

Science and Technology Indicators

2008 NORWAY



Introduction

This booklet, containing tables and figures on R&D statistics and other science and technology indicators has been published annually since 1997. A broader coverage of S&T input and output figures is published in the *Report on Science and Technology Indicators for Norway 2007*, *The Norwegian Research Council, Oslo, 2008*. You may also find information at www.foustatistikbanken.no. All expenditures are given in current prices, unless otherwise indicated. 1.00 PPP US\$ = 8.53 NOK in 2007 (Main Science and Technology Indicators 2007-2, OECD), by May 2007 1 Euro = 7.8 NOK.

Who prepares the R&D statistics?

NIFU STEP and Statistics Norway carry out the statistical surveys on resources devoted to R&D in Norway. NIFU STEP is responsible for collecting, processing and dissemination of statistics and indicators regarding the Institute and Higher education sectors, while Statistics Norway is responsible for the Industrial sector. NIFU STEP is also responsible for assembling the information into a total R&D statistics for Norway. For the Industrial and Institute sectors annual statistical surveys are carried out. For the Higher education sector the survey is carried out every second year. For all three sectors main figures are produced every year. Further information may be obtained at www.nifustep.no, with links to the report mentioned above, and at the home pages of The Research Council of Norway (www.rcn.no) and Statistics Norway (www.ssb.no/english).

How are R&D statistics compiled?

Norwegian R&D statistics are compiled in accordance with the international guidelines issued by the OECD. These guidelines are contained 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). The sections of this manual dealing with basic definitions and conventions of R&D have been translated to Norwegian by NIFU STEP (2004). Total R&D figures for Norway are available through administrative registers and questionnaires sent to the concerning units in the three performing sectors.

The survey on R&D activity in the **Industrial sector** contains all companies with 50 or more employees. In addition, the survey includes a number of selected companies with a minimum of 10 employees. Before 1995, the survey included only companies with 50 or more employees. The statistics on the Industrial sector from 1995 are therefore not comparable with those of the previous years.

The **Higher education sector** is thoroughly surveyed. Each individual department or corresponding equivalent unit is surveyed. University hospitals are also included in this sector. Supplementary sources of information include surveys on staff members' time distribution, information on personnel and expenditure from the institutions' central administration, the Research Council of Norway, and medical foundations.

The **Institute sector** is also covered by complete surveys. Questionnaires are sent to research institutes and other institutions that are expected to perform R&D activities. In addition, this sector includes non-university hospitals not included in the Higher education sector and estimates of R&D resources at museums.

Other data sources:

Statistics on **R&D personnel** in the Higher education and Institute sectors are based on NIFU STEP's register on Research personnel, scientists, and engineers. The register is updated every second year, annually from 2007. Data on **international R&D statistics** are extracted from the OECD's *Main Science and Technology Indicators*. The **doctoral degree statistics** are based on NIFU STEP's Norwegian doctoral degree register, which is updated biannually. Information about doctoral degrees in the Nordic and Baltic countries is found in **NORBAL**, a database operated by NIFU STEP on behalf of NordForsk. **Bibliometric data** are extracted from the database *National Science Indicators* prepared by the *Thomson Scientific* in the U.S. This database contains worldwide publication and citation statistics.

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

In Norwegian R&D statistics, resources are classified in three performing sectors: *The Industrial sector*, *the Higher education sector*, and *the Institute sector*. The Norwegian classification somewhat differs from the OECD's: For international comparisons *Business enterprise sector* includes industry as well as non-profit institutes serving firms (these business-oriented institutes are included in the Institute sector in Norway). OECD's *Higher education sector* corresponds to the Norwegian classification, while its *Government sector* and *Private Non-Profit sector (PNP)* together cover the rest of the Institute sector in Norway. The PNP sector is rather small in Norway, and it is therefore included in the Government sector of OECD's statistics.

