statistics, in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the Code of Practice for Official Statistics. Designation can be broadly interpreted to mean that the statistics:

- meet identified user needs;
- are well explained and readily accessible;
- are produced according to sound methods, and
- are managed impartially and objectively in the public interest.

Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed.

<http://www.statisticsauthority.gov.uk/assessment/assessment/assessment-reports/confirmation-of-designation-letters/letter-of-confirmation-as-national-statistics---assessment-report-227--2-.pdf>

## Northern Ireland Statistics and Research Agency

From 1st April 2011, responsibility for the production of official statistics on the economy and labour market became the responsibility of Department of Finance and Personnel (DFP). Those powers previously exercised by the Department of Enterprise, Trade and Investment (DETI) under the Statistics of Trade and Employment (Northern Ireland) Order 1988 are now exercised by DFP from this date, as a result of the Departments (Transfer of Functions) (No.2) Order (Northern Ireland) 2011. While DFP exercise the powers of the 1988 Order, in practice the operational responsibility for statistics production will reside with the Northern Ireland Statistics and Research Agency (NISRA), an Agency of DFP.

# 1: Context

## Introduction

This bulletin provides information on the level of Research & Development (R&D) activity in Northern Ireland. R&D activity contributes to the development of new technologies, products and processes and is a key driver of productivity growth. The Northern Ireland R&D surveys cover the business sector, higher education and other government financed activities.

It includes information on: the level of R&D; sources of funding for R&D and employment in R&D. Data is presented in cash terms, while real terms estimates have been adjusted for changes in the general price level between years using the GDP deflator. This allows changes in the volume of R&D expenditure to be examined over time.

It provides important indicators of the extent to which Northern Ireland companies and higher education establishments are investing in the activities that underlie future economic development.

A primary use of the business R&D data (BERD) in this statistical bulletin is its provision to ONS for inclusion in the UK published results. This in turn is a key component in measuring the UK's gross domestic expenditure on R&D.

## Coverage and Results

The performance and funding of most Research & Development (R&D) activity occurs in three main economic sectors: - the Business sector, Higher Education Institutions and Government.

The Northern Ireland Statistics and Research Agency (NISRA) carries out annual surveys of R&D expenditure in the Business sector and Higher Education Institutions in Northern Ireland (see Section 6 of this Statistics Bulletin for information on Higher Education R&D). Information on Government R&D comes from an annual survey conducted by the Office for National Statistics (ONS), which is addressed to all Government Departments, including those in NI<sup>1</sup>.

All companies believed to be performing R&D were included in the survey - in effect, therefore, a census of known R&D performers was carried out. Further information about identifying such companies is contained in the background notes section. A total of 1,262 returns were received by the Department – some 92% of those identified.

Where companies failed to respond, their level of R&D spend was estimated from Invest NI administrative records, other business surveys and historical records as appropriate. Overall, estimates accounted for 7.1% of the value of total Business Expenditure on R&D (BERD) for 2013. For further information see Section 7 - Background Notes.

All results contained in this bulletin are provisional and may be subject to revision to take account of any additional information received subsequent to publication.

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<sup>1</sup> The latest details are available on the Office for National Statistics website at <http://www.ons.gov.uk/ons/rel/rdit1/science--engineering-and-technology-statistics/2012/stb-set-2012.html>

## Research and Development

The definition of R&D adopted for the purposes of the NI inquiry is the same as that used by ONS for the equivalent GB survey and comes from the Frascati manual:

"The guiding line to distinguish between research and technological development activity (R&D) from non-research activity is the presence or absence of an appreciable element of novelty or innovation. If the activity departs from routine and breaks new ground it should be included; if it follows an established pattern it should be excluded".

The Frascati Manual was originally written by, and for, the experts in OECD member countries that collect and issue national data on R&D. The definitions provided in this manual are internationally accepted and now serve as a common language for designing, collecting and using R&D data.

The NI questionnaire follows the same structure and includes the same questions as the GB questionnaire, although there were some modifications to tailor the questions asked for use in NI e.g. identification of Invest NI companies.

## 2: Main messages

- Total expenditure on R&D in Northern Ireland in cash terms was £645.1 million in 2013, of which £481.8m (75%) was spent by Businesses, £147.0m (23%) by the Higher Education sector and the remainder (£16.3m or 3%) was Government expenditure. There was an increase of £21.0m (3%) in cash terms in Northern Ireland total R&D expenditure between 2012 and 2013, driven by the Business sector.
- Total business R&D expenditure in 2013 was £481.8m, up £20.5m (4%) in cash terms on the previous year. Between 2008 and 2013, overall Business R&D expenditure has risen by 162% in cash terms (from £183.9m).
- The percentage increase in Northern Ireland (in-house) business R&D expenditure (5.5%) between 2012 and 2013 was the ninth highest of the 12 UK regions. Of the 12 UK regions, eleven showed an increase in cash terms over the period.
- Government R&D expenditure rose in cash terms by £0.8m (5%) while Higher Education expenditure decreased by £0.3m (-0.2%) over the year.
- The ten biggest spending companies accounted for 60% of the total R&D spend in Northern Ireland in 2013, lower than in 2012 (63%).
- Externally owned companies accounted for 75% of Business R&D expenditure compared to 25% by locally owned companies. R&D spend by locally owned companies reported an annual increase of 16%.
- Expenditure by Small and Medium Enterprises (SME), that is, businesses with less than 250 employees, increased by £1m (0.6%) from 2012 to 2013, in cash terms. Since 2008 such expenditure has increased by 64% to £173.8m.

**Table 1: Total Expenditure on R&D in cash terms (£million)**

	2011	2012	2013
<b>Total expenditure on R&amp;D (of which)</b>	567.5	624.1	645.1
<b>Expenditure by Businesses</b>	388.8	461.3	481.8
<b>Expenditure by Higher Education<sup>2</sup></b>	164.3	147.3	147.0
<b>Other expenditure by Government</b>	14.4	15.5	16.3

<sup>2</sup> To avoid double counting, this figure excludes £1.3m in 2013, £1.6m in 2012, £1.3m in 2011 of expenditure on R&D by businesses that was undertaken by universities or higher education establishment

### 3: Total R&D Expenditure

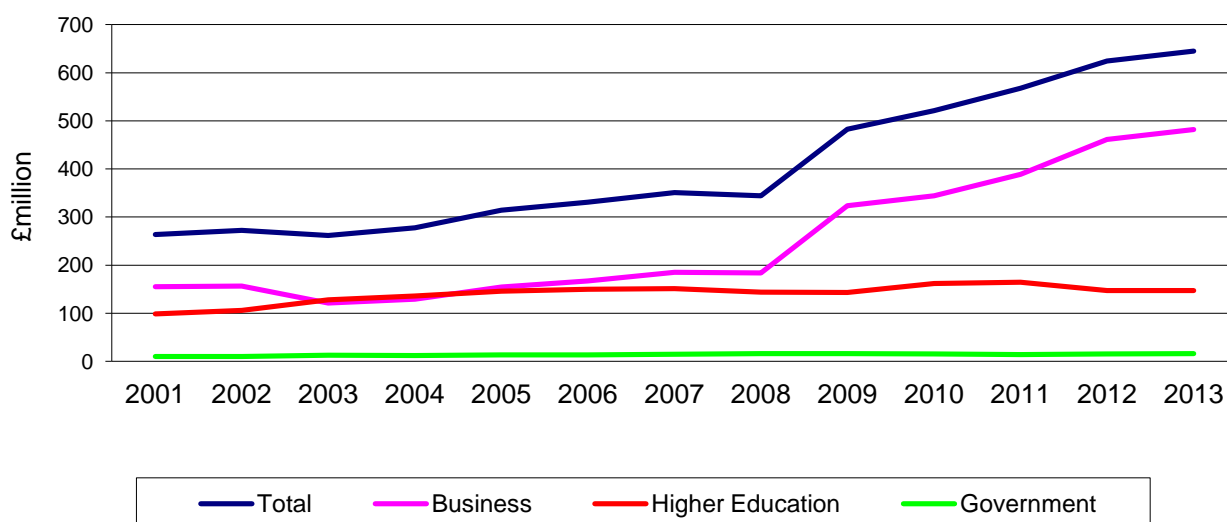
#### Total Expenditure on R&D in Cash Terms

Total expenditure on R&D in Northern Ireland (NI) in cash terms was £645.1 million (m) in 2013, of which £481.8m (75%) was spent by businesses, £147.0m (23%) by the Higher Education sector and the remainder, £16.3m (3%) was Government expenditure.

There was an increase of £21.0m (3.4%) in cash terms in NI total R&D expenditure between 2012 and 2013 to £645.1m. This increase was comprised of rises in Business R&D expenditure of £20.5m (4.4%) and in Government expenditure of £0.8m (5.2%) and a decrease in Higher Education expenditure of £0.3m (-0.2%). Over the last five years total R&D spending in cash terms in NI has risen by 88% and by 145% since 2001.

#### Historical Expenditure (Cash terms)

Figure 1: Expenditure on R&D in Cash Terms 2001-2013 (£million)



**Table 2: Total Expenditure on R&D in Cash Terms 2001-2013 (£million)**

	<b>Business</b>	<b>Higher Education</b>	<b>Government</b>	<b>Total</b>
<b>2001</b>	155.0	98.8	10.0	263.8
<b>2002</b>	156.6	105.8	10.1	272.5
<b>2003</b>	121.3	127.8	12.7	261.8
<b>2004</b>	129.0	136.1	12.3	277.4
<b>2005</b>	154.3	146.2	13.6	314.1
<b>2006</b>	167.0	150.1	13.7	330.8
<b>2007</b>	185.1	151.3	14.7	351.1
<b>2008</b>	183.9	144.2	15.9	344.0
<b>2009</b>	323.7	143.0	16.1	482.8
<b>2010</b>	344.0	161.8	15.6	521.4
<b>2011</b>	388.8	164.3	14.4	567.5
<b>2012</b>	461.3	147.3	15.5	624.1
<b>2013</b>	481.8	147.0	16.3	645.1

### **Total Expenditure on R&D in Real Terms**

In real terms, total expenditure increased by £10.2m or 1.6% from £634.9m in 2012 to £645.1m in 2013.

In 2013 the NI business sector again accounted for a greater share of total R&D expenditure (75%) than the Higher Education sector (23%). In 2012 the figures were 74% and 24% respectively.

Over the last five years (2008-2013) total R&D spending in real terms in NI has risen by 69% and by 82% since 2001.

Over the year to 2013 there was an increase in expenditure by businesses and Government while a decrease occurred in Higher Education expenditure. In real terms, expenditure by businesses increased by £12.5m (2.7%), Higher Education decreased by £2.9m (-1.9%) and Government expenditure increased by £0.5m (3.4%) in real terms over the year.

Business R&D expenditure rose by 136% between 2008 and 2013 in real terms and by 132% between 2001 and 2013.

