



2014

Science and Technology Indicators

R&D statistics

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 www.nifu.no/en/statistics/. 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. The 2014-edition will be published in September. The 2013-edition also included an abridged english version. The internet version of the report is regularly updated. You may also find information at www.foustatistikkbanken.no. All expenditures are given in current prices, unless otherwise indicated. In 2012 1.00 PPP US\$ = 8.8 NOK (Main Science and Technology Indicators 2013-2, OECD). By April 2014 1 Euro = 8.2 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). 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

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 prepared by the Thomson Reuters in the U.S. This database contains world-wide publication and citation statistics. Patent data are from the Norwegian Industrial Property Office.

Highlights

- Total R&D expenditure in Norway amounted to 48.0 billion NOK in 2012, an increase from 45.4 billion NOK in 2011.
- R&D expenditure in 2012 amounted to 1.65 % of GDP, as in 2011. In the OECD area the average R&D share of GDP was 2.3 per cent, corresponding to 1.95 per cent for the EU-28.
- Norway spent 9 174 NOK on R&D per capita in 2011. Denmark and Sweden spent 11 190 and 12 692 NOK, respectively.
- In 2012, in Health region South East, both the level of current R&D expenditure and share of R&D were higher than in the other regions.
- Government budget appropriations or outlays for R&D (GBAORD) increased in real terms of 4 % from 2013 to 2014. The real increase from 2001 to 2014 was 57 %. Less business-oriented ministries increased the most.
- About 66 000 persons participated in R&D in Norway in 2012. 46 700 were researchers/academic staff. 40 % were women, and the share of women was highest at universities/university colleges, with approx. 46 % women. 33 % of the total research staff were doctorates.
- In 2013, 36 % of new doctoral degrees in Norway were awarded to candidates with a foreign citizenship. 2010–2013, the highest share of candidates with a foreign citizenship came from Asia.
- Norwegian scientists published 11 405 articles in international journals in 2012. This represented 2.3 articles per capita compared to 2.7 articles for Denmark, and for Finland and Sweden, 2.1 and 2.5 articles respectively.
- Relative specialization index 2012 shows that scientific publishing in Norway specialized within the disciplines earth sciences and technology (=0.5), environmental sciences and technology (=0.3) and Health sciences (=0.3) compared to the world average (=1).
- In 2010 patent applications from big Norwegian firms registered by the Norwegian property Office were 26 per cent of Norwegian patent applications.

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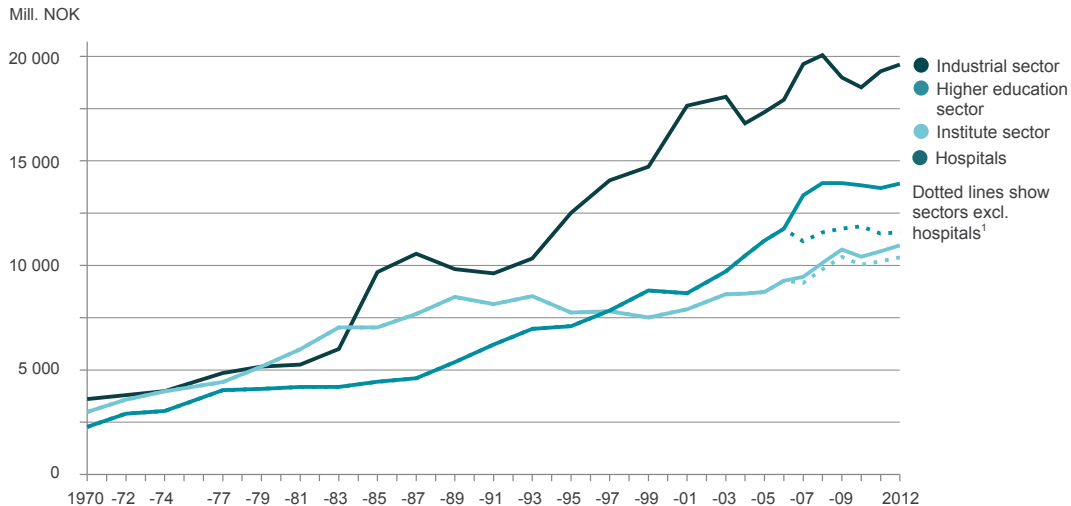
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- 18 Patent applications filed in Norway by Norwegian firms by firm size. 2001–2010

1 R&D expenditure in Norway by sector of performance: 1970–2012. Fixed 2010-prices.



¹ Hospitals in the higher education sector (university hospitals) and institute sector (other health trusts and private, non-profit hospitals).
Source: NIFU/Statistics Norway, R&D statistics

