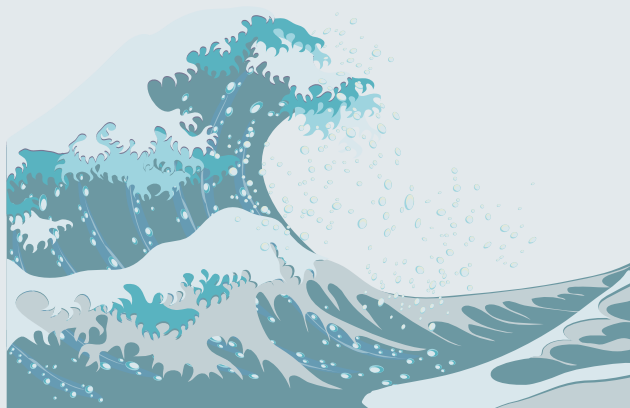


2017



Science and Technology Indicators

R&D statistics

2017

NIFU

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Introduction

This booklet, containing tables and figures on R&D statistics and science and technology indicators, has been published annually since 1997. The web-edition can be found at <http://www.nifu.no/en/statistics-indicators/nokkeltall/>. Here you can also download tables and figures in Excel format. A broader coverage of S&T input and output data is also published annually in the Report on Science and Technology Indicators for Norway by The Research Council of Norway. As in 2015, the 2017-edition will be published in October. The 2017-edition will include an abridged english version. The internet version of the report is regularly updated (http://www.forskningsradet.no/prognett-indikatorrapporten/Home_page/1224698172612). You may also find information at www.foustatistikkbanken.no.

All expenditures are given in current prices, unless otherwise indicated. In 2015 1.00 PPP US\$ = 9.7 NOK (OECD ,Main Science and Technology Indicators 2016-2). By May 2017 1 Euro = 9.39 NOK.

Who prepares the R&D statistics?

NIFU and Statistics Norway carry out the statistical surveys on resources devoted to R&D in Norway. NIFU is responsible for collecting, processing and disseminating statistics and indicators regarding the institute sector (see classification on page four) and the higher education sector, while Statistics Norway is responsible for the industrial sector. NIFU is also responsible for compiling the information into national totals for Norway. In the industrial and institute sectors, and the health trusts, annual statistical surveys are carried out. In the higher education sector the survey is carried out every second year. For all sectors main figures are presented annually. Further information may be found at: www.nifu.no/en/statistics/.

How are R&D statistics compiled?

Norwegian R&D statistics are compiled in accordance with the international guidelines proposed by the OECD in the «Frascati Manual» (The Measurement of Scientific and Technological activities: Proposed Standard Practice for Surveys on Research

and Experimental Development «Frascati Manual 2002», OECD 2002). A new and revised edition was published in October 2015. R&D statistics for Norway are based on administrative registers and questionnaires sent to the R&D performing units in each sector.

The survey on R&D activity in **the industrial sector** covers all companies with 50 or more employees. In addition, the survey includes a sample of companies with a minimum of 10 employees. Prior to 1995, the survey only included companies with 50 or more employees. Statistics on the Industrial sector from 1995 onwards are therefore not comparable with previous years.

In **the higher education sector** each individual department or corresponding equivalent unit is surveyed. Supplementary sources of information include surveys on staff time distribution, information on personnel and expenditure from the institutions' central administration, information from the Research Council of Norway, and from medical foundations.

The institute sector is also fully covered by exhaustive surveys. Questionnaires are sent to research institutes and other institutions that are expected to perform R&D activities. R&D performed at museums is estimated.

Statistics on R&D resources in **health trusts** (university hospitals and other hospitals), are collected through a separate, national reporting system. Since the 2007 edition, the reporting system for health trusts has been integrated with that for national R&D statistics. In international R&D statistics, university hospitals are included in the higher education sector, while other hospitals are included in the government sector/institute sector.

Basic definitions of research and experimental development (R&D)

Research and experimental development (R&D) comprise 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.

Three types of R&D may be distinguished:

- **Basic research** is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.
- **Applied research** is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.
- **Experimental development** is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

Sector classification

Norwegian R&D statistics are generally presented divided into three sectors: Industrial sector, institute sector and higher education sector. The higher education sector, university hospitals included, corresponds to the OECD higher education sector. For international comparisons, business enterprise sector includes the industrial sector as well as non-profit research institutes serving enterprises. In national statistics, these business-oriented research institutes are included in the institute sector, which also covers the government sector and private non-profit sector (PNP). The PNP sector is relatively small in Norway, and is therefore merged into the government sector in international statistics presentations.

In this publication, health trusts are sometimes presented apart.

Other data sources

Norwegian R&D statistics comes from the national statistical producers NIFU and Statistics Norway. Statistics on R&D personnel in the higher education and institute sectors are based on NIFU's Register of Research personnel. The register is updated annually. International R&D statistics are extracted from the OECD's Main Science and Technology Indicators and the OECD online database. Information about doctoral students and awarded doctoral degrees in the Nordic and Baltic countries is from NORBAL, a database operated by NIFU. The doctoral degree statistics are based on NIFU's Norwegian Doctoral degree register, which is updated biannually. Bibliometric data are extracted from the database Web of Science of Clarivate analytics. This database contains worldwide publication and citation statistics.