## Historical Expenditure (Real terms)

Figure 2: Expenditure on R&D in Real Terms 2001-2013 (£million)<sup>3</sup>

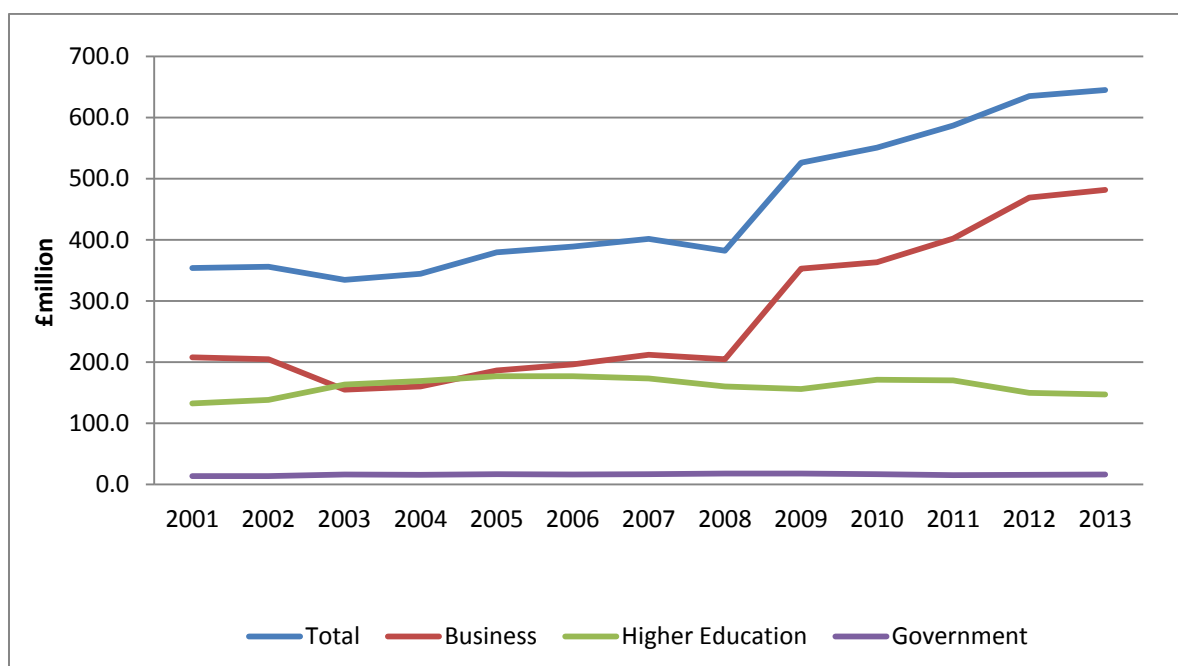


Table 3: Total Expenditure on R&D in Real Terms 2001-2013 (£million)

	Business	Higher Education	Government	Total
2001	207.8	132.4	13.4	353.6
2002	204.5	138.2	13.2	355.8
2003	155.0	163.3	16.2	334.6
2004	160.2	169.0	15.3	344.5
2005	186.4	176.6	16.4	379.5
2006	196.4	176.6	16.1	389.1
2007	211.7	173.0	16.8	401.5
2008	204.4	160.3	17.7	382.3
2009	352.7	155.8	17.5	526.1
2010	363.3	170.9	16.5	550.7
2011	402.1	169.9	14.9	586.9
2012	469.3	149.9	15.8	634.9
2013	481.8	147.0	16.3	645.1

<sup>3</sup> GDP deflator used to convert cash terms to real terms: e.g. 2007 (87.4), 2008 (90.0), 2009 (91.8), 2010 (94.7), 2011 (96.7), 2012 (98.3), 2013=100



# 4: Business Expenditure on Research and Development (BERD)

Detailed analysis of company spend in the rest of this publication is undertaken in cash terms, except where otherwise stated.

## 4.1: BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT COMPARISONS OVER TIME

Prior to 2001, the Research and Development Survey was conducted every three years (in 1993, 1996 and 1999). Since 2001, DETI (and now NISRA) have undertaken to survey companies annually. Table 4 below makes comparisons with earlier surveys. To allow comparability of current with previous results, all figures relate to Total Business Expenditure - i.e. total expenditure by business on R&D (including grants given by government). Higher Education spending and other direct expenditure by Government are excluded.

Between 2008 and 2013 total business expenditure on R&D increased by 136% in real terms, with in-house R&D increasing by 134% and purchased R&D expenditure increasing by 162%. The share of business expenditure from own funds as a proportion of all funding decreased by 1% over the year, other sources of funding decreased by 21% and Government funding increased by 23%.

## 4.2: Key Findings

The ten biggest R&D spenders in 2013 accounted for 60% of total expenditure which is lower than the proportion in 2012 (63%).

The proportion of total expenditure by the top ten companies for each R&D survey for the preceding five years is as follows – 63% in 2012, 62% in 2011, 59% in 2010, 57% in 2009, and 41% in 2008.

In 2013, 54 companies spent more than £1 million on R&D, three more companies than in 2012, four more than in 2011, ten more than in 2010, and seven more than the number in 2009. Average in-house R&D expenditure was £93,000 per R&D employee in 2013, 1% higher than the figure of £92,000 per R&D employee in 2012, (employees are on a Full-Time Equivalent basis).

In 2013, 4,750 employees (on a Full-time Equivalent (FTE) basis) were engaged in R&D work – 9% of all employees of companies involved in R&D. Comparable figures for 2012 were 4,570 employees or 6.8% of all employees of R&D companies (2011: 7.7% 2010:8.2%, 2009: 5.8%, 2008: 5).

**Table 4: Business Expenditure on R&D 2008 – 2013<sup>4</sup>**

	Cash Terms						Real Terms (2013 Prices) <sup>5</sup>						% Change Real Terms	
	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013	12-13	08-13
Total Business Expenditure (£m)	183.9	323.7	344.0	388.8	461.3	481.1	204.4	352.7	363.3	402.1	469.3	481.1	3%	136%
In-house R&D (£m)	170.6	297.2	324.2	354.1	419.9	443.2	189.6	323.9	342.4	366.2	427.2	443.2	3.7%	134%
Non capital (£m)	152.2	235.0	230.0	321.2	377.5	382.6	169.1	256.1	242.9	332.2	384.1	382.6	-0.4%	126%
Capital (£m)	18.4	62.2	94.2	32.8	42.4	60.6	20.4	67.8	99.5	33.9	43.1	60.6	40.5%	196%
Purchased R&D (£m)	13.3	26.5	19.8	34.7	41.4	38.7	14.8	28.9	20.9	35.9	42.1	38.7	-8.1%	162%

<sup>4</sup> A more detailed Breakdown of Business expenditure, including funding, ownership, research, size and sector can be found in Annex table 1

<sup>5</sup> GDP deflator used to convert cash terms to real terms: 2008 (90.0), 2009 (91.8), 2010 (94.7), 2011 (96.7), 2012 (98.3), 2013=100

## Business R&D: In-house Expenditure

NI business R&D expenditure carried out within a company in NI (in-house), accounted for 92% (£443.2m) of total business expenditure in 2013. In-house expenditure increased by 5.5% between 2012 and 2013.

## In-house Business R&D: UK and Regional Comparisons

In-house expenditure is perhaps the most important component of total R&D as it shows the amount spent on R&D by firms in NI that was undertaken within NI (purchased R&D expenditure by companies in NI may be carried out in other parts of the UK or abroad). Spending carried out within a company in NI (in-house), accounted for 92% (£443m) of total business expenditure in 2013.

Of the 12 UK regions, eleven showed an increase in in-house business R&D expenditure in cash terms over the year to 2013, including NI which increased by 5.5%. This was the ninth highest percentage increase across the UK regions. In the UK as a whole such expenditure increased by 7.6%. Changes varied from an increase of 37.2% in Wales to a decrease of 9.9% in London.

Over the two year period 2011 to 2013, in-house business R&D expenditure in cash terms in NI increased by 26%. In the UK as a whole such expenditure rose by 6%.

It is worth noting that a number of NI companies are part of national and international companies. Many concentrate their R&D at particular sites, not necessarily in NI, although all of their plants, including those in NI, will share in the benefits of research. Variations may occur in NI R&D data from year to year due to the influence of one or two large-scale projects.

**Table 5: In-house Expenditure by UK Government Office Region (Cash Terms)**

	Expenditure (£million)		%Change (2012-2013)
	2013	2012	
UK	18,448	17,144	7.6%
England	16,838	15,746	6.9%
North East	309	282	9.6%
North West	1,784	1,775	0.5%
Yorkshire & The Humber	644	600	7.3%
East Midlands	1,369	1,242	10.2%
West Midlands	1,697	1,462	16.1%
South West	1,452	1,372	5.8%
East of England	4,071	3,443	18.2%
London	1,317	1,461	-9.9%
South East	4,195	4,108	2.1%
Wales	369	269	37.2%
Scotland	798	709	12.6%
Northern Ireland	443	420	5.5%

Note: Data for UK and GB regions are from the Office for National Statistics and Department of Finance and Personnel

## R&D Investment Rate

Regional Gross Value Added (GVA) for 2013 released by the Office for National Statistics (ONS) on the 10th December 2014 shows that Northern Ireland 2013 in-house R&D as a proportion of GVA was 1.3% and was the fifth highest of the twelve UK regions (a lower proportion was recorded in North West (1.3%), South West (1.3%), North East (0.7%), Scotland (0.7%), Wales (0.7%), Yorkshire & The Humber (0.6%) and London (0.4%). Northern Ireland in-house R&D as a proportion of GVA is higher than the UK average rate (1.2%). UK R&D results can be found at the following link:

<http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Research+and+Development+in+Business>

## Business R&D: Sectoral Analysis

As was the case in 2012, in 2013, the majority of R&D was carried out within the Manufacturing sector (75%) with the remainder (25%) carried out in the Services & Other sector. The share of expenditure in the Manufacturing sector compared to the previous year has decreased by 4%.

Over the year to 2013, an increase in expenditure occurred in both the Manufacturing sector and in the Services & Other sector. The increase in expenditure in the Manufacturing sector, (£1.1m or 0.3%) was smaller in value and proportional terms than the increase of £19.4m (19%) in the Services & Other sector.

## Business R&D: by Company Size

Companies with 250 or more employees accounted for 64% of business R&D expenditure in 2013, although they represented only 7.1% of R&D performing companies. Small firms (i.e. those with less than 50 employees) represented some 71% of R&D performing companies and accounted for 13% of total business R&D expenditure while R&D expenditure by Small and Medium-sized companies (SMEs)\* accounted for 36% of the total business expenditure. Total SME expenditure increased by £1m (0.6%) from 2012 to 2013, in cash terms. However, since 2008 SME expenditure has increased by 64% to £173.8m. The proportion that large companies (250+ employees) make to total R&D expenditure (64%) was slightly higher than 2012 (63%).

\*The European Commission definition of Small Medium Enterprises (SME) used is defined as being enterprises with less than 250 employees and large companies as being enterprises with more than 250 employees.

## Business R&D: Source of funds

The majority of funding came from companies' own funds (82%), with 12% from Government, 6% from overseas and other sources. The proportion of funding from Government has increased from 10% in 2012 to 12% in 2013, whilst funding from overseas and other sources decreased from 7% in 2012.

## Business R&D: Ownership

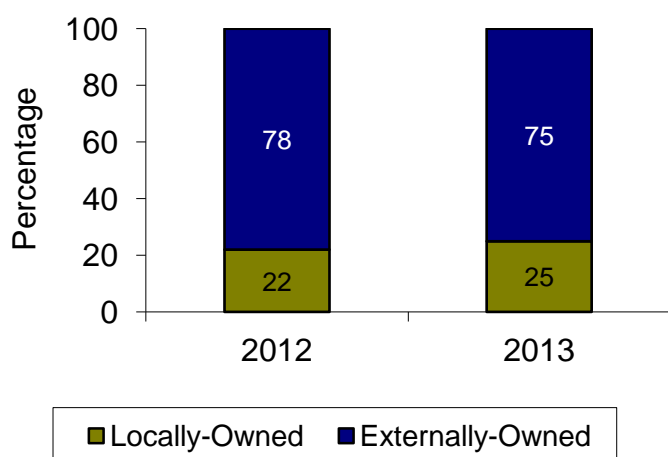
Companies with ownership outside NI play an important role in financing R&D activities in the region. Over three quarters, £363.0m (75%) of total R&D spend was by such externally-owned

companies although they accounted for 18% of all R&D performing companies. Their contribution to the total R&D spend was lower than in 2012 (78%) and their cash value increased by £3.9m over the same period.