Highlights

- Total R&D expenditure in Norway amounted to 32.8 billion NOK in 2006, a raise from 29.6 billion NOK in 2005.
- R&D expenditure accounted for 1.52 per cent of the Gross Domestic Product (GDP) in 2005 and 2006.
- In Sweden, R&D expenditure accounted for 3.89 per cent of the GDP in 2005. Approximately three quarters of the R&D expenditure in Sweden was conducted in the Business enterprise sector, compared to 54 per cent in Norway.
- Norway spent 6410 NOK per capita on R&D in 2005. This was higher than France, Canada and the Netherlands, but still the lowest among the Nordic countries.
- Estimates for 2007 show that 7050 researchers in the Institute sector and 19 100 academic staff in the Higher education sector participated in R&D, compared to 6484 and 18 087 in 2005.
- Associate professors and full professors had the highest increase in numbers from 2005 to 2007.
- 32 per cent of the researchers in Norway were female in 2005, a higher share than Denmark, France and Japan. Portugal had the highest representation of women; 44 per cent.
- The share of women in the Norwegian Business enterprise sector (BES) was just over 20 per cent in 2005, lower than Iceland and Denmark. In the Higher education sector in Norway the share of women was higher than in Japan, France and Denmark.
- The representation of women in the Institute sector in Norway was 36 per cent in 2007, an increase from 34 per cent in 2005.
- Government budget appropriations for R&D (GBAORD) in Norway accounted for 0.7 per cent of the GDP in 2006. This amounts to 3228 NOK per capita, the highest GBAORD among the Nordic countries.
- Norway had the highest increase in the number of earned doctoral degrees per capita among the Nordic and Baltic countries from 2005 to 2006, while Denmark and Lithuania had the largest decrease.
- In 2007, more than 1000 doctoral degrees were awarded at Norwegian higher education institutions.
- Sweden, Finland and Denmark had the highest number of articles per 1000 inhabitants in 1997–2001 and 2002–2006. Norway had the highest increase in articles per 1000 inhabitants in the two periods, followed by Belgium and the Netherlands.

Table of contents

Tables

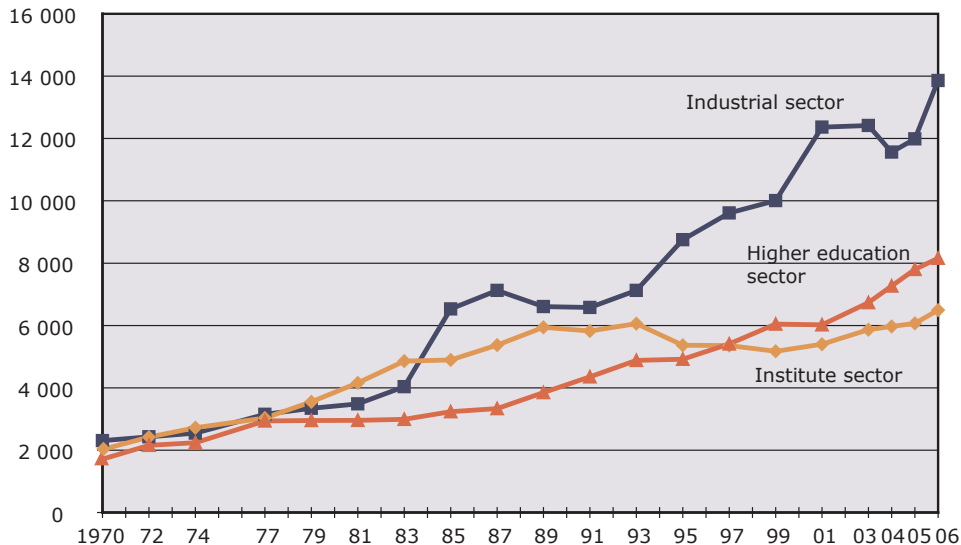
1. R&D expenditure in Norway by sector of performance and source of funds: 2005	8
2. R&D expenditure as a percentage of the Gross Domestic Product (GDP) by source of funds and sector of performance, as well as per capita (NOK) in selected OECD-countries: 2005	10
3. R&D personnel (head count) in Norway by sector of performance: 2005. Estimates for 2007	13
4. Tenured academic/professional staff paid by general university funds in the Higher education sector in Norway by position and type of institution: 2005 and 2007	14
5. R&D resources in the Industrial sector in Norway by industry: 2005 and 2006	20