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Highlights

- Total R&D expenditure in Norway amounted to 60.2 billion NOK in 2015, an increase from 53.9 billion NOK in 2014 and 50.7 billion NOK in 2013.
- Norwegian R&D expenditure in 2015 amounted to 1.93 % of GDP. In the OECD area the average R&D share of GDP was 2.4 % (2014), corresponding to 1.95 % for the EU 28.
- Norway spent 11,618 NOK on R&D per capita in 2015. Denmark and Sweden spent 14,035 and 15,104 NOK, respectively.
- In purchase-power-adjusted PPP\$ and fixed 2010 prices, R&D expenditure per capita in Norway was 623 in 1995 and 1,119 in 2015, an increase of 495. For comparison, EU 28 average increased from 408 to 676, ie. 268 PPP\$.
- At universities and university colleges in Norway, medical and health sciences was the largest field of science in 2005 with 31 per cent of current R&D expenditure for R&D. In 2015, social sciences was the biggest field of science (30 prosent).
- Industrial sector financed 19 per cent of R&D in the institute sector in 2015. The majority of this went to the technological and industrial research institutes. This represented 12 per cent of total R&D expenditure in the sector. Core funding to all institutes from the Research council of Norway represented 7 per cent of the total R&D in the sector.
- At university hospital trusts, expenditure on R&D amounted to 5 per cent of total current expenditure in 2015. Other hospital trusts spent a little more than one per cent of current expenditure on R&D.
- In 2015, 76,566 persons were involved in R&D in Norway. Of these, researchers amounted to 70 per cent and support staff had 30 per cent share. Total R&D personnel performed 42 409 FTEs, 45 per cent were related to industrial sector.
- 48 per cent of new doctoral degrees in Norway were in 2015 awarded to women.
- The University of Oslo (UiO) is the institution awarding most doctoral degrees (34 per cent 2012–2016).
- The number of scientific articles adjusted for number of inhabitants, Norway follows Switzerland, Denmark, Sweden, and Australia with 2.53 articles per capita. Number of Norwegian articles as a share of World production represented 0.6 per cent.

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R&D personnel

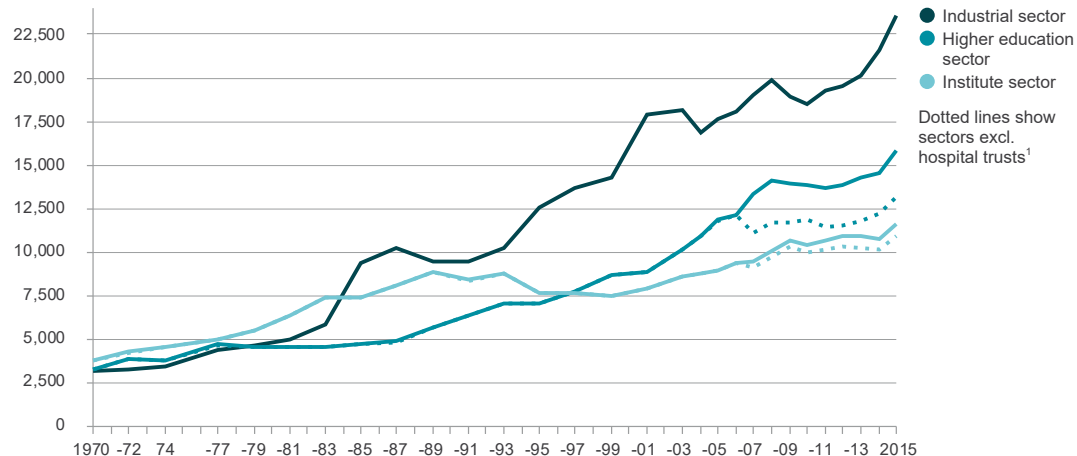
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1 R&D expenditure by sector of performance: 1970–2015. Fixed 2010-prices. Mill. NOK. Norway.

Mill. NOK



¹ Hospitals in the higher education sector (university hospital trusts) and institute sector (other hospital trusts).