R&D expenditure by locally-owned companies increased by 16% (£16.6m) between 2012 and 2013 while R&D Expenditure by externally-owned companies increased by 1% (£3.9m).

The majority of R&D expenditure in Manufacturing is carried out by externally-owned companies (81%), compared with the Services & Other sector (59%).

**Figure 3: Expenditure by Ownership 2012-2013 (percentages)**



### **Business R&D: Employment**

Estimates of employment in R&D are produced on a full-time equivalent (FTE) basis whereby businesses convert part-time employees' hours into full-time employees' equivalents. FTE estimates provide a better indication of total labour input than a simple headcount.

In 2013, companies surveyed reported a total of 6,720 employees working on R&D, some 13% of all employees in companies carrying out R&D. The full time equivalent figure (FTE) for 2013 was 4,750.

The number of R&D employees increased by 6% over the year to 2013. The FTE rise from 2012 to 2013 was 4%.

**Table 6: R&D Employment 2005-2013**

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Number of Employees	2,720	3,040	3,310	3,750	4,690	5,230	5,440	6,310	6,720
FTE	2,600	2,870	2,760	2,940	3,520	3,950	4,240	4,570	4,750

**4.3: BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT IN 2013**

Table 7 details the headline results from the 2013 Business Expenditure on Research & Development (BERD) survey. The table shows that in 2013, total expenditure (in cash terms) on R&D by NI businesses was an estimated £481.8 million.

Total BERD consists of in-house R&D expenditure (i.e. R&D carried out within the company) and purchased R&D expenditure (i.e. R&D funded by firms in NI but undertaken by other firms in the UK and abroad). The vast majority of total BERD was in-house expenditure (£443.2m or 92%) with £38.7m or 8% being purchased R&D expenditure which decreased from £41.4m in the previous year. Of this £38.7m of purchased R&D expenditure in NI, some £1.3m was undertaken by the Higher Education sector.

82% of funding for in-house R&D in 2013 came from the companies' own resources (£364.4m) while government provided a further 12% (or £54.3m) and the remainder came from overseas and other sources (6% or £24.5m).

**Table 7: Business Expenditure on R&D – 2013**

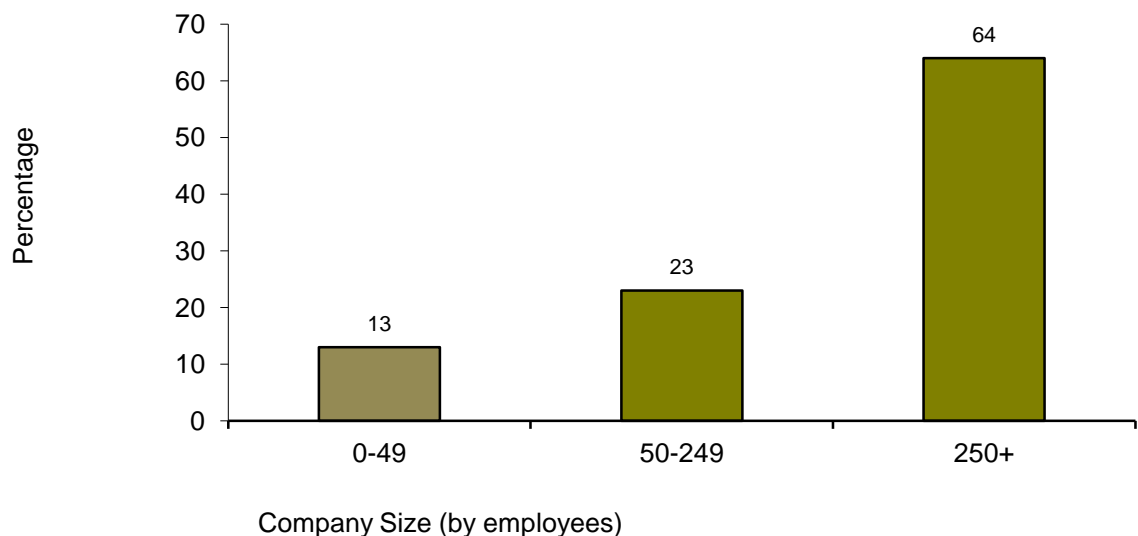
	Total Expenditure by Business (£million)	As % of Total Expenditure
Total Expenditure	481.8	100
In-house R&D Expenditure <sup>6</sup>	443.2	92
of which:		
Non Capital Expenditure	382.6	79
Capital Expenditure	60.6	13
Purchased R&D Expenditure <sup>7</sup>	38.7	8
Of which:		
Undertaken by Higher Education	1.3	0.3

<sup>6,7</sup> For definitions see Section 6, Background Notes.

Total employment on R&D in businesses for 2013 was 4,750 (based on full time equivalent figures), which was higher than that in 2012 (4,570) and 2011 (4,240).

As shown in figure 4 companies with 250 or more employees accounted for 64% of business R&D expenditure in 2013, although they represented only 7% of R&D performing companies. Small firms (i.e. those with less than 50 employees) represented some 71% of R&D performing companies and accounted for 13% of total business R&D expenditure while R&D expenditure by Small and Medium-sized companies (SMEs)\* accounted for 36% of the total business expenditure. Total SME expenditure increased by £1m (0.6%) from 2012 to 2013, in cash terms; and since 2008, SME expenditure has increased by 64% to £173.8m. The proportion that large companies (250+ employees) make to total R&D expenditure (64%) was slightly higher than the previous year (2012: 63%). See Annex Table 4 for further details.

**Figure 4: Percentage of Total BERD Expenditure in 2013 by Company Size**



#### 4.4: BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – SECTORAL BREAKDOWNS

In 2013, the majority of R&D was carried out within the Manufacturing sector (75%) with the remaining 25% carried out in the Services & Other industries category. After a period of decline, this is the second year the Services and Other industries sector category has reported an increase (2012: 22%). The contribution of the Services & Other industries to total expenditure steadily increased from 29% in 2003 to 44% in 2007 and then started to decrease thereafter - 2008 (38%), 2009 (29%), 2010 (29%) and 2011 (21%).

The manufacture of transport equipment sub-section (CL) accounted for 52% of all Manufacturing R&D (see Figure 5), a slight decrease from 53% in 2012, with the manufacture of computer, electronic and optical products (CI) accounting for 15%.

**Figure 5: Percentage of Manufacturing R&D Expenditure in 2013 by Sub-section (SIC 2007 basis)<sup>8</sup>**

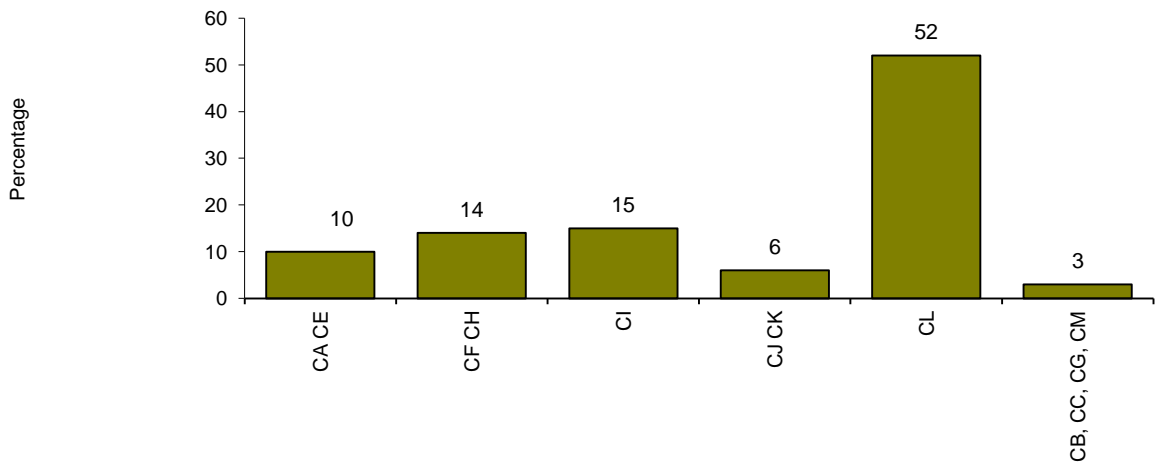
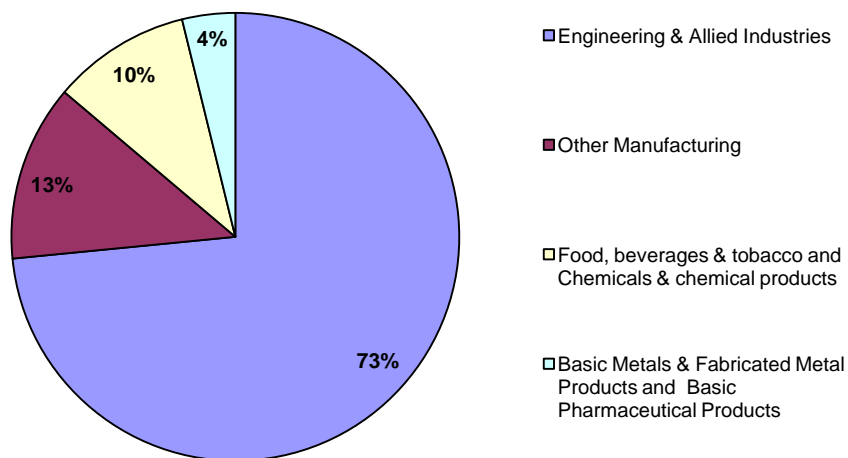


Figure 6 below, highlights that 73% of R&D spending within the Manufacturing sector was accounted for by companies involved in Engineering & Allied Industries (CI, CJ, CK, CL).

**Figure 6: Percentage of Manufacturing Expenditure by SIC 2007 Subsection<sup>8</sup> 2013**



<sup>8</sup> For a description of subsection headings see Section 6, Background Notes - Results.



**Table 8: In-house and Purchased R&D Expenditure by Sector 2013**

	IN-HOUSE		PURCHASED	
	£m	% of Total BERD Expenditure	£m	% of Total BERD Expenditure
Manufacturing	326.8	68	33.6	7
Services & Other	116.4	24	5.1	1
All Industries <sup>9</sup>	443.2	92	38.7	8

As Table 8 shows, in-house R&D expenditure, i.e. spending carried out within the company, accounted for 92% (£443.2 million) of total expenditure in NI in 2013, slightly higher than the proportion in 2012 and 2011 (91%). The majority of in-house R&D expenditure was in the Manufacturing sector as was the majority of purchased R&D expenditure.

The two components of in-house R&D expenditure are non capital expenditure (salaries & wages and other costs) and capital expenditure (land & buildings and plant & machinery).

Non capital expenditure makes up 86% of in-house expenditure, lower than in 2012 (90%) and 2011 (91%) but higher than 2010 (71%) and 2009 (79%). Table 9 and Figure 7 highlight that there were differences between sectors in the categories of in-house R&D spend.

The proportion spent on non capital is much greater than capital expenditure in both Manufacturing and in Services & Other. A larger proportion of non capital expenditure was spent on salaries and wages in the Services & Other sector (63% of total in-house expenditure) compared to 39% in the Manufacturing Sector. Within capital expenditure Manufacturing had more expenditure in Plant & Machinery than in Land & Buildings while the same was also true for Services and Other.