2 R&D expenditure in Norway by type of institution and source of funds. 2012. Million NOK.

Type of institution	Total	Industry		Government		Other ¹	Abroad	
		Total	Of Which: oil-com- panies	Total	Of Which: Research council of Norway		Total	Of Which: EU- comm.
Industrial sector	21 176	17 445	..	977	412	575	2 183	89
Institute sector²	11 213	2 326	509	7 139	2 800	432	1 165	420
Of which: Research inst. serving enterprises	3 939	1 617	362	1 570	1 056	242	510	216
Government sector	7 273	709	146	5 569	1 743	341	654	204
Universities and colleges³	12 528	..	..	..	..	..	..	..
Health trusts	3 127	39	-	2 880	168	185	23	18
Of Which: University hospitals	2 511	29	-	2 305	162	155	22	18
Health trusts and private, non-profit hospitals	616	10	-	575	6	30	1	0
Total	48 044	..	..	..	..	..	..	..

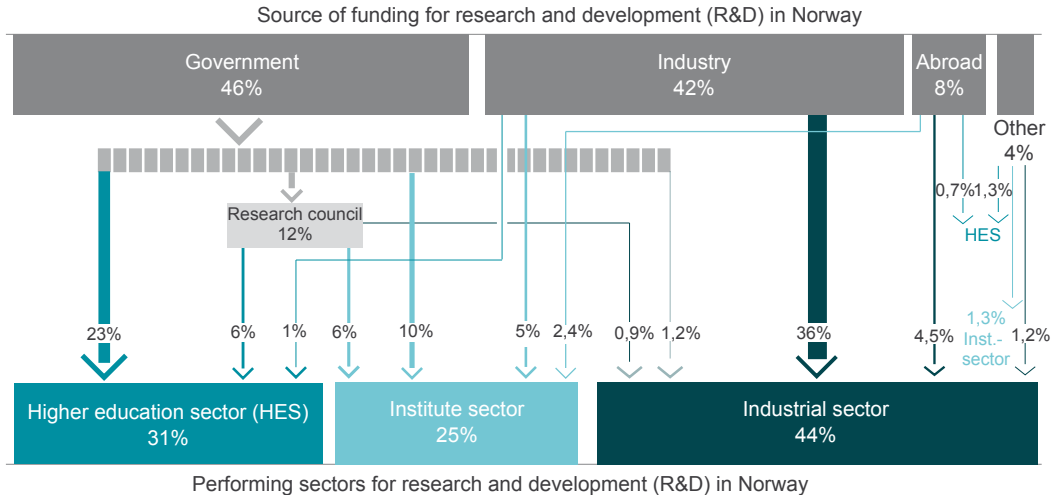
¹ Includes private funding, own funds and tax deduction fund "SkatteFunn" in Industrial sector.

² Excluding hospitals.

³ Only totals available for universities and colleges for 2012.

Source: NIFU/Statistics Norway, R&D statistics

3 Total R&D expenditure in Norway by source of funds¹. 2012. Per cent.
Total R&D expenditure 2012: 48 043 mill. NOK.



¹ For universities and colleges source of funds are estimated based on the distribution in 2011.

Source: NIFU, R&D statistics

4 R&D expenditure as a percentage of the Gross Domestic Product (GDP) by source of funds and sector of performance in 2012.