Source: NIFU/Statistics Norway, R&D statistics

2 R&D expenditure by type of institution and source of funds.
Norway. 2015. Million NOK.

Type of institution	Total	Industrial sector		Government		Other ¹	Abroad	
		Total	Of which: Oil companies	Total	Of which Research council		Total	Of which: EU-comm.
Industrial sector	27,782	21,690	..	1,171	553	1,315	3,607	118
Institute sector²	12,897	2,539	416	8,285	2,988	702	1,372	431
Of which: Research inst. serving enterprises	4,663	1,895	317	1,634	1,124	497	637	237
Government sector	8,235	644	99	6,651	1,864	206	735	194
Universities and colleges	15,523	549	157	13,759	2,565	690	525	397
Of which: Universities and spec. univ. inst.	13,524	496	154	11,881	2,346	657	490	371
State university colleges	1,999	53	3	1,877	219	33	36	26
Hospital trusts	4,007	62	-	3,670	239	236	38	14
Of which: University hospital trusts	3,186	38	-	2,915	217	197	36	12
Other hospital trusts	821	24	-	756	22	39	2	1
Total	60,209	24,839	..	26,885	6,345	2,943	5,542	960

¹ Includes private funding, own funds and tax deduction fund «SkatteFunn» in Industrial sector.

² Excluding hospitals.

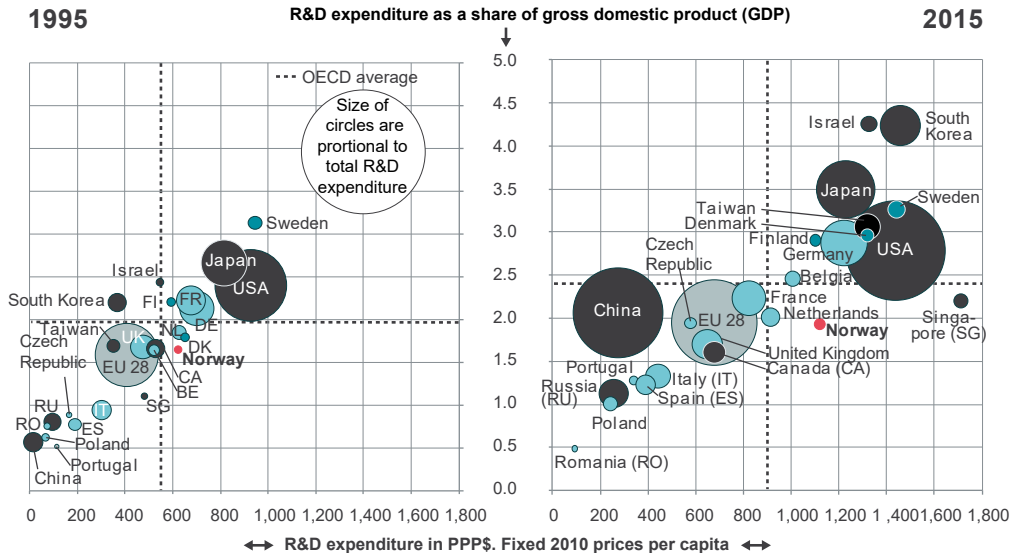
Source: NIFU/Statistics Norway, R&D statistics

3 R&D expenditure as a percentage of the gross domestic product (GDP), by source of funds, and sector of performance. Selected countries. 2015.

Country	R&D expenditure as a percentage of GDP							R&D expenditure per capita NOK
	Total	Sector of performance			Source of funds			
		Industrial sector	Higher ed. sector	Government sector	Government	Industry	Other	
Austria	3.07	2.16	0.74	0.15	1.12	1.44	0.50	14,709
Canada	1.60	0.80	0.65	0.16	0.56	0.73	0.32	6,737
China	2.07	1.55	0.14	0.33	0.43	1.51	0.08	2,877
Denmark	2.96	1.87	0.97	0.08	0.86	1.73	0.33	14,035
Finland	2.90	2.11	0.77	0.28	0.92	1.74	0.52	11,859
France	2.23	1.46	0.45	0.33	0.77	1.25	0.22	8,855
Germany	2.87	1.96	0.50	0.43	0.83	1.90	0.15	13,360
Iceland	2.19	1.30	0.61	0.10	0.64	0.67	0.70	10,116
Japan	3.49	2.82	0.44	0.33	0.55	2.80	0.24	12,978
South Korea	4.23	3.32	0.39	0.57	1.01	3.20	0.08	14,185
Norway	1.93	0.92	0.53	0.26	0.77	0.71	0.23	11,618
Russia	1.13	0.64	0.10	0.34	0.76	0.29	0.04	2,680
Sweden	3.26	2.19	0.84	0.11	0.89	1.92	0.34	15,104
The Netherlands	2.01	1.11	0.64	0.25	0.67	0.97	0.36	9,670
United Kingdom	1.70	1.10	0.43	0.15	0.47	0.81	0.40	6,879
USA	2.79	1.97	0.36	0.42	0.66	1.77	0.33	15,123
Total OECD	2.40	1.65	0.42	0.32	0.66	1.47	0.27	9,432
EU 28	1.95	1.24	0.45	0.26	0.64	1.07	0.25	7,292

Sources: OECD – Main Science and Technology Indicators 2016–2 and national sources

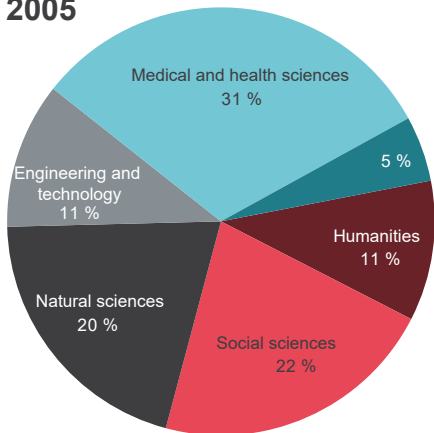
4 R&D expenditure per capita, as a share of gross domestic product (GDP) and total R&D. Fixed 2010 prices in PPP\$ and per cent. Selected countries. 1995 and 2015.