Salaries and Wages as a proportion of in-house expenditure have decreased in Manufacturing from £137.4m (42%) in 2012 to £127.1m (39%) in 2013. Although the Services & Other sector increased from £68m in 2012 to £73.6m in 2013, it also saw a decrease as a proportion of in house expenditure from 72% in 2012 to 63% in 2013. This expenditure appears to have been transferred to Plant and Machinery expenditure, which saw increases in both the Manufacturing (£38.1m (12%) in 2012 to £48.8m (15%) in 2013) and Services and Other (£3.2m (3%) in 2012 to £9.9m (9%) in 2013)

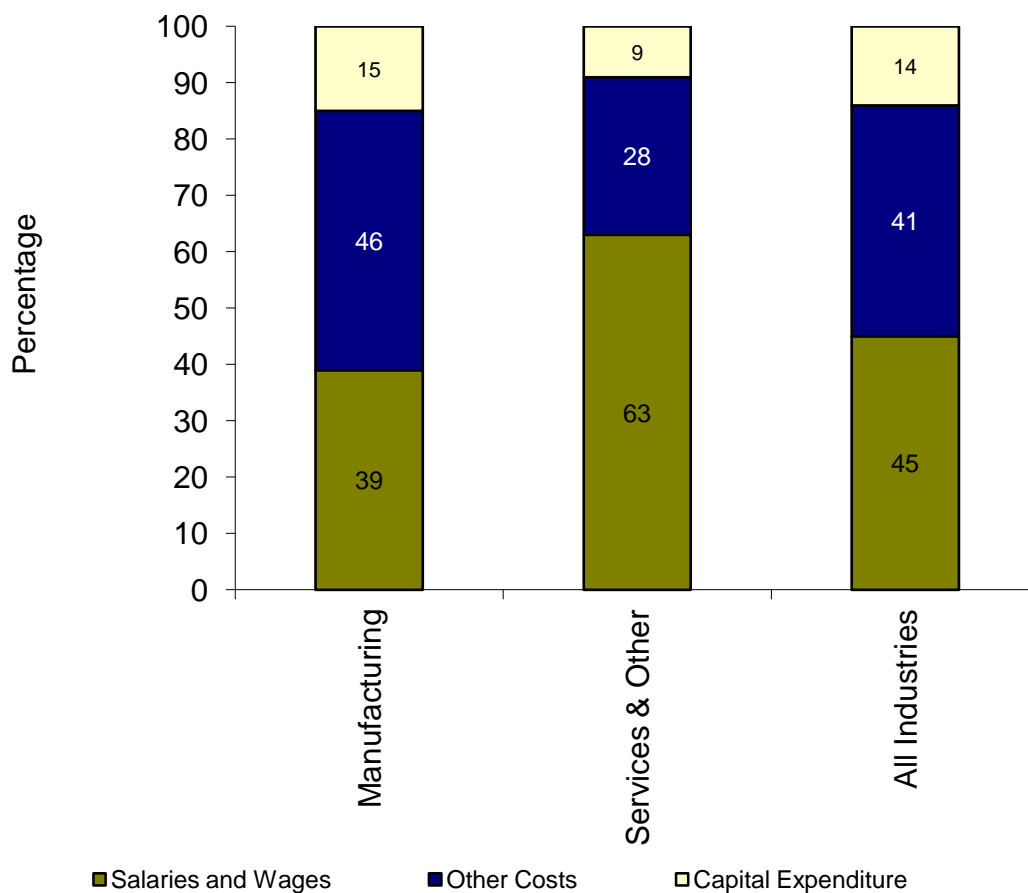
Over the year to 2013 the proportion spent on capital expenditure increased from 10% to 14%.

<sup>9</sup> All industries include Manufacturing, service sector industries plus a range of other industries. For full details of the other industries covered see Section 6, Background Notes.

**Table 9: Breakdown of In-house R&D Expenditure by Sector (£million) 2013**

	Manufacturing		Services & Other		All Industries	
	£m	%	£m	%	£m	%
<b>Non Capital Expenditure</b>						
Salaries & Wages	127.1	39%	73.6	63%	200.7	45%
Other Costs	149.3	46%	32.5	28%	181.9	41%
<b>Capital Expenditure</b>						
Land & Buildings	1.5	0%	0.3	0%	1.8	0%
Plant & Machinery	48.8	15%	9.9	9%	58.8	13%
<b>In-house Expenditure</b>	<b>326.6</b>	<b>100%</b>	<b>116.4</b>	<b>100%</b>	<b>443.2</b>	<b>100%</b>

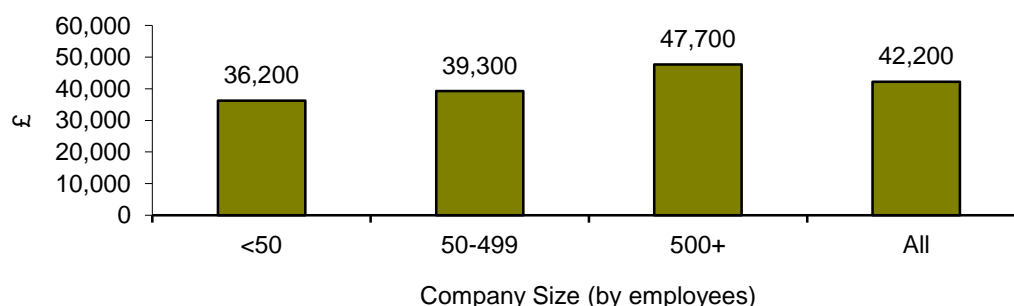
**Figure 7: Percentage of In-house R&D Expenditure by Sector 2013**



## 4.5: BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – NON CAPITAL EXPENDITURE

As Figure 8 below shows, there are differences in the level of salaries & wages per head between companies of different sizes (based on full-time equivalent (FTE) figures).

**Figure 8: Salaries & Wages per Head by Company Size (rounded to nearest £100) 2013**



Overall the salaries and wages per R&D FTE was £42,200, a decrease of 6% from £45,000 in the previous year. Salaries and wages per head for companies with 500 or more employees were £47,700. This compares with £36,200 per head for companies with less than 50 employees and £39,300 per head for companies with between 50 and 499 employees.

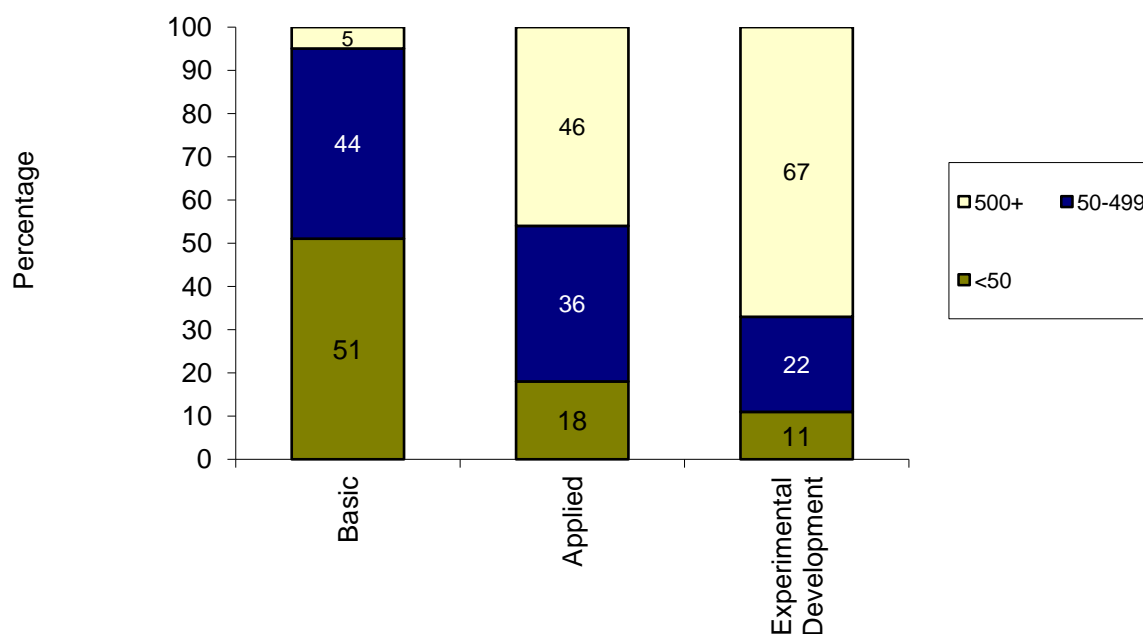
The majority of R&D expenditure occurred in Manufacturing and 60% of all R&D expenditure was in experimental development.

**Table 10: Type of Research by Sector as percentage of All Research (Non Capital Expenditure) (percentages) 2013<sup>10</sup>**

	Manufacturing %	Services and Other %	All Industries %
Basic	2	1	3
Applied	21	16	37
Experimental Development	49	11	60
All Research	72	28	100

<sup>10</sup> For definitions see Section 6, Background Notes - Definition of Terms.

**Figure 9: Type of Research by Company Size (percentage) 2013**



Non capital expenditure can also be analysed in terms of type of research carried out. Experimental development accounted for 60% of non capital expenditure in 2013, higher than that in 2012 (58%), with applied research and basic research accounting for 37% and 3% respectively.

Figure 9 shows that the majority of spending on applied research and basic development is carried out by companies with between 0 and 499 employees (54% and 95% respectively). 67% of spending on experimental research is carried out by companies with 500 or more employees. A detailed breakdown of the type of research carried out by both industry and company size is given in Annex Table 2.

## 4.6: BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – SOURCES OF FUNDS

The funding of in-house R&D expenditure comes from a number of sources: the companies' own funds, from Government, overseas funding (e.g. EU) and other businesses and organisations.

**Table 11: In-house BERD R&D Funding by Source and Company Size 2013**

	<50	50-499	500+	All
	%	%	%	%
Own Funds NI	61	58	86	75
Own Funds Parent	11	14	3	7
Government	14	15	11	12
Overseas/Other	14	13	0	6
Total	100	100	100	100

Table 11 shows that the greatest proportion of R&D funding was from Own Funds NI – 75% in 2013, up from 73% in 2012. 86% of R&D was funded by Own Funds NI in firms with over 500 employees compared to 61% and 58% in firms with fewer than 50 and between 50 and 499 employees, respectively.

Firms with fewer than 50 employees and between 50 and 499 employees received a greater proportion of funds from parent companies (11% and 14% respectively) than firms with 500 or more employees (3%). The proportion of funding for R&D from own funds, NI and parent, was 72% for firms with under 50 employees, 72% for firms with between 50 and 499 employees (down from 93% in 2012) and 89% for firms with 500 or more employees.

Firms with fewer than 50 employees reported a higher proportion of funding from Government than previous years at 14% (2012: 11%), firms with 50 to 499 employees also reported an increase at 15% (2012: 5%) whereas firms with 500 or more employees reported a slight decrease at 11% (2012: 12%).

## 4.7: BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – OWNERSHIP ANALYSIS

The majority of BERD is accounted for by externally owned businesses. Since 2008, the percentage has been at least 60%.

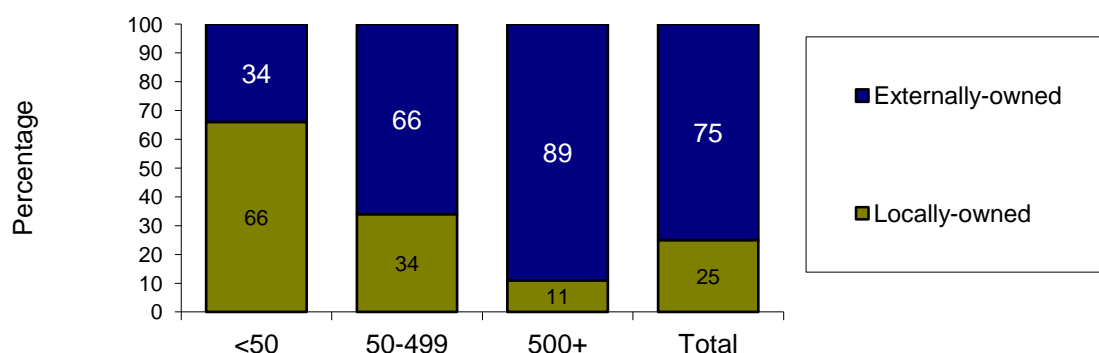
**Table 12: Breakdown of R&D expenditure by ownership of company 2013**

	£m	%	Number of companies	%
Locally-owned companies	118.8	25	439	82
Externally-owned companies	363.0	75	96	18
Total (All companies)	481.8	100	535	100

Expenditure by locally owned companies (£118.8m) has increased by 16.3% from £102.2m in 2012 while the number of these companies who reported R&D expenditure increased to 439 (from 405 in 2011).