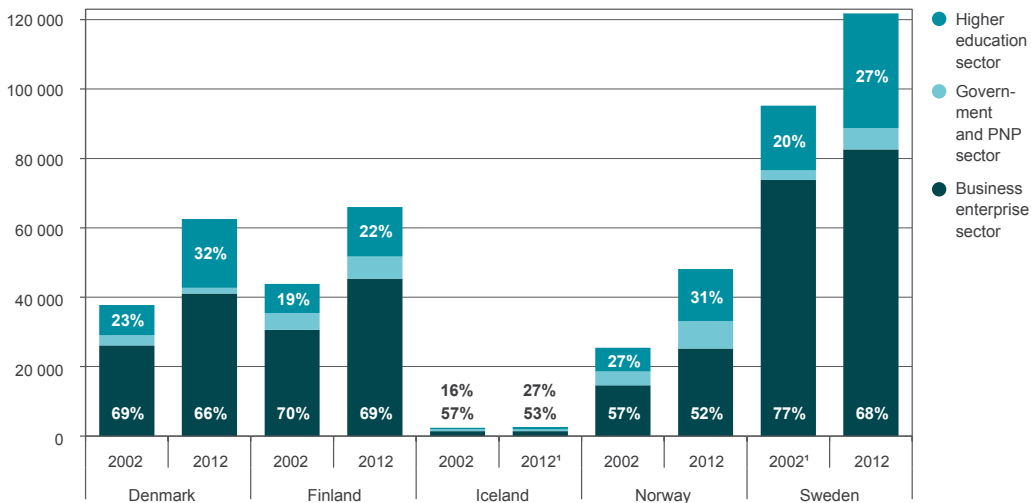
Country	Total	R&D expenditure as a percentage of GDP						R&D expenditure per capita NOK
		Sector of performance			Source of funds			
		Industrial sector ²	Higher ed. sector	Government sector	Government	Industry	Other	
Austria	2.84	1.9	0.7	0.2	1.1	1.2	0.5	10 972
Canada	1.73	0.8	0.7	0.2	0.6	0.8	0.3	6 231
China	1.98	1.5	0.2	0.3	0.4	1.5	0.1	1 575
Denmark	2.98	2.0	0.9	0.1	0.9	1.8	0.3	11 190
Finland	3.55	2.4	0.8	0.3	0.9	2.2	0.4	12 192
France	2.25	1.4	0.5	0.3	0.8	1.2	0.2	7 346
Germany	2.89	2.0	0.5	0.4	0.9	1.9	0.1	10 639
Iceland	2.40	1.3	0.6	0.5	1.0	1.3	0.3	8 229
Ireland	1.72	1.2	0.4	0.1	0.5	0.8	0.4	6 617
Japan	3.39	2.6	0.4	0.4	0.6	2.6	0.2	10 416
Norway	1.65	0.9	0.5	0.3	0.8	0.7	0.2	9 174
Russia	1.12	0.6	0.1	0.4	0.7	0.3	0.1	2 319
Sweden	3.39	2.3	0.9	0.2	0.9	2.0	0.5	12 692
United Kingdom	1.72	1.1	0.4	0.2	0.5	0.8	0.4	5 380
USA	2.79	1.9	0.4	0.5	0.9	1.6	0.3	12 647
Total OECD	2.39	1.6	0.4	0.3	0.7	1.4	0.2	7 640
EU – 28	1.95	1.2	0.5	0.3	0.7	1.0	0.2	5 816

¹ Where 2012 data is not available, the date of reference is 2011 (France, Iceland, Japan, Germany, Norway, Sweden, OECD, EU 28).

Source: OECD - Main Science and Technology Indicators 2013-2

5 R&D expenditure in the Nordic countries by sector of performance. 2002¹ and 2012¹. Mill. NOK.

Mill. NOK



¹Reference year: Sweden: 2001, Iceland: 2011.

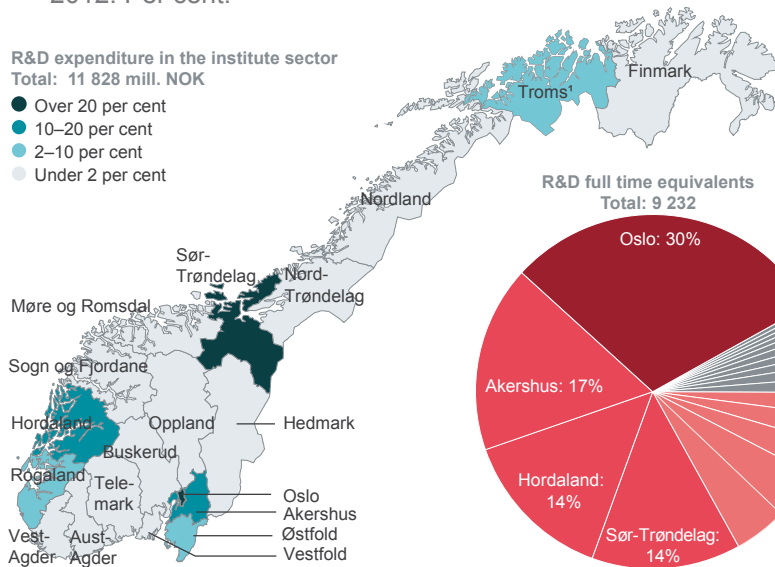
Source: OECD - Main Science and Technology Indicators 2013-2