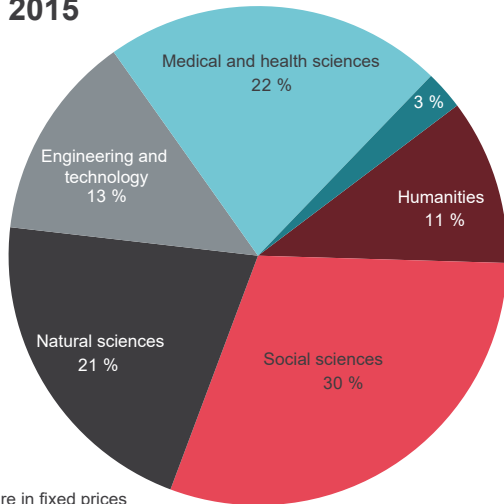
Source: OECD – Main Science and Technology Indicators 2016-2

5 R&D expenditure in universities and university colleges by field of science. Norway. Current R&D expenditure. 2005 and 2015.

2005



2015

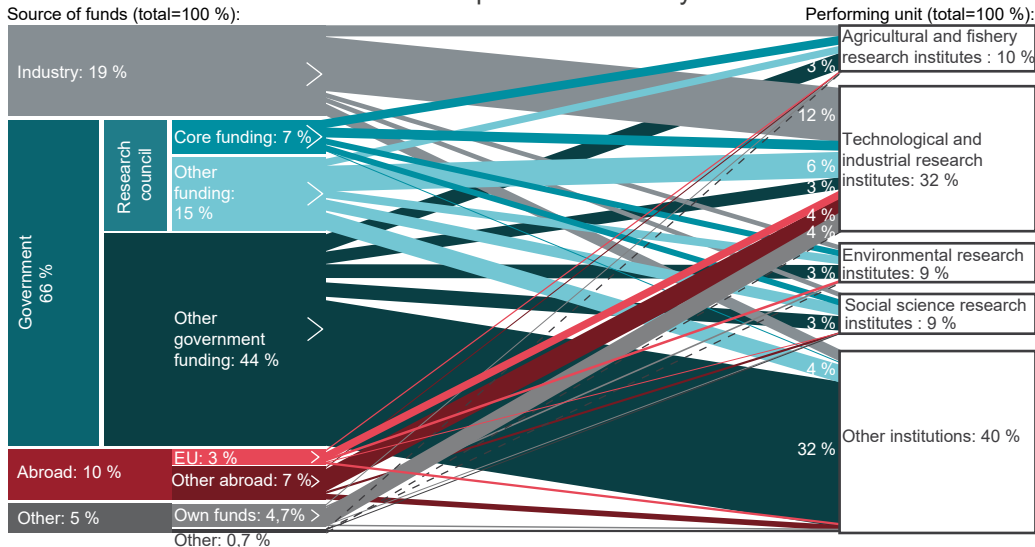


● Agricultural sciences

Size of diagrams are proportional to current R&D expenditure in fixed prices

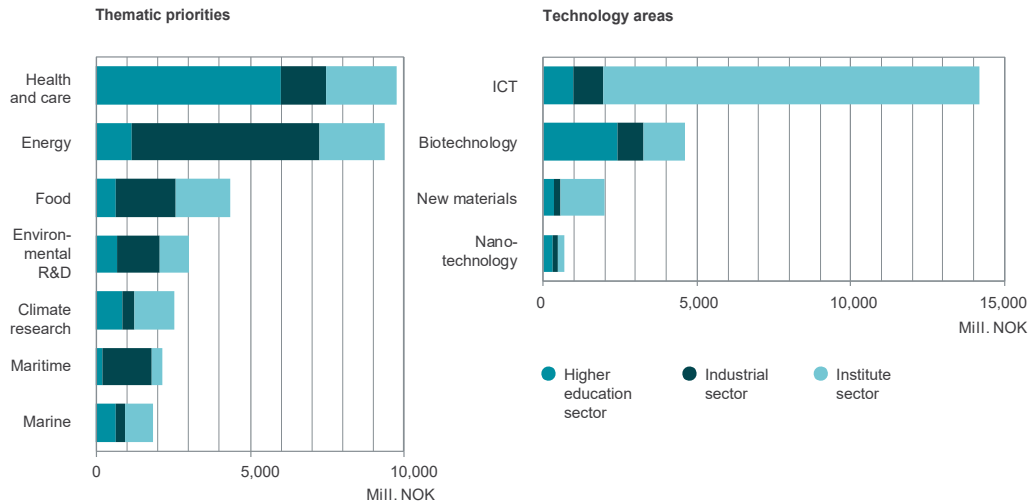
Source: NIFU, R&D statistics

6 R&D expenditure in the institute sector by source of funds and type of performing institution. Per cent of total R&D expenditure. Norway. 2015.