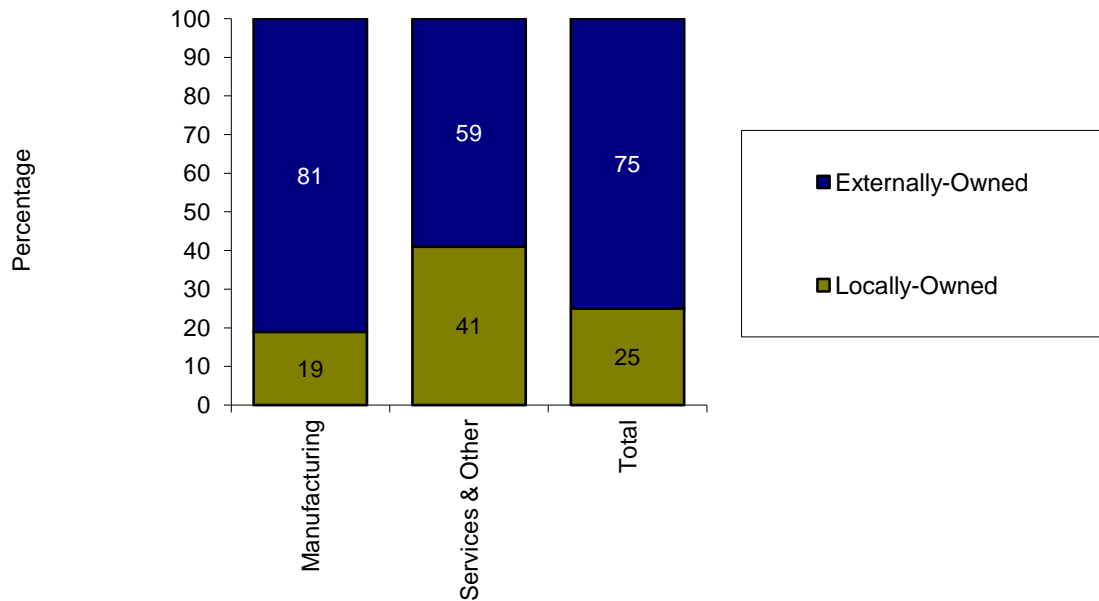
NI owned companies in 2013 accounted for 82% of all R&D performing companies and 25% of the total £481.8m expenditure. This can be compared with externally-owned companies accounting for 75% of the R&D expenditure and 18% of R&D performing companies.

**Figure 10: Expenditure by ownership by company size (percentages) 2013**



The majority of R&D spend in companies with under 50 employees (66%) was by NI owned firms. However, in companies with between 50 and 499 employees the larger proportion (66%) was by externally owned firms. The analysis shows that in companies with 500 or more employees the majority of R&D expenditure (89%) was also by externally-owned firms.

**Figure 11: Expenditure by ownership by sector (percentages) 2013**



Analysis of R&D spend split by ownership and sector showed that 81% of R&D spend in the Manufacturing sector was by externally-owned companies.

In the Services & Other sector, NI owned companies accounted for 41% of R&D expenditure.

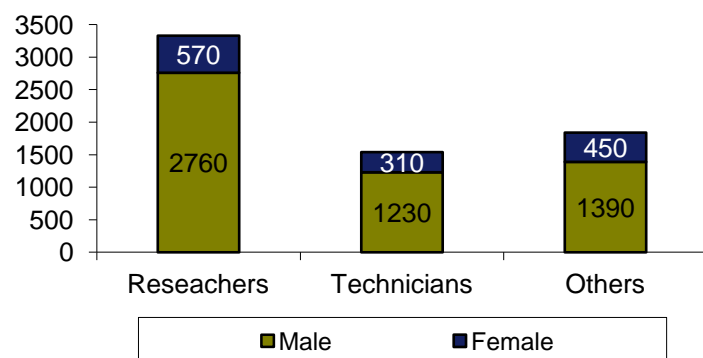
Compared to the previous year locally-owned companies increased their proportion of expenditure in both the Manufacturing (from 17% to 19%) and Services & Other sectors (from 39% to 41%).

#### 4.8: BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – EMPLOYMENT ON R&D

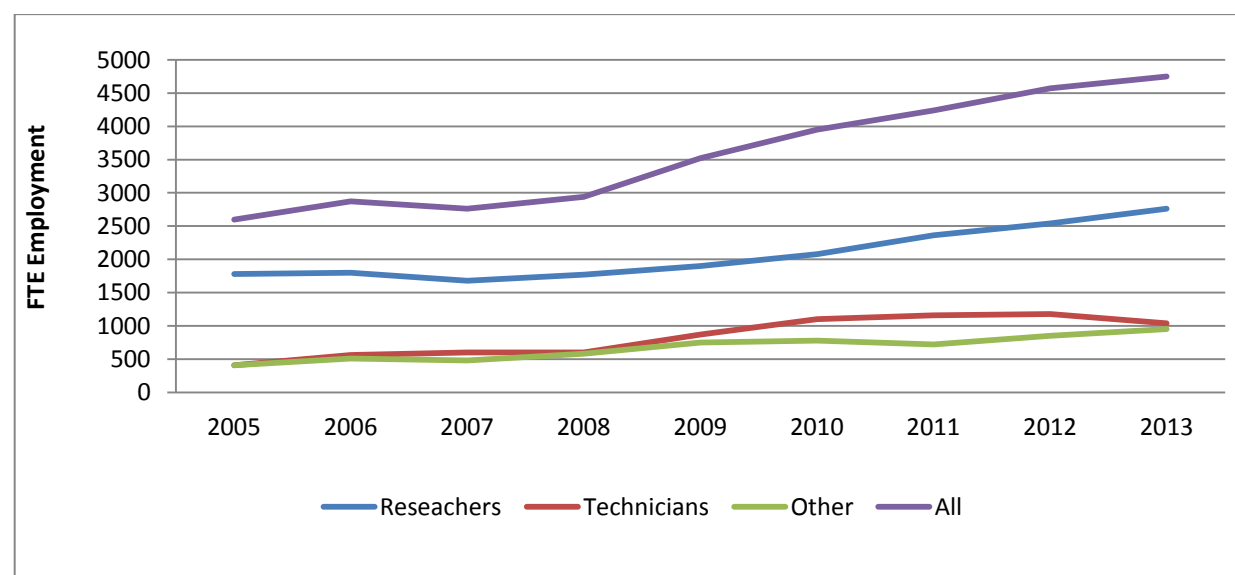
In 2013, surveyed companies reported a total of 6,720 employees working on R&D, approximately 13% of all employees in companies carrying out R&D which is higher than in 2012 (9%). Of these 6,720<sup>11</sup> employees involved in R&D activities, 5,390 (80%) were males and 1,330 (20%) were females. This compared to 6,310 employees in 2012 with 5,100 males and 1,210 females, representing 81% and 19% respectively.

By type of R&D employee, researchers accounted for 50%, technicians for 23% and other employees (e.g. support staff including skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects) for 27% of all R&D employees. Comparable full-time equivalent figures show that 2,760 employees were researchers (58%), 1,040 employees were technicians (22%) and the number of other employees was 950 (20%).

**Figure 12: Employment on R&D in 2013 by gender (Headcount)**



**Figure 13: Employment on R&D 2005-2013 (FTE)**



<sup>11</sup> Please note: All employment figures have been rounded to the nearest 10



On a full-time equivalent basis there were 2,990 employees in Manufacturing and 1,760 in the Services & Other sectors. Within Manufacturing, researchers accounted for 60% of R&D employees with the level of technicians at 18% and other employees at 23%.

Within the Services & Other sectors, researchers made up 56% of R&D employees, technicians 29% and other employees 16%.

#### 4.9: TAX CREDITS

Businesses were asked if they received any R&D tax credits and if their R&D work was part of a joint project in 2013, following the introduction of the question in the 2004 survey.

217 R&D performing companies reported that they received tax credits amounting to £40.8million in total. This represents an increase in the number of R&D performing companies receiving tax credits and an increase in the amount received when compared with last year.

**Table 13: Breakdown of R&D Tax Credits 2008-2013**

	2008	2009	2010	2011	2012	2013
Number of companies	57	77	80	136	149	217
Tax credit (£m)	9.5	21.7	19.2	35.3	37.2	40.8

#### 4.10: JOINT PROJECTS

46 companies reported that their R&D work was part of a joint project with a source outside their company. 10 companies had a joint project with Higher Education Establishments, 25 with other Businesses and 11 with both. This shows a decrease in the number of companies engaging in joint projects since last year (63 companies in 2012).

## 4.11 R&D Information from other sources

### Business Expenditure on Research & Development in the Republic of Ireland

The biennial Business Expenditure on Research and Development (BERD) Survey 2011/2012 is jointly conducted by the Central Statistics Office (CSO) and Forfás and the most recent data was released by the CSO on 19 February 2013. This survey examines R&D activities performed across the business sector in 2011.

The key findings include:

#### Aggregate levels of BERD (2011)

- Enterprises across all business sectors in Ireland spent €1.86 billion on in-house research and development (R&D) activities in 2011, a 1.3% increase on 2010. Enterprises active in R&D in 2011 estimated an R&D spend of €1.96 billion in 2012, an increase of 5.5%.
- Business R&D intensity (BERD as a percentage of GDP) reached 1.17% in 2011 (1.46% of GNP). Finland had the highest BERD intensity in the EU with 2.67% of GDP.
- Foreign owned enterprises accounted for 71% of the total business R&D spend in 2011.
- The vast majority of expenditure on R&D by businesses (86%) in 2011 was current expenditure (wages of R&D staff etc.) and 14% on capital expenditure (e.g. buildings, equipment, licence payments etc.)
- 61% of BERD was generated in the services sector in 2011.
- Medium and large enterprises (more than 50 employees) accounted for almost three quarters of BERD in 2011.
- 89% of BERD funding was from company funds in 2011, down from 92% in 2009.

#### Human resources in R&D (2011)

- There were over 19,000 research personnel in the business sector, a 21% increase since 2009 and more than 14,000 full time equivalents (FTEs).
- More than half of R&D personnel (headcount) were employed in foreign owned firms.
- The majority of R&D personnel (63%) were employed in the services sector.
- Medium to large companies employed two thirds of all research personnel.
- There were 10,618 researchers or 8,996 FTEs employed in the business sector.
- Of total researchers in the business sector, 22% were female. Iceland had the highest proportion of female researchers in the business sector at 32%.
- 15% of all business sector researchers held a PhD qualification.

#### Number of R&D performing firms (2011)

- The number of R&D performing firms increased by 25% from 2009 to 2011 to over 1,600 and almost three quarter were Irish owned.
- Of firms engaged in R&D activities, 58% were in the services sector and 42% in manufacturing.
- Small firms with less than 50 employees accounted for 69% of all R&D active firms.
- More than 72% of all R&D performing enterprises spent less than €500k on R&D activities and one in ten enterprises were engaged in large scale R&D activities (spending in excess of €2 million)
- Half of foreign-owned firms engaged in mid to large scale R&D (in excess of 500k) compared with 19% of Irish firms
- Almost half of medium to large sized firms engaged in mid to large scale R&D activities compared with 18 per cent of small firms

- In both the manufacturing and services sectors, 27% of firms were engaged in mid to large scale R&D activities

### **Type of research (2011)**

- R&D expenditure was mostly concentrated in experimental development, accounting for 71% of all expenditure.
- Nearly two-thirds of Irish enterprises were engaged in experimental development compared to three-quarters of foreign owned companies.
- Small enterprises were more likely to engage in applied research (28%) than medium and large enterprises (23%).