6 R&D expenditure and R&D full time equivalents (FTE) in the institute sector. 2012. Per cent.

R&D expenditure in the institute sector

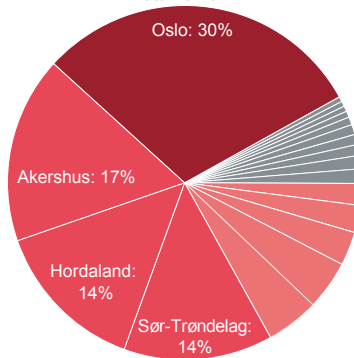
Total: 11 828 mill. NOK

- Over 20 per cent
- 10–20 per cent
- 2–10 per cent
- Under 2 per cent



R&D full time equivalents

Total: 9 232



- Under 2 per cent
 - Finnmark : 0.5%
 - Hedmark: 0.5%
 - Buskerud: 0.5%
 - Sogn og Fjordane: 0.6%
 - Vest-Agder: 0.7%
 - Aust-Agder: 0.9%
 - Nord-Trøndelag: 0.9%
 - Telemark: 1%
 - Nordland: 1.2%
 - Oppland: 1.3%
- 2–10 per cent
 - Vestfold: 2%
 - Rogaland: 3%
 - Østfold: 3%
 - Troms¹: 5%
 - Møre og Romsdal: 5%

¹ Inkluder Svalbard

Source: NIFU, R&D statistics

7 Current expenditure¹ and current R&D expenditure in Norwegian health trusts by type of health trust and region in 2012. Mill. NOK.

Region	University hospitals ²			Health trust without university function		
	Total current expenditure ³	Current R&D expenditure ⁴	% R&D	Total current expenditure ³	Current R&D expenditure ⁴	% R&D
Mid Norway	7 848	203	2.6	8 527	54	0.6
Northern Norway	6 110	208	3.4	7 068	36	0.5
South-Eastern Norway	25 772	1 651	6.4	38 621	465	1.2
Western Norway	14 248	540	3.8	6 262	40	0.6
Total	53 978	2 601	4.8	60 478	596	1.0

¹ According to the accountant principle, current expenditure includes depreciation.

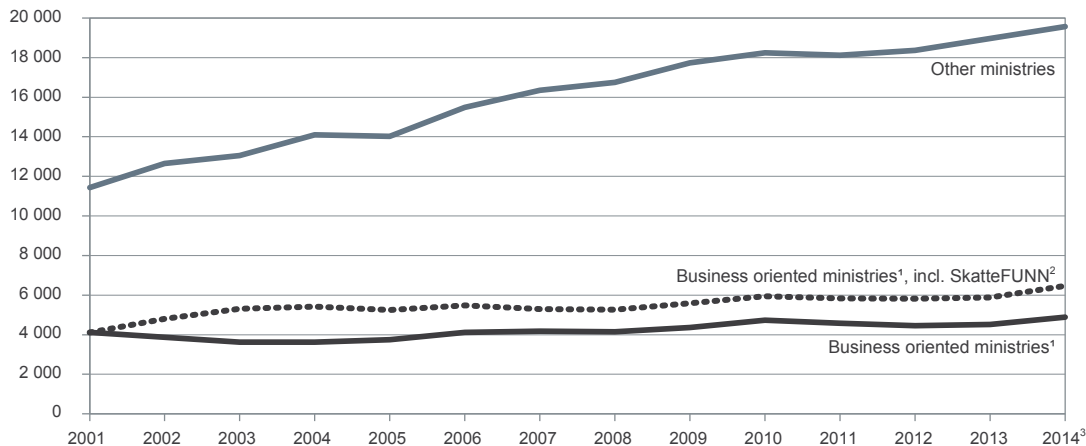
² Includes Oslo University Hospital HF, Akershus University Hospital HF, Bergen Health Trust HF, Stavanger Health Trust HF, St. Olav hospital HF and University Hospital Northern Norway HF.

³ Source: Regional health trusts and private, non-profit hospitals.

⁴ Source: NIFU, use of resources in the health trusts.

8 Government budget appropriations or outlays for R&D (GBAORD) in Norway by groups of ministries and budget term. 2001–2014. Mill. NOK. Fixed prices.