Source: NIFU, R&D statistics

7 Current R&D expenditure by thematic priority and technology area and sector of performance. Mill. NOK. Norway. 2015.



¹ Definitions of thematic priorities may overlap, those of technology areas may not.

Source: NIFU/Statistics Norway, R&D statistics

8 Total current expenditure and current expenditure¹ for R&D by type of health trust and health region. Current R&D expenditure as a percentage of total current expenditure. Mill. NOK. Per cent. Norway. 2015.

Health region	University hospital trusts ²			Other hospital trusts		
	Total current costs ³	Current costs for R&D ⁴	% R&D	Total current expenditure ³	Current expenditure for R&D ⁴	% R&D
Mid Norway	9,938	255	2.6	10,012	49	0.5
Northern Norway	7,155	240	3.4	8,434	55	0.6
South-Eastern Norway	30,566	1,942	6.4	46,443	652	1.4
Western Norway	17,539	686	3.9	7,647	62	0.8
Total	65,198	3,123	4.8	72,536	817	1.1

¹ Current expenditure, including depreciation and externally funded R&D expenditure.

² Includes Oslo University Hospital HF, Akershus University Hospital HF, Bergen Health Trust HF, Stavanger Health Trust HF, St. Olav hospital HF and University Hospital Northern Norway HF.

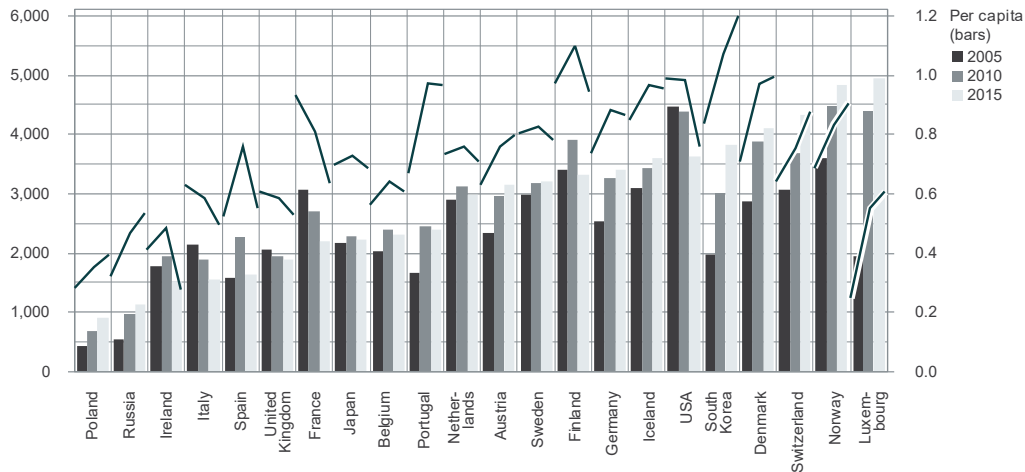
³ Source: Regional health trusts and private hospitals

⁴ Source: NIFU, R&D statistics

9 Government budget appropriations or outlays for R&D (GBARD) per capita and as a share of GDP. NOK. Fixed prices. Percent. Selected countries. 2005¹, 2010, and 2015¹.

□ GBARD per capita. NOK (bars)

— GBARD as a share of GDP (2005, 2010, 2015)



¹ Switzerland: 2006 and 2014. Iceland: 2014.

Source: OECD - Main Science and Technology Indicators 2016-2

10 R&D personnel by type of institution.
Head count and full time equivalents (FTE). Norway. 2015.

Type of institution	Head count by 01.10.2015			R&D full time equivalents	
	Total R&D personnel	Of which: Researchers/academic staff	Tech. & supp. staff	Total	Of which: Researchers/academic staff
Industrial sector	31,068	19,236	11,832	19,087	13,000
Institute sector¹	10,753	7,311	3,442	8,661	6,267
Of which: Research inst. serving enterprises	2,778	1,970	808	2,550	1,921
Research inst. serving government	7,975	5,341	2,634	6,112	4,346
Universities and university colleges	28,162	21,116	7,046	11,443	9,545
Of which: Universities	18,875	13,250	5,625	9,199	7,437
Spec. univ. institutions etc.	2,338	2,144	194	726	702
State univ. colleges	6,949	5,722	1,227	1,518	1,406
Health trusts	6,574	4,518	2,056	3,218	1,820
Of which: University hospital trusts	5,004	3,488	1,516	2 509	1,431
Other hospital trusts	1,570	1,030	540	709	389
Total	76,557	52,181	24,376	42,409	30,632

¹ Excluding hospitals.