### **Collaboration**

- Of all R&D performing firms, 35% engaged in joint research projects with other parties in 2011.
- 40% of medium to large firms engaged in collaborative research projects compared with 33% of small firms. Of all collaboration partners, both small and medium/ large firms were most likely to collaborate with Higher Education Institutes (HEIs) in Ireland.
- Foreign owned firms were more likely than Irish firms to collaborate with research partners, with 44% and 32% respectively engaged. Foreign owned firms were most likely to collaborate with other firms outside Ireland, and Irish firms with HEIs in Ireland.
- The most likely collaboration partner for all firms was HEIs in Ireland, rather than HEIs outside of Ireland or collaborations with other firms either within or outside Ireland

The 2013/2014 results will be published in early 2015.

## **UK Innovation Survey**

The most recent UK Innovation Survey (2013) provides estimates of the innovation activity of small, medium and large businesses (SMEs – those with 10 - 249 employees) in the production and most of the services sectors. Innovation covers a wide range of activities of which R&D is just one element. According to the latest results, during 2010-12 40% of NI SMEs were innovation active, compared to 33% during 2008-10 (2011 survey). The equivalent UK figures also showed an increase from 37% to 45%. The survey also reported that 11% of businesses reported carrying out internal R&D. However, the Innovation definition of R&D is broader than the Frascati manual definition, which must be borne in mind when making comparisons between the results of the R&D and Innovation surveys.

Northern Ireland results from the 2013 and earlier Innovation Surveys are available at:

[http://www.detini.gov.uk/index/what-we-do/deti-stats-index/stats\\_publications\\_2014\\_onwards/innovation\\_survey.htm](http://www.detini.gov.uk/index/what-we-do/deti-stats-index/stats_publications_2014_onwards/innovation_survey.htm)

The methodology, sample details and first UK-level findings from the UK Innovation Survey 2013 can be found on the Office for National Statistics website at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/301385/14-p107a-first-findings-from-the-ukis-2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/301385/14-p107a-first-findings-from-the-ukis-2013.pdf)

# 5: Northern Ireland Higher Education Expenditure (HERD) and Government Expenditure on Research & Development (GERD) during 2013

## 5.1: Higher Education Expenditure on Research and Development (HERD)

Table 14 details the headline results from the 2011, 2012 and 2013 Higher Education Expenditure on Research & Development (HERD) surveys.

**Table 14: Higher Education Expenditure on R&D**

	2011	2012	2013
	£million	£million	£million
HERD Expenditure <sup>12</sup>	165.6	148.9	148.3
of which:			
Non Capital Expenditure	148.4	141.7	139.4
Capital Expenditure	17.2	7.2	8.9
Source of funding of R&D:			
Government Block Grant	84.4	78.9	78.3
OST Research Councils <sup>13</sup>	13.1	12.4	12.8
UK-based charities	9.3	10.8	10.7
UK Cent Gov/Local Auth/Health <sup>14</sup>	39.7	25.4	24.4
UK Ind/Comm/Pub Corp <sup>15</sup>	4.5	5.3	4.0
EU Government	8.1	8.8	9.1
EU Other	2.2	2.1	3.0
Other Overseas	3.0	3.1	4.0
Other Sources	1.4	2.1	2.0
	Number	Number	Number
HERD Employment <sup>16</sup>	1,550	1,500	1,610
of which:			
Academic staff	1,180	1,120	1,210
Technicians <sup>17</sup>	200	200	200
Other <sup>18</sup>	170	180	200

<sup>12</sup>Expenditure for 2013 includes £1.3 million of expenditure funded by Northern Ireland businesses (1.6 m in 2012 and £1.3m in 2011). Therefore, net HERD in 2013 was £147.0m (this is as detailed in Table 1). All university expenditure on R&D is in-house expenditure - i.e. R&D work carried out within the university. Figures given are in £millions and constituent parts may not add due to rounding.

<sup>13</sup> Office of Science and Technology Research Councils

<sup>14</sup> Funding from UK Central Government, Local Authorities and Health Trusts/Hospitals

<sup>15</sup> Funding from UK industry/commerce/public corporations

<sup>16</sup> This is the number of full-time equivalents. Figures are rounded to the nearest 10 and constituent parts may not add due to rounding

<sup>17</sup> Technicians – Perform scientific and technical tasks normally under the supervision of researchers.

<sup>18</sup> Others -Support staff including skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects.

Total HERD expenditure decreased by 0.4% from £148.9m in 2012 to £148.3m in 2013, compared with a decrease of 10% from 2011 to 2012. The decrease in 2013 in-house expenditure was comprised of a 23.6% increase in capital expenditure and a decrease of 1.6% in non capital expenditure. This compares to the previous period where capital expenditure decreased by 58% and non capital expenditure decreased by 4.6%.

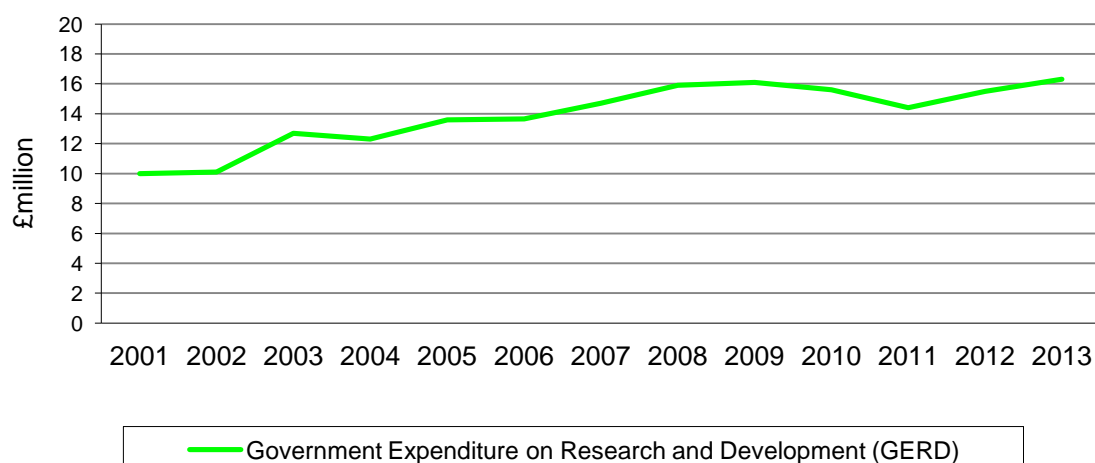
Employment totals increased between 2012 and 2013, from 1,500 full-time equivalent persons in 2012 to 1,610 in 2013. The change in R&D employment consisted of an increase in the number of academic staff (from 1,120 to 1,210), no change in the number of technicians (remaining at 200) and an increase in the number of other employees employed in R&D (from 180 to 200).

Block grants remained the largest source of funds with their relative contribution decreasing by a small margin from 53% in 2012 to 52.8% in 2013. Funding from UK Central Government/Local Authorities and Health Trusts/Hospitals decreased by 3.9% from £25.4m in 2012 to £24.4m in 2013, accounting for 16.4% of HERD funding in 2013 compared to 17.0% in 2012. Funding from UK industry/commerce/public corporations also showed a decrease (-24.0%) from £5.3m in 2012 to £4.0m in 2013, accounting for 2.7% of HERD funding in 2013 compared to 4.0% in 2012.

## 5.2: Government Expenditure on Research and Development (GERD)

Government R&D expenditure rose in cash terms by £0.8m (5%) over the year to 2013. Over the five year period from 2008 to 2013 Government R&D expenditure increased by 2.5%.

**Figure 14: Government Expenditure on R&D (GERD)**



## 6: Background Notes

A quality report for the Northern Ireland Research and Development Statistic publication can be found at the following link:

<http://www.detini.gov.uk/deti-stats-index/stats-surveys/stats-research-development.htm>

### 6.1: Business Expenditure on Research & Development

#### Definition of R&D

The survey of Northern Ireland Business Expenditure on Research and Development during 2013 was undertaken by the Northern Ireland Statistics and Research Agency (NISRA). The sample and survey results only cover business enterprises. This excludes government organisations, higher education establishments and charities.

The definition of R&D adopted for the purposes of the NI inquiry is the same as that used by ONS for the equivalent GB survey and comes from the Frascati manual:

"The guiding line to distinguish between research and technological development activity (R&D) from non-research activity is the presence or absence of an appreciable element of novelty or innovation. If the activity departs from routine and breaks new ground it should be included; if it follows an established pattern it should be excluded".

The activities that are classified as R&D differ from company to company, but there are two basic models. In one model, the primary function of R&D is to develop new products; in the second model, the primary function of R&D is to discover and create new knowledge about scientific and technological topics with the purpose of uncovering and enabling development of new products, processes, and services. According to the Department for Business Innovation and Skills (BIS), R&D is defined as "any project to resolve scientific or technological uncertainty aimed at achieving an advance in science or technology".

For the purposes of National Statistics, R&D and related concepts follow internationally agreed standards defined by the Organisation for Economic Cooperation and Development (OECD), as published in the 'Frascati' Manual. R&D, in the Frascati Manual, is defined as "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".

The Frascati Manual was originally written by, and for, the experts in OECD member countries that collect and issue national data on R&D. The definitions provided in this manual are internationally accepted and now serve as a common language for designing, collecting and using R&D data.

The NI questionnaire follows the same structure and includes the same questions as the GB questionnaire, although there were some modifications to tailor the questions asked for use in NI e.g. identification of Invest NI companies.

The survey covers expenditure in the year ending December 2013, although companies were given the option of supplying data for a business year ending on any date between 6 April 2013 and 5 April 2014.

## Survey Design - Sample

R&D surveys pose special problems for survey design – R&D takes place in only a small proportion of businesses but a comprehensive list of these businesses does not exist. A simple random sample of the business population would not be suitable for an R&D survey because many of the sample businesses would not undertake R&D and many significant R&D performers would be missed in such a sample.

The solution is to implement a stratified sample design. The stratification variable was the known level of R&D performance of the businesses. This information was gained from previous surveys (mainly the 2012 survey) and extra information from various sources such as the Office for National Statistics (ONS), Invest NI and filter questions on the Annual Business Inquiry and Community Innovation Survey. For the purposes of the 2013 survey, businesses were stratified into 4 groups:

- (i) Businesses responding to the 2012 survey who returned or had estimated a total R&D expenditure value greater than zero;
- (ii) Businesses reporting positively to the R&D filter question in the Annual Business Inquiry and Community Innovation Survey; other identified potential R&D performers (principally, those companies who had received assistance from Invest NI during 2013); and companies newly identified to ONS as R&D spenders;
- (iii) Companies who have been identified as 'not R&D performers' when selected for past surveys;
- (iv) The remainder of Northern Ireland businesses.

The businesses making up strata (i) and (ii) formed a register of R&D performers and the sample for the 2013 survey was derived from this register. Indeed, each of these businesses was issued a questionnaire – in effect, therefore, a census of R&D performers was carried out. Strata (iii) and (iv) were not included as they were assumed to have zero R&D expenditure.

## Survey Design - Response Rate

It is worth noting that a number of NI companies are part of national and international companies. Many concentrate their R&D at particular sites, not necessarily in NI, although all of their plants, including those in NI, will share in the benefits of research. For 2013, 1,368 forms were sent out to businesses believed to be performing R&D. Completed forms were returned by 1,262 businesses representing a response rate of 92 per cent. The total number of companies spending on R&D is relatively small – 535 in 2013 (and 495 in 2012).