Mill. NOK, fixed prices

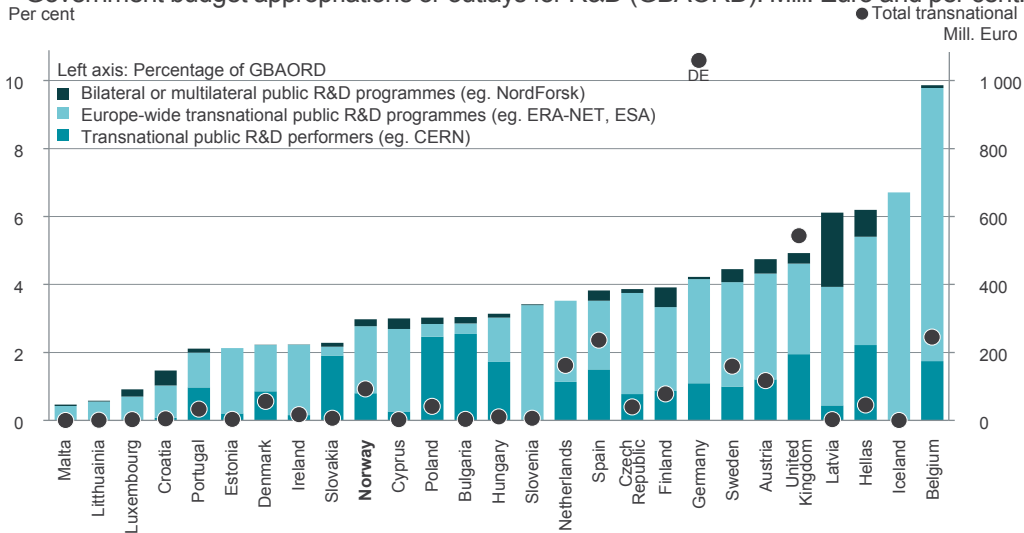


¹ Business oriented ministries includes Min. of Local Government, Min. of Agriculture and Food, Min. of Trade, Industry and Fisheries, Min. of Petroleum and Energy.

² SkatteFUNN is a taxincentive arrangement.

³ Preliminary results.

9 National public funding to transnationally coordinated research¹. Total and as a share of Government budget appropriations or outlays for R&D (GBAORD). Mill. Euro and per cent.



¹ National public funding to transnationally coordinated research is defined as the total budget funded by the government (GBAORD) directed to transnational public R&D performers and transnational public R&D programmes.

Source: Eurostat, Ilibrary

10 R&D personnel by type of institution in Norway. 2012.
Head count and full time equivalents (FTE).

Type of institution	Head count by 01.10.2012			Full time equivalents	
	Total R&D personnel	Of which: Researchers/academic staff	Tech. & supp. staff	Total	Of which: Researchers/academic staff
Industrial sector	24 730	16 460	8 270	16 062	11 375
Institute sector¹	10 939	7 666	3 273	8 650	6 274
Of which: Research instit. serving enterprises	2 942	2 170	772	2 562	1 957
Government sector	7 997	5 496	2 501	6 088	4 317
Universities and univ. colleges	25 505	19 071	6 434	10 247	8 530
Health trusts	4 911	3 550	1 361	2 748	1 662
Of which: University hospitals	3 771	2 830	941	2 166	1 325
Health trusts and private, non-profit hospitals ²	1 140	720	420	582	337
Total	66 085	46 747	19 338	37 707	27 841

¹ Excluding hospitals

Source: NIFU/Statistics Norway, R&D statistics

11 Researchers/academic staff (head count) in Norway by type of institution:
2012. Doctorates and women.

Type of institution	Totalt			Doctorate holders ¹			
	Total Number	Women Number	%	Total Number	%	Women Number	%
Industrial sector	16 460	5 172	31	1 988	12	420	8
Institute sector²	7 666	3 094	40	3 626	47	1 321	43
Of which: Research inst. serving enterprises	2 170	655	30	1 077	50	306	47
Government sector	5 496	2 439	44	2 549	46	1 015	42
Universities and univ. colleges	19 071	8 741	46	8 124	43	3 034	35
Of which: Universities	11 991	5 117	43	6 031	50	2 201	43
Spec. university institutions etc.	1 826	788	43	697	38	237	30
State university colleges	5 254	2 836	54	1 396	27	596	21
Health trusts	3 550	1 613	45	1 731	49	693	43
Of which: University hospitals	2 830	1 269	45	1 487	53	595	47
Health trusts and private, non-profit hospitals	720	344	48	244	34	98	28
Total	46 747	18 620	40	15 469	33	5 468	29