Source: NIFU/Statistics Norway, R&D statistics

11 Researchers/academic staff (head count) by type of institution.
Doctorates and women. Norway. 2015.

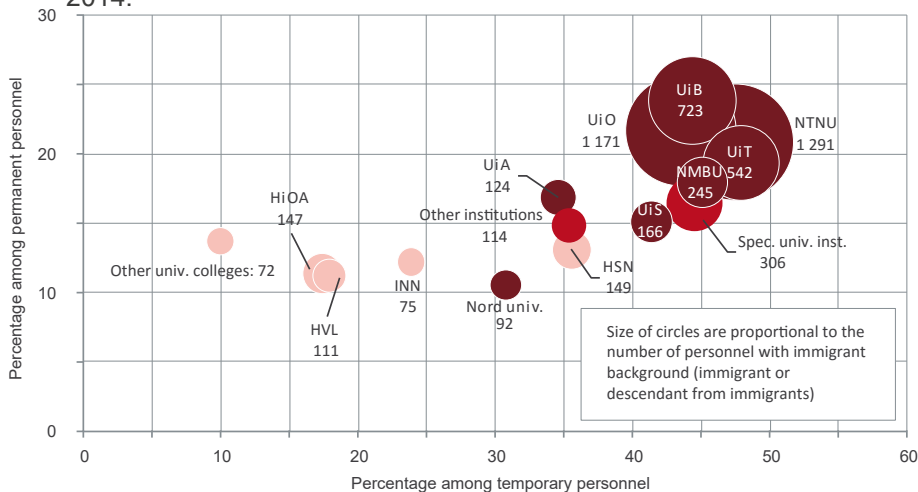
Type of institution	Total			With a doctoral degree ¹			
	Total number	Women Number	%	Total Number	%	Women Number	%
Industrial sector	19,236	4,217	22	2,050	11	506	12
Institute sector²	7,311	3,051	42	3,970	54	1,557	51
Of which: Research inst. serving enterprises	1,970	620	31	1,162	59	373	60
Research inst. serving government	5,341	2,431	46	2,808	53	1,184	49
Universities and university colleges	21,116	9,958	47	9,719	46	3,867	39
Of which: Universities	13,250	5,826	44	7,081	53	2,715	47
Spec. university institutions etc.	2,144	952	44	777	36	280	29
State university colleges	5,722	3,180	56	1,861	33	872	27
Health trusts	4,518	2,281	50	2,281	50	1,017	45
Of which: University hospital trusts	3,488	1,751	50	1,901	55	853	49
Other hospital trusts	1,030	530	51	380	37	164	31
Total	52,181	19,507	37	18,020	35	6,947	36

¹ Also includes licenciates.

² Excluding hospitals.

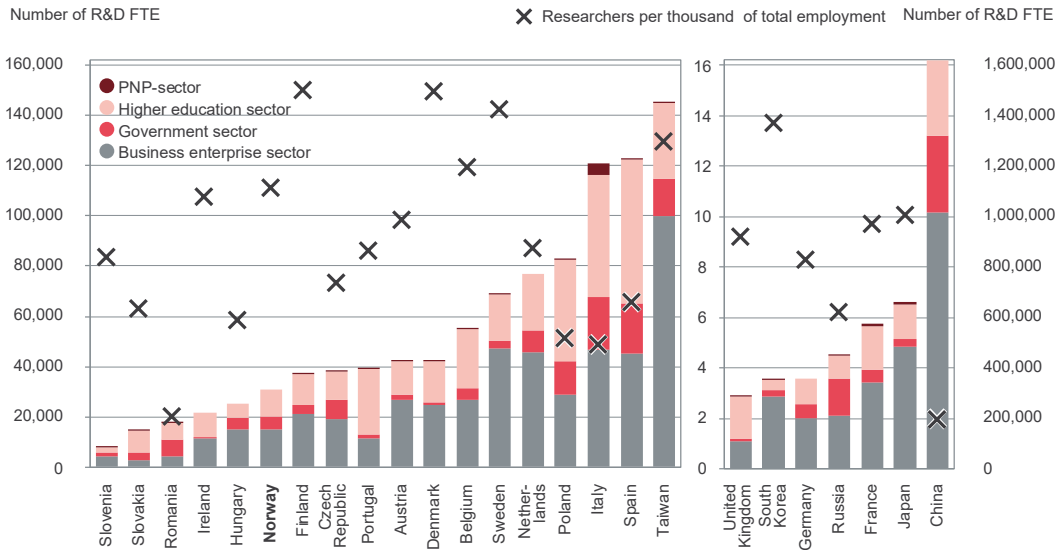
Source: NIFU/Statistics Norway, R&D statistics

12 Immigrants and descendants from immigrants among researchers at universities and university colleges. Share among tenured¹ and temporary personnel, and total number. 2014.