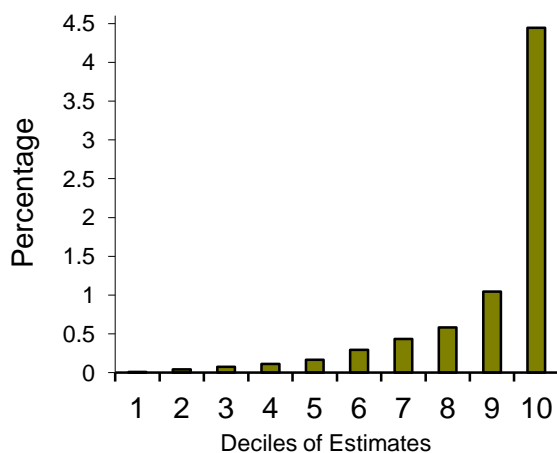
## Survey Design – Validation and Estimation

Variations may occur in NI R&D data from year to year due to the influence of one or two large-scale projects. Estimates were made for the R&D activity of non-responding businesses. Estimates for Invest NI companies were based on the value of offers made to promote R&D investment, the amount remaining to be claimed against these offers, the frequency of claims and the contribution of Invest NI's assistance to total planned R&D expenditure. Estimates for Invest NI companies make up 42% of the total non-respondent companies. The remaining 58% - non Invest NI estimates were based on historical information and other administrative surveys within Economic and Labour Market Statistics Branch.

Overall, all estimates make up 7.1% of total BERD spend for 2013 (compared to 5% in 2012). Estimates for Invest NI companies account for 1.4% of total BERD spend while estimates for non Invest NI companies account for 5.6% of total BERD spend. This should be borne in mind when considering the results.

Figure 14 shows that all estimates made up 7.1% of total 2013 BERD spend. When estimates are ranked according to ascending size of spend, the last two deciles (i.e. the top 20% of companies) accounted for 76% of the total BERD estimated spend indicating that most of the estimates were small in magnitude. The bulk of the value of the estimates has been accounted for by a relatively small number of companies.

**Figure 15: Deciles of Estimates as a percentage of 2013 BERD**



### Status of Figures in Current Bulletin

The results are provisional and may be revised should additional information become available usually due to business misreporting and late returns.

Figures contained within all tables in this release may not add due to rounding. Percentages calculated on these rounded figures may differ from those that are detailed in the text. Results are shown mainly by industrial sector and company size (based on the number of employees). The sectoral analyses are based on the Standard Industrial Classification 2007 (or SIC 2007) of industries. Data prior to 2009 are on a SIC 2003 basis. Care should therefore be taken when making comparisons with previous reports.

More details on SIC 2007 are available at the link below.

<http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/index.html>

### Definition of Terms

#### a) Type of R&D Expenditure

Total Expenditure on R&D - This covers expenditure by businesses, expenditure by higher education and other expenditure by Government.

Other Expenditure by Government - The ONS also collect annual data on Government-funded Science, Engineering and Technology for the UK as a whole and publish this in the Forward Look report. By utilising Forward Look data in conjunction with the results from the NISRA survey, it has been possible to compile a more complete picture of total expenditure on R&D in NI. Forward Look figures will include financial assistance to both higher education and to businesses by Government as well as expenditure on R&D conducted within Government



Departments. The figures shown in Tables 1, 2 and 3, expenditure by businesses and higher education and other expenditure by Government, should complement each other; i.e. there should be no double counting.

In-house R&D – This is R&D carried out within the company and was previously referred to as intramural expenditure.

Purchase of R&D – This is R&D funded by plant(s) in Northern Ireland but undertaken by other firms or organisations in the UK and abroad and was previously referred to as extramural expenditure.

Capital Expenditure - Includes companies' expenditure on land, buildings, equipment and machinery (including vehicles). Capital expenditure on R&D is particularly subject to distortions and is likely to fluctuate significantly from year to year as a small number of projects could cause this percentage to increase or decrease sharply. For example, some R&D projects may have a duration of several years but involve heavy capital outlay in the formative years of the research. The erratic nature of R&D capital expenditure may partly explain differences in capital expenditure among companies of different sizes. Only by looking at underlying trends over several years will it be possible to see if some sectors or companies of differing sizes are more likely to require more expenditure of a capital nature.

## **b) Type of Research**

Basic Research - work undertaken primarily for the advancement of scientific knowledge without a specific practical application in view.

Applied Research - Research undertaken with a general or a particular application in view.

Experimental Development - covers the use of the results of basic and applied research directed to the introduction of new materials, processes, products, devices and systems, or the improvement of existing ones. This includes the prototype or pilot plant stage, design and drawing required during R&D and innovation work done on contracts with outside organisations, Government departments and public bodies.

## **c) Sources of Funding**

Business - Funds from individual plants within NI or from parent or other companies within the group.

Government - Funds from Invest NI and other government sources.

Overseas - This includes EU Funds as well as other funds from outside the UK. EU funds are those from the European Commission's Structural or Framework Funds.

Other Funds - Funds from private businesses, other public organisations and any other organisations within the UK.

## **d) Employment on R&D**

Staff Types - Employment on R&D splits into the following categories; researchers – engaged in the conception or creation of new knowledge, products, methods and systems; technicians – who perform scientific and technical tasks normally under the supervision of researchers; and others – support staff including skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects.

Full Time Equivalent Employment – One full time equivalent (FTE) may be thought of as one person-year. For example, a person who normally spends 30% of their time on R&D and the rest on other activities would be considered as 0.3 FTE. Similarly, if a full-time R&D worker is employed at an R&D unit for only six months, this results in the FTE of 0.5. A person who works half of a standard week and spends half of their time on R&D and the rest on other activities should be considered as 0.25 FTE

### **SIC 2007 Classification**

Manufacturing is defined to cover Section C, which includes the following groupings in this publication:

- CA Manufacture of food products, beverages and tobacco products
- CB Manufacture of textiles, wearing apparel, leather and related products
- CC Manufacture of wood and paper products; printing and reproduction of recorded media
- CD Manufacture of coke and refined petroleum products
- CE Manufacture of chemicals and chemical products
- CF Manufacture of basic pharmaceutical products and pharmaceutical preparations
- CG Manufacture of rubber and plastics products, and other non-metallic mineral products
- CH Manufacture of basic metals and fabricated metal products, except machinery and equipment
- CI Manufacture of computer, electronic and optical products
- CJ Manufacture of electrical equipment
- CK Manufacture of machinery and equipment n.e.c.
- CL Manufacture of transport equipment
- CM Other manufacturing; repair and installation of machinery and equipment

Where aggregation of Manufacturing groupings within this publication is required it is as follows (for example, see Figure 5):

- CA Food, beverages & tobacco
- CE Chemicals & chemical products
- CH Basic Metals & Fabricated Metal Products, except machinery & equipment
- CI, CJ, Engineering & Allied Industries
- CK, CL
- CB, CC, Other Manufacturing
- CD, CF,
- CG, CM

The Service Sector covers Sections G through to U, namely:

- G Wholesale and retail trade; repair of motor vehicles and motorcycles
- H Transportation and storage
- I Accommodation and food service activities
- J Information and communication
- K Financial and insurance activities
- L Real estate activities
- M-N Professional, scientific, technical, administrative and support service activities
- O-Q Public administration and defence, education, human health and social work activities
- R-U Other service activities

The Other Industries category covers:

- A Agriculture, forestry and fishing
- B Mining and quarrying
- D Electricity, gas, steam and air conditioning supply
- E Water supply; sewerage, waste management and remediation
- F Construction

## Users and Uses of Data

A primary use of the business R&D data (BERD) in this Statistical Bulletin is its provision to ONS for inclusion in the UK published results. This in turn is a key component in measuring the UK's gross domestic expenditure on R&D.

Changes introduced as part of the amendments to the System of National Accounts (SNA) in 2008 and European System of Accounts (ESA) in 2010 specify R&D, from 2014 onwards, should not be considered as an ancillary activity and instead expenditure on R&D should constitute investment in R&D assets, which as a consequence needs to be capitalised in the UK National Accounts. Therefore R&D expenditure will now contribute to the compilation of the value of the UK's net worth and be included as part of Gross Domestic Product (GDP) estimates.

Within Government, the Department of Enterprise, Trade and Investment (DETI) rely upon R&D data to better inform policy development; this includes conducting economic research, appraisals and evaluation; providing Ministerial briefings and economic commentary, as well as responding to Assembly Questions. Below is a link to the Research, Development and Innovation page of the DETI website which outlines recent policy developments and how these are supported by the use of R&D statistics; and a second link providing an example of how the statistics are further utilised in a government research setting:

<http://www.detini.gov.uk/deti-eco-dev-research-development.htm>

[http://www.niassembly.gov.uk/Documents/RaISe/Publications/2012/enterprise\\_trade\\_investment/2312.pdf](http://www.niassembly.gov.uk/Documents/RaISe/Publications/2012/enterprise_trade_investment/2312.pdf)

Invest NI use the data to better inform their decision making and investment strategies and to enhance their own internal research. The below link provides an example:

[http://www.investni.com/index/already/product/research\\_and\\_development.htm](http://www.investni.com/index/already/product/research_and_development.htm)

Outside government the data is used by a variety of different private sector and academic analysts to assist with industrial and investment decisions. The data is also used to inform the wider public about the shape of the Northern Ireland Economy.

[http://www2.warwick.ac.uk/fac/soc/wbs/research/csme/research/working\\_papers/wp107.pdf](http://www2.warwick.ac.uk/fac/soc/wbs/research/csme/research/working_papers/wp107.pdf)

<http://www.agendani.com/reversing-rd-under-performance>

The Research and Development Society is a UK-based organisation formed to promote the better understanding of R&D in all its forms. The Society makes use of UK BERD data as a key source of information, for understanding how much UK businesses are investing in R&D on an annual business and to inform wider debates on the subject.

<http://www.rdsoc.org>

## 6.2: Northern Ireland Higher Education Expenditure on Research & Development

Table 14 (page 29) details Higher Education Expenditure on R&D (HERD). The table gives combined results from the two Northern Ireland universities - i.e. Queen's University Belfast (QUB) and the University of Ulster (UU). The data collected refers to the academic year i.e. 2012/2013 ending 31/7/2013. The universities have made data available for this period on the basis of Transparency Review data collected within each respective institution.

### Transparency Review

The Transparency Review is a Government initiative, introduced with the Comprehensive Spending Review (CSR) in 1998. The CSR awarded £1.5bn of additional funding for Higher Education, but the Treasury made this conditional on the sector becoming more open about the way public funds are spent in universities and colleges.

More detailed information on Transparency Review procedures in each of the local universities can be found at

<http://www.qub.ac.uk/directorates/FinanceDirectorate/CapitalandCosting/Costing/> for QUB and at [http://www.ulster.ac.uk/finance/transparency\\_reviews.html](http://www.ulster.ac.uk/finance/transparency_reviews.html) for UU.

Total R&D Expenditure - Following consultation with the universities, it was agreed that all university expenditure on R&D is 'in-house' expenditure - i.e. R&D work carried out within the university.

Non Capital Expenditure – Includes expenditure on salaries and wages and other costs (materials, supplies, equipment and services).

Capital Expenditure - Includes expenditure on land, buildings, machinery and equipment. It should be noted that capital expenditure on R&D within universities is likely to fluctuate significantly from year to year. For example, an R&D project may have duration of several years but involve heavy capital outlay in the formative years of the research.

Source of funding – this is split into nine separate categories as shown in Table 14. For the purposes of this survey, the Government Block Grant was used as a 'balancing figure' with values for the other eight categories completed using data from the Transparency Review.