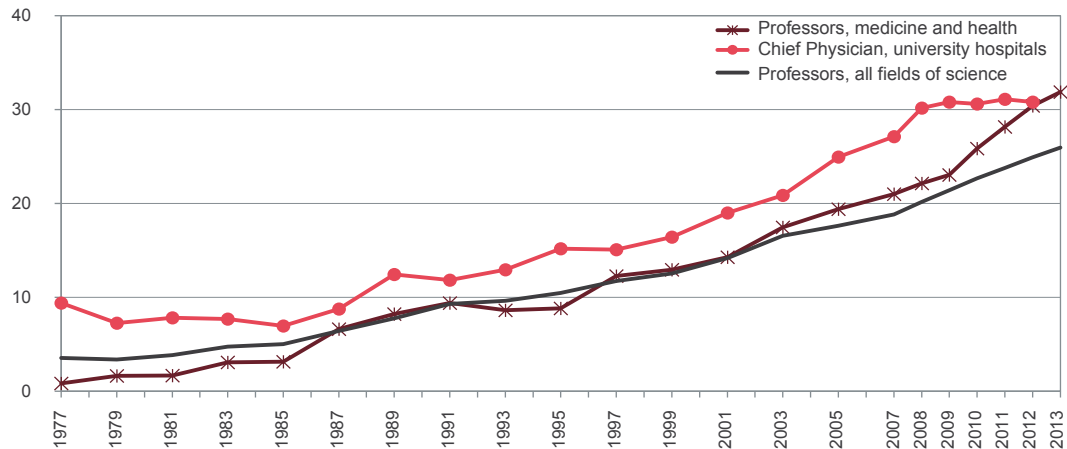
¹Also includes licenciates.

²Excluding hospitals.

Source: NIFU/Statistics Norway

12 Womens share of professors at the universities of Oslo, Bergen, Trondheim and Tromsø in total and within medicine and health, and amongst chief physicians at university hospitals. 1977–2013¹.

Per cent

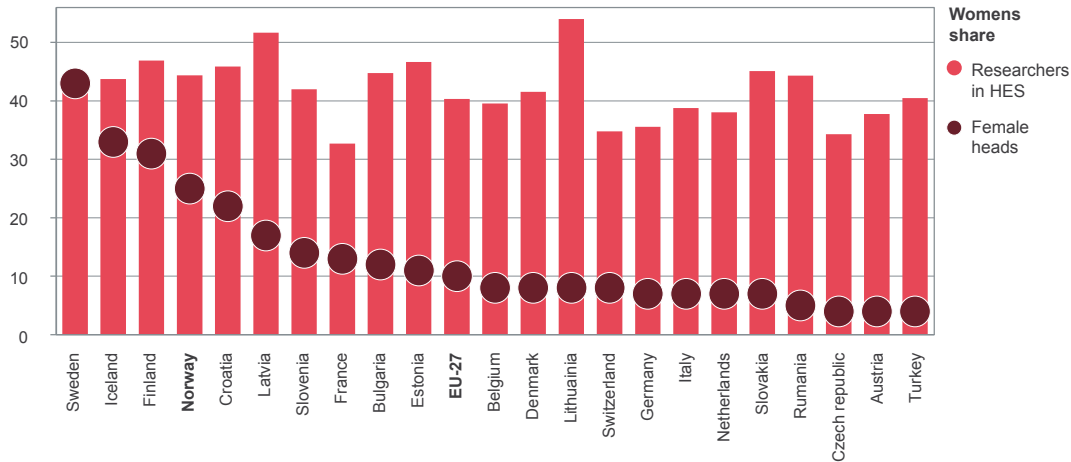


¹ Preliminary figures for 2013.

Source: NIFU

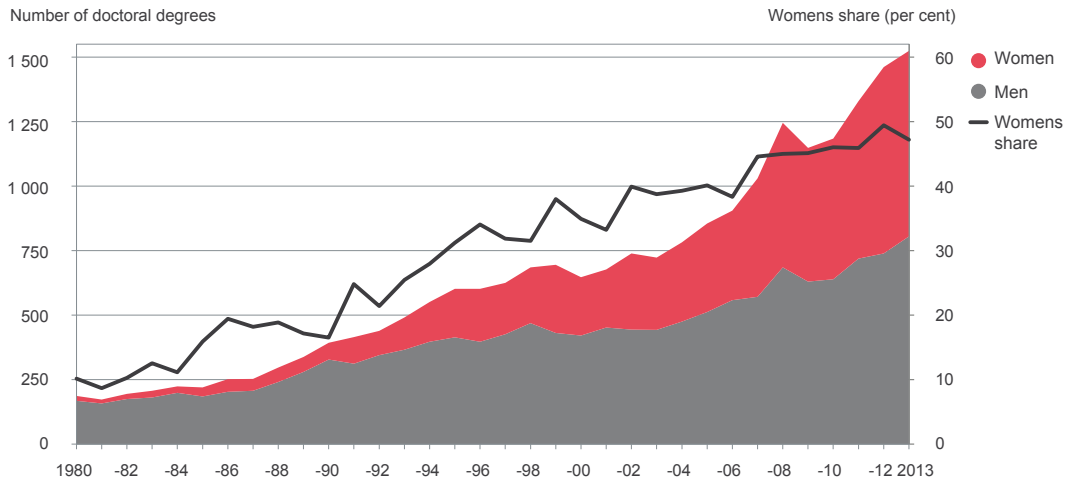
13 Share of female researchers in the higher education sector (HES) and share of female heads of universities or assimilated institutions. Selected countries. 2010.