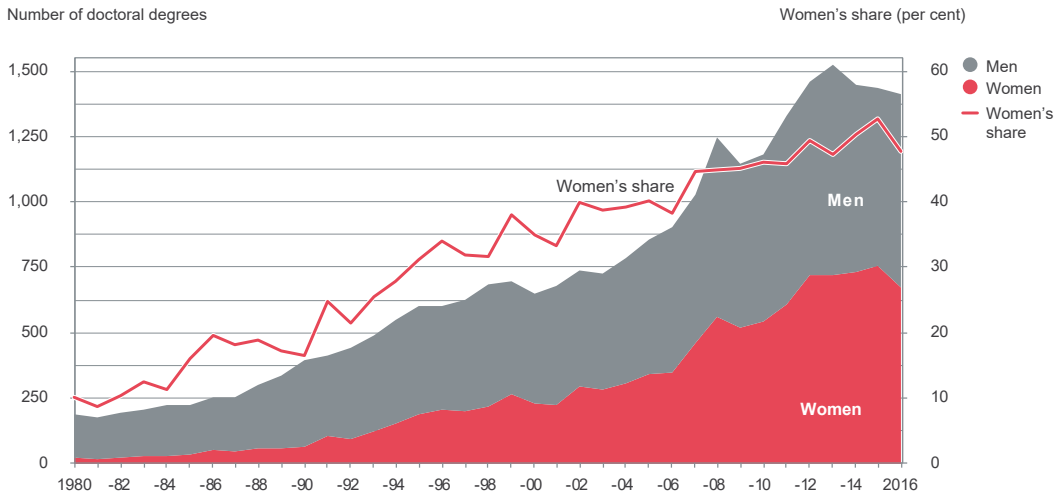
¹ Tenured: Full professor, associate professor, assistant, lecturer. Temporary: Ph.D. student, post.doc and researcher on projects. Source: Mangfoldsstatistikk, NIFU working paper 2016:17. Data from NIFU, Register of Research personnel and Statistics Norway

13 R&D full time equivalents (FTE) performed by researchers. Number per sector and per thousand of total employment. Selected countries. 2015.



Source: OECD.stat

14 Awarded doctoral degrees in Norway by sex. 1980–2016.

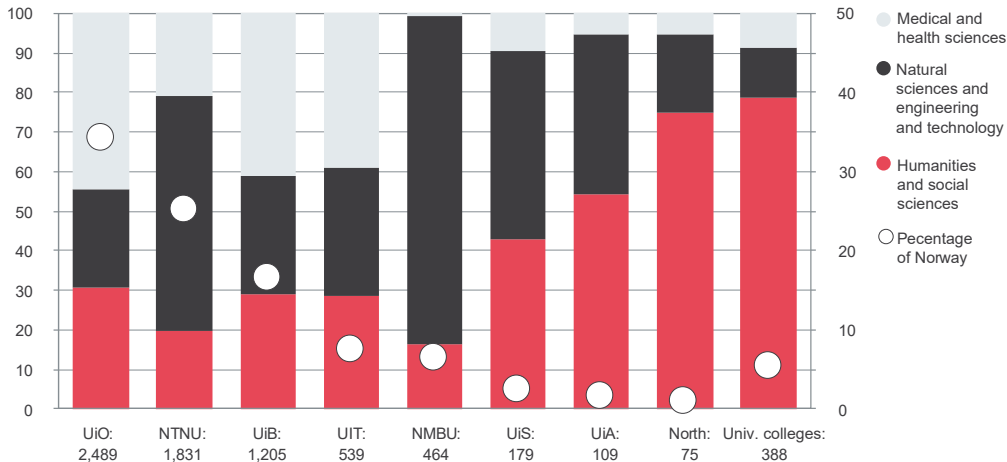


Source: NIFU/The Doctoral degree register

15 Awarded doctoral degrees in Norway by institution¹, field of science² and as a percentage of total number of awarded doctoral degrees. Per cent. 2012–2016.

Per cent (field of science)

○ Institution's percentage in total



¹ Reclassified to apply to the 2016 institutional structure.

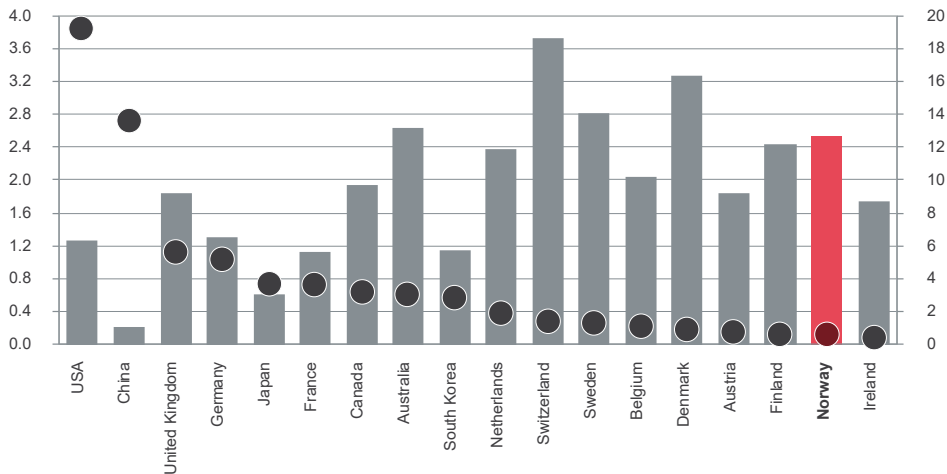
² Agricultural sciences are classified as natural sciences and engineering and technology.