Employment on R&D – It is possible, using the results from the Transparency Review, to determine how much time members of staff spend on R&D. Figures shown have been rounded to the nearest 10

## 6.3: Northern Ireland Government Expenditure on Research & Development

Government Expenditure on Research and Development is conducted annually by the Office of National Statistics (ONS) as a census survey. Approximately 15 government departments and research councils are sent a questionnaire. Government departments are asked to include their in-house R&D as part of their estimates – this includes estimates for R&D performed by local authorities and NHS trust.

## 7. ANNEX

Annex Table 1: Business Expenditure on R&D 2008 – 2013

	Cash Terms						Real Terms (2012 Prices) <sup>19</sup>						% Change Real Terms	
	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013	12-13	08-13
Total Business Expenditure (£m)	183.9	323.7	344.0	388.8	461.3	481.8	204.4	352.7	363.3	402.1	469.3	481.8	2.7%	136%
In-house R&D (£m)	170.6	297.2	324.2	354.1	419.9	443.2	189.6	323.9	342.4	364.1	427.2	443.2	3.7%	134%
Non capital (£m)	152.2	235.0	230.0	321.2	377.5	382.6	169.1	256.1	242.9	332.2	384.1	382.6	-0.4%	126%
Capital (£m)	18.4	62.2	94.2	32.8	42.4	60.6	20.4	67.8	99.5	33.9	43.1	60.6	40.5%	196%
Purchased R&D (£m)	13.3	26.5	19.8	34.7	41.4	38.7	14.8	28.9	20.9	35.9	42.1	38.7	-8.1%	162%
<b>In-house R&amp;D Funding</b>														
R&D Funded from own funds (£m)	145.8	242.5	264.0	294.1	350.5	364.4	162.0	264.3	278.8	304.2	356.6	364.4	2.2%	125%
R&D Funded by Government (£m)	22.7	50.4	57.3	54.2	41.9	54.3	25.2	54.9	60.5	56.1	42.6	54.3	27.4%	115%
R&D (£m) Overseas/ Other	2.1	4.3	2.8	5.8	27.5	24.5	2.3	4.7	3.0	6.0	28	24.5	-12.4%	950%

<sup>19</sup> GDP deflator used to convert cash terms to real terms: 2008 (90.0), 2009 (91.8), 2010 (94.7), 2011 (96.7), 2012 (98.3), 2013=100

Annex Table 1 continued: Business Expenditure on R&D 2008 – 2013

	Cash Terms						Real Terms (2012 Prices) <sup>19</sup>						% Change Real Terms	
	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013	12-13	08-13
<b>Ownership</b>														
External Ownership (%)	60	73	68	74	78	75	60	73	68	74	78	75	-3.8%	25.0%
Local Ownership (%)	40	27	32	26	22	25	40	27	32	26	22	25	13.6%	-37.5%
<b>Type of In-house Non capital Research</b>														
Basic Research (£m)	8.0	13.5	18.4	7.3	11.8	9.8	8.9	14.7	19.4	7.5	12.0	9.8	-18.4%	10.2%
Applied Research (£m)	74.1	83.9	96.7	114	147.8	141.7	82.3	91.4	102.1	117.9	150.4	141.7	-5.8%	72.1%
Experimental Development (£m)	70.1	137.7	114.9	200	218	231.1	77.9	150.1	121.4	206.8	221.8	231.1	4.2%	197%
<b>Size</b>														
SME <sup>20</sup> (£m)	106.1	144.3	133.4	140.6	172.8	173.8	117.9	157.2	140.9	145.4	175.8	173.8	-1.1%	47.4%
250+ (£m)	77.8	179.4	210.6	248.1	288.5	308.1	86.5	195.5	222.4	256.6	293.5	308.1	5.0%	256%

<sup>20</sup> The European Commission definition of Small Medium Enterprises (SME) used is defined as being enterprises with less than 250 employees and large companies as being enterprises with more than 250 employees.

**Annex Table 1 continued: Business Expenditure on R&D 2007 – 2013**

	Cash Terms						Real Terms (2012 Prices) <sup>19</sup>						% Change Real Terms	
	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013	12-13	08-13
<b>Sector<sup>21</sup></b>														
Manufacturing (%)	62	71	71	79	78	75	62	71	71	79	78	75	-3.8%	21.0%
Services and Other (%)	38	29	29	21	22	25	38	29	29	21	22	25	13.6%	-34.2%

<sup>21</sup> SIC 2003 basis up to 2008, SIC 2007 basis thereafter. For definitions see Section 6, Background Notes

**Annex Table 2: Breakdown of In-House R&D Expenditure 2013 by employment size-bands (< 50 employees, 50 to 249 employees and 250+ employees) in £000s (rounded to nearest £100,000)**

	Non Capital Expenditure						Capital Expenditure			Total In-House R&D Expenditure
	Salaries & Wages	Other Costs	Total Expenditure	Basic Research	Applied Research	Experimental Development	Lands & Building	Plant & Machinery	Total Expenditure	
<b>Manufacturing</b>										
<50	8,900	*	*	*	*	*	*	*	*	17,400
50- 249	27,100	*	*	*	*	*	*	*	*	57,600
250+	91,100	122,600	213,700	2,200	56,900	154,600	*	*	38,200	251,800
Total	127,100	149,300	276,500	6,500	81,000	189,000	1,500	48,800	50,300	326,800
<b>Services &amp; Other</b>										
<50	26,600	*	*	*	*	*	*	*	*	41,300
50 -249	29,100	*	*	*	*	*	*	*	*	42,100
250+	17,900	8,500	26,400	400	20,600	8,100	*	12,600	6,600	33,300
Total	73,600	32,500	106,100	3,300	63,400	42,100	*	9,900	10,200	116,400
<b>All Industries</b>										
<50	35,500	20,100	55,600	5,000	24,800	25,700	*	2,900	3,000	58,600
50-249	56,200	30,700	86,900	2,200	42,100	42,600	*	11,400	12,700	99,700
250+	109,000	131,100	240,100	2,600	77,500	162,700	*	44,800	44,800	284,800
Total	200,700	181,900	382,600	9,800	144,400	231,100	*	58,800	60,600	443,200

\*Disclosive

Totals may not sum due to rounding



**Annex Table 3: Breakdown of Purchased R&D Expenditure 2013 by employment size-bands (< 50 employees, 50 to 249 employees and 250+ employees) in £000s (rounded to nearest £100,000)**

		Purchased R&D Expenditure			
		Work commissioned within NI	Work commissioned within GB	Work carried out outside the UK	Total Purchased R&D Expenditure
<b>Manufacturing</b>					
	<50	*	*	*	900
	50-249	*	*	*	*
	250+	*	*	*	*
	<b>Total</b>	7,600	10,800	15,100	33,600
<b>Services &amp; Other</b>					
	<50	*	*	*	2,600
	50-249	*	*	*	*
	250+	*	*	*	*
	<b>Total</b>	2,400	300	2,400	5,100
<b>All Industries</b>					
	<50	2,300	400	1,000	3,600
	50-249	800	*	*	11,900
	250+	7,000	*	*	23,200
	<b>Total</b>	10,000	11,100	17,500	38,700

\*Disclosive  
Totals may not sum due to rounding

**Annex Table 4: Breakdown of Business Expenditure on R&D (BERD) by Small and Medium Sized Enterprises (SMEs <250 employees) 2001-2013 (£m)<sup>22</sup>**

	R&D Expenditure												2012	2013
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011			
<b>SMEs (&lt;250)</b>														
In- house	40.2	63.2	53.2	54.8	69.4	73.4	110.5	98.3	123.0	119.7	119.4	155.9	158.3	
Purchased	3.3	3.6	3.2	7.5	5.5	8.2	6.8	7.9	21.3	13.7	21.2	16.9	15.5	
<b>Total</b>	43.4	66.8	56.4	62.3	74.9	81.6	117.2	106.1	144.3	133.4	140.6	172.8	173.8	
<b>(250+)</b>														
In- house	109.8	86.1	63.3	65.4	78.4	83.2	66.4	72.3	174.2	204.5	234.6	264.0	284.8	
Purchased	1.8	3.8	1.6	1.4	1.0	2.2	1.4	5.5	5.3	6.1	13.5	24.5	23.2	
<b>Total</b>	111.6	89.9	64.9	66.8	79.4	85.4	67.9	77.8	179.4	210.6	248.1	288.5	308.1	
<b>All</b>														
In- house	149.9	149.3	116.5	120.2	147.8	156.6	176.9	170.6	297.2	324.2	354.1	419.9	443.2	
Purchased	5.1	7.3	4.8	8.8	6.5	10.4	8.2	13.3	26.5	19.8	34.7	41.4	38.7	
<b>Total</b>	155.0	156.6	121.3	129.0	154.3	167.0	185.1	183.9	323.7	344.0	388.8	461.3	481.8	

Totals may not sum due to rounding

<sup>22</sup>The European Commission definition of Small Medium Enterprises (SME) used is defined as being enterprises with less than 250 employees.

**Annex Table 5: Breakdown of 2013 R&D Employment by gender, employment size-band and Full time Equivalent (FTE) (rounded to nearest 10)**

		Researchers				Technicians				Other				All Types			
		Male	Female	Total	FTE	Male	Female	Total	FTE	Male	Female	Total	FTE	Male	Female	Total	FTE
<b>Manufacturing</b>																	
Employment Size-bands	<50	*	*	*	*	*	*	*	*	*	*	*	*	510	80	590	300
	50-249	1,190	220	1,410	1,220	*	*	360	290	440	70	510	410	1,890	380	2,270	1,920
	250+	*	*	*	*	*	*	*	*	*	*	*	*	1,060	310	1,370	780
	Total	1,770	330	2,110	1,780	670	140	810	530	1,020	300	1,320	680	3,460	770	4,230	2,990
<b>Services &amp; Other</b>																	
Employment Size-bands	<50	*	*	*	*	*	*	*	*	*	*	*	*	870	160	1020	690
	50-249	210	70	280	250	*	*	220	160	60	10	70	40	430	140	570	460
	250+	*	*	*	*	*	*	*	*	*	*	*	*	630	270	900	620
	Total	990	230	1,230	980	570	170	740	500	370	160	530	280	1,930	560	2,490	1,760
<b>All Industries</b>																	
Employment Size-bands	<50	610	90	700	490	450	50	490	270	320	110	430	220	1,380	240	1,610	980
	50-249	1,400	290	1,680	1,470	430	150	580	460	500	80	580	450	2,320	520	2,840	2,370
	250+	760	200	950	800	360	110	470	310	580	270	840	290	1,690	570	2,270	1,400
	Total	2,760	570	3,330	2,760	1,230	310	1,540	1,040	1,390	450	1,850	950	5,390	1,330	6,720	4,750

\*Disclosive  
Totals may not sum due to rounding

## User Engagement

We welcome any feedback you might have in relation to this report, and would be particularly interested in knowing how you make use of these data to inform your work. Please contact us at [statistics@dfpni.gov.uk](mailto:statistics@dfpni.gov.uk)

## Next Publication

The next bulletin will be published in November 2015.

## FOR FURTHER INFORMATION

### Statistics contact:

**Patrick McVeigh/Kimberley Gillespie**

Economic and Labour Market Statistics Branch, Room 120, Netherleigh, Massey Avenue, Belfast BT4 2JP.

**Email:** [statistics@dfpni.gov.uk](mailto:statistics@dfpni.gov.uk)

**Tel:** (028) 9052 9431

**Textphone:** (028) 9052 9304

### Media contact:

Press Office, Netherleigh, Massey Avenue, Belfast BT4 2JP

**Email:** [pressoffice@detini.gov.uk](mailto:pressoffice@detini.gov.uk)

**Tel:** (028) 9052 9604

**Textphone:** (028) 9052 9304