Per cent



Source: Women in Science database/She Figures 2012, Eurostat

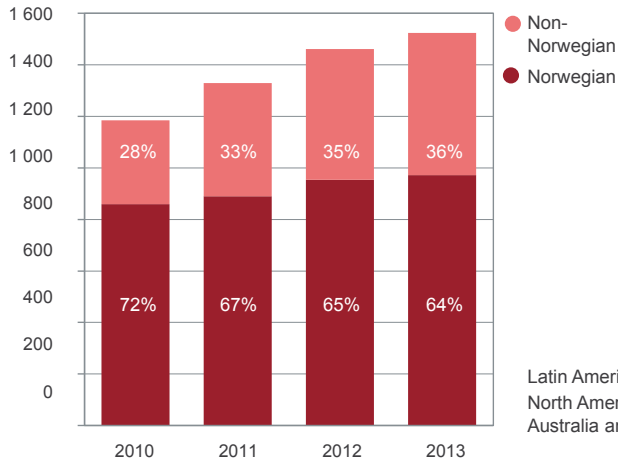
14 Awarded doctoral degrees in Norway by sex. 1980–2013.



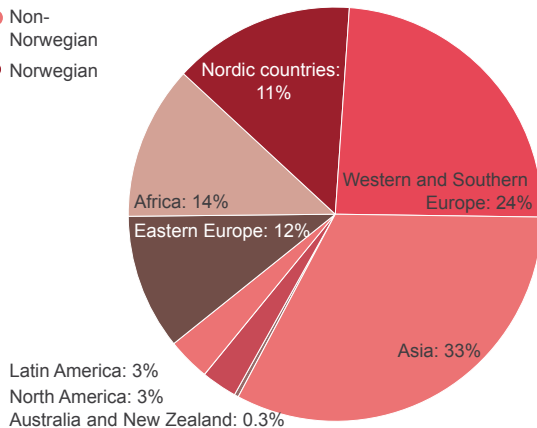
Source: NIFU/The Doctoral Degree Register

15 Awarded doctoral degrees in Norway 2010–2013 by citizenship and region of origin.

Number of awarded doctoral degrees in Norway in total:

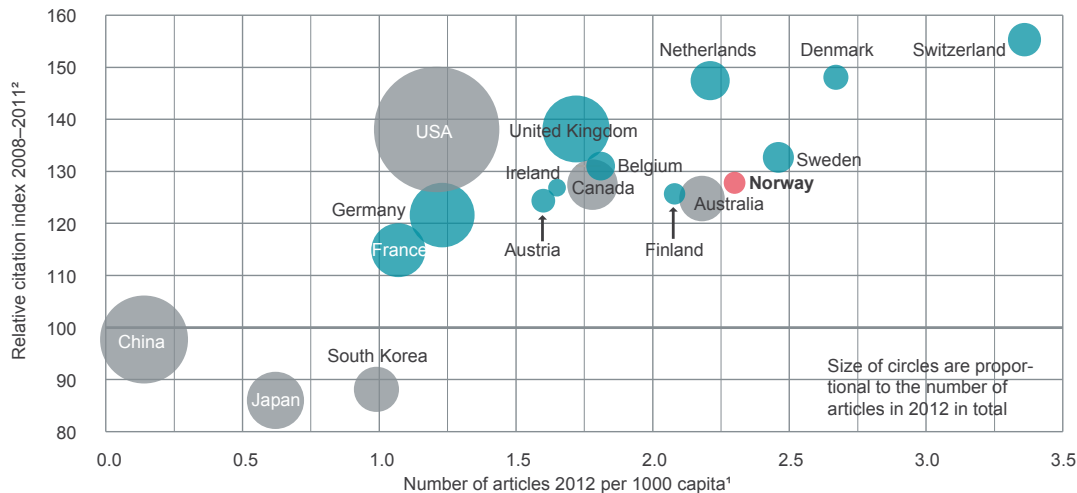


Awarded to foreign citizens 2010-2013 (N=1 824)



Source: NIFU, Doctoral degree registry

16 Scientific publishing for selected countries. Number of articles 2012 in total and per 1000 capita¹ and relative citation index 2008–2011².