Source: NIFU, The Doctoral degree register

16 Articles in international scientific journals. Number of articles per capita and percentage of world production¹. Selected countries.

□ Number of articles per 1,000 capita (bars)

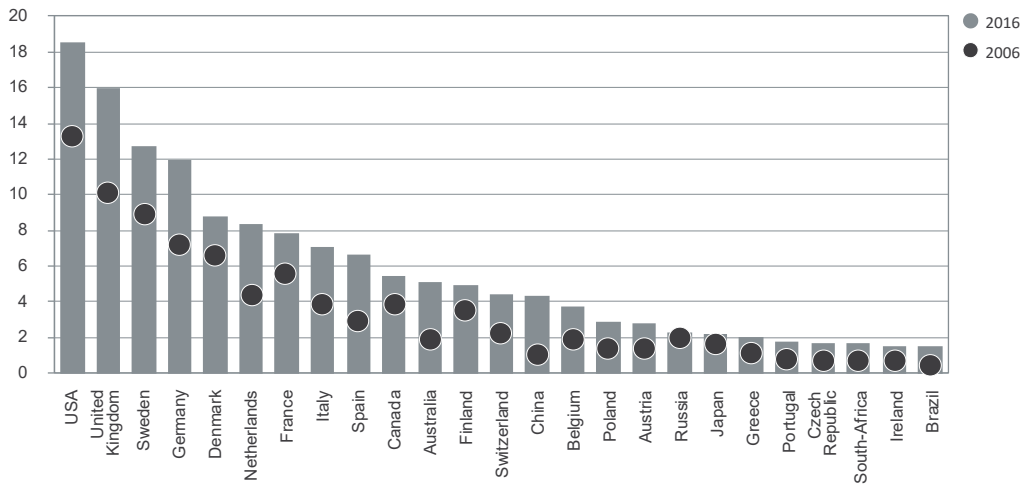
○ Percentage of World production (dots)



¹ Number of articles in 2015 per 1,000 capita in 2014. Share of world production computed from the sum of all countries. Source: Clarivate analytics, Web of Science. Computations: NIFU.

17 Co-authorship between Norway and foreign countries. Share of the total Norwegian article production with co-authors from selected countries¹. 2006 and 2016.

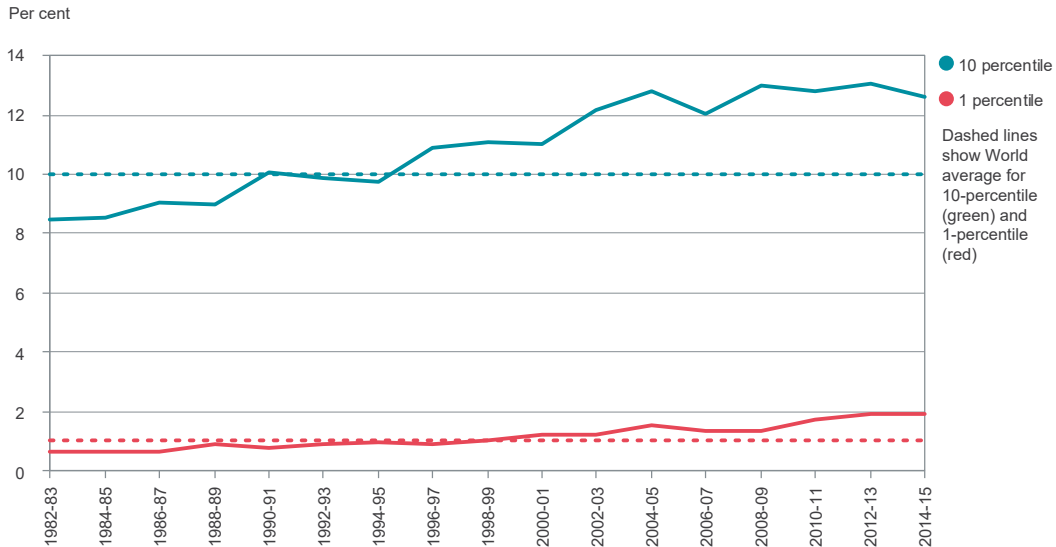
Per cent



¹ Limited to the 25 most frequent collaborative countries.

Source: Clarivate analytics, Web of Science. Computations: NIFU.

18 Share of Norwegian articles among the 10 and one percent most cited articles worldwide. Per cent. 1982/83–2014/15.



Source: Clarivate analytics, Web of Science. Computations: NIFU.