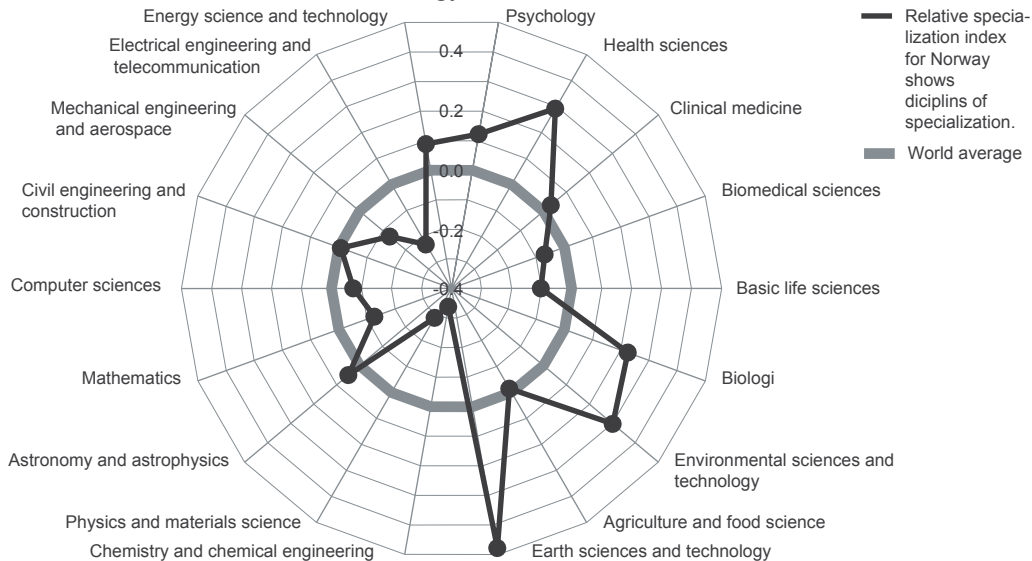


¹ Number of articles in 2012 per 1000 capita in 2011.

² Relative citation index for articles published between 2008 and 2011. World average = 100.

Source: Thomson Reuters/CWTS Web of Science. Computations: CWTS/NIFU.

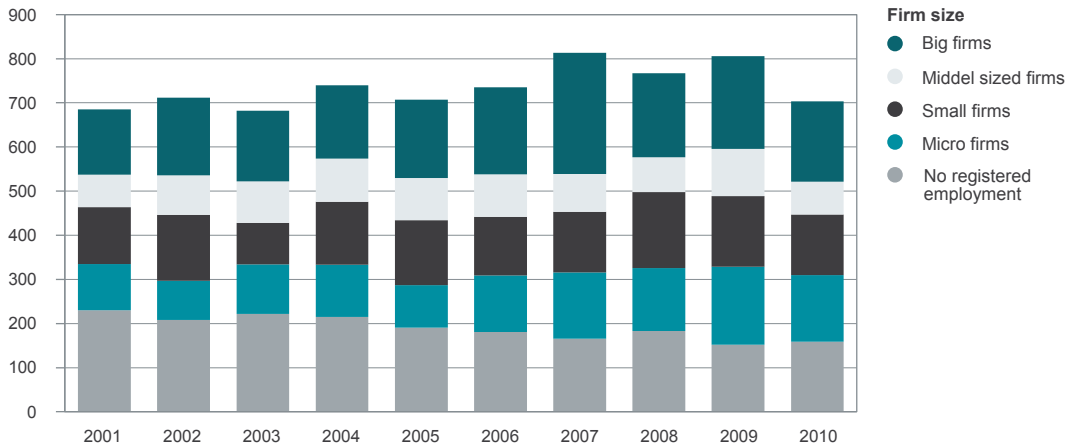
17 Relative specialization index (publishing profile) for Norway 2012. Selected diciplins within natural sciences, technology, medical and health sciences.



Source: Thomson Reuters/CWTS Web of Science. Computations: NIFU

18 Patent applications¹ filed in Norway by Norwegian firms by firm size. 2001–2010.

Number of applications



¹ The presentation is based on links between data on patent applications from the Norwegian Industrial property Office and the Norwegian business registry (BoF), which is done by NIFU in cooperation with Statistics Norway.

Source: The Norwegian Industrial Property Office / SSB