Figures

1. R&D expenditure in Norway by sector of performance: 1970–2006. Fixed 2000-prices	7
2. R&D expenditure as a percentage of the Gross Domestic Product (GDP) in the Nordic countries and EU-25 by sector of performance: 2005	9
3. R&D expenditure per capita (NOK) and as a percentage of the Gross Domestic Product (GDP) in selected OECD-countries: 2005	11
4. Current R&D expenditure in Norway by sector of performance and type of R&D: 1991–2005	12
5. Tenured academic/professional staff paid by general university funds at universities and specialized university institutions and researchers in the Institute sector in Norway by field of science: 2007	15
6. Female and male researchers in selected OECD-countries: 2005	16
7a. Share of female researchers in the Business enterprise sector in selected OECD-countries: 1997–2005	17
7a. Share of female researchers in the Higher education sector in selected OECD-countries: 1997–2005	17
8. Representation of women in the Institute sector in Norway by type of institution: 1997–2007	18
9. Operating income at Research institutes in Norway by source of funds: 2006	19
10. Government budget appropriations for R&D (GBAORD) as a percentage of the Gross Domestic Product (GDP) and NOK per capita in selected OECD-countries: 2006	21
11. Earned doctoral degrees per 1000 inhabitants in the Nordic and Baltic countries: 2005 and 2006	22
12. Earned doctoral degrees in Norway by sex: 1980–2007	23
13. Articles per 1000 inhabitants in selected countries: 1997–2001 and 2002–2006	24

Figure 1 R&D expenditure in Norway by sector of performance: 1970–2006.
Fixed 2000-prices.

Bill. NOK



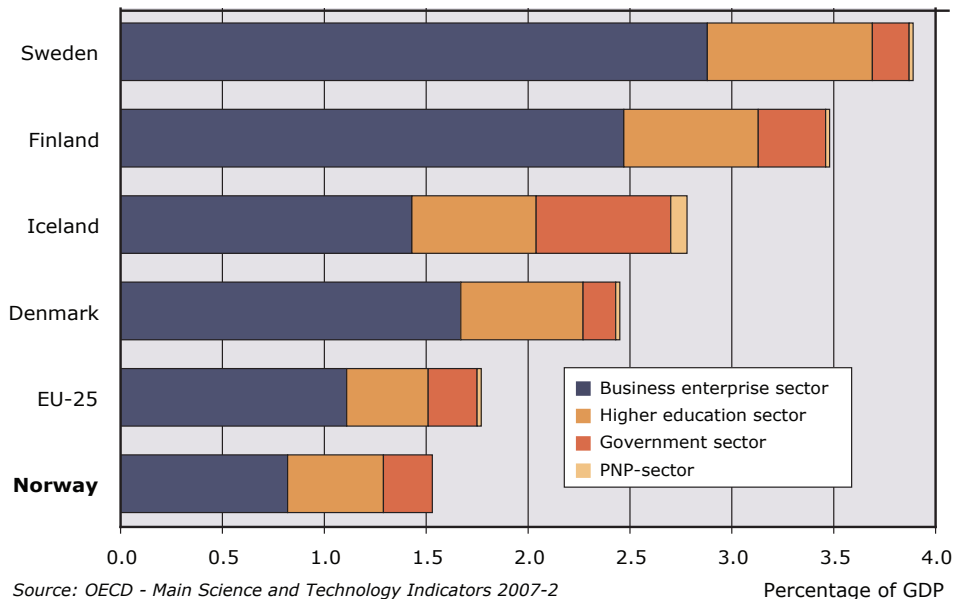
Source: NIFU STEP, Statistics Norway/R&D Statistics

Table 1 R&D expenditure in Norway by sector of performance and source of funds: 2005.
Billion NOK.

Sector of performance	Total	Source of funds						
		Industry		Government		Other	Abroad	
		Total	Of which: Oil comp.	Total	Of which: Research Council of Norway		Total	Of which: EU- comm.
Industrial sector	13 640.3	11 226.4	973.3	569.4	201.4	513.2	1 331.3	59.3
Institute sector	6 906.8	1 505.2	363.0	4 404.2	1 609.8	209.9	787.5	217.8
<i>Of which: Institutes in BES</i>	2 270.8	1 017.3	278.5	852.9	505.9	74.7	325.9	104.3
<i>Government sector</i>	4 636.0	487.9	84.5	3 551.3	1 103.9	135.2	461.6	113.5
Higher education sector	9 096.3	430.9	139.3	7 963.7	1 655.1	427.5	274.2	166.3
<i>Of which: Universities/spec.inst.</i>	8 112.8	415.6	139.3	7 113.3	1 573.9	327.5	256.4	149.7
<i>State univ. colleges</i>	983.5	15.4	-	933.6	81.2	16.7	17.8	16.5
Total	29 643.4	13 162.5	1 475.6	12 937.3	3 466.3	1 150.6	2 393.0	443.4

Source: NIFU STEP, Statistics Norway/R&D statistics

Figure 2 R&D expenditure as a percentage of the Gross Domestic Product (GDP) in the Nordic countries and EU-25 by sector of performance: 2005.



Source: OECD - Main Science and Technology Indicators 2007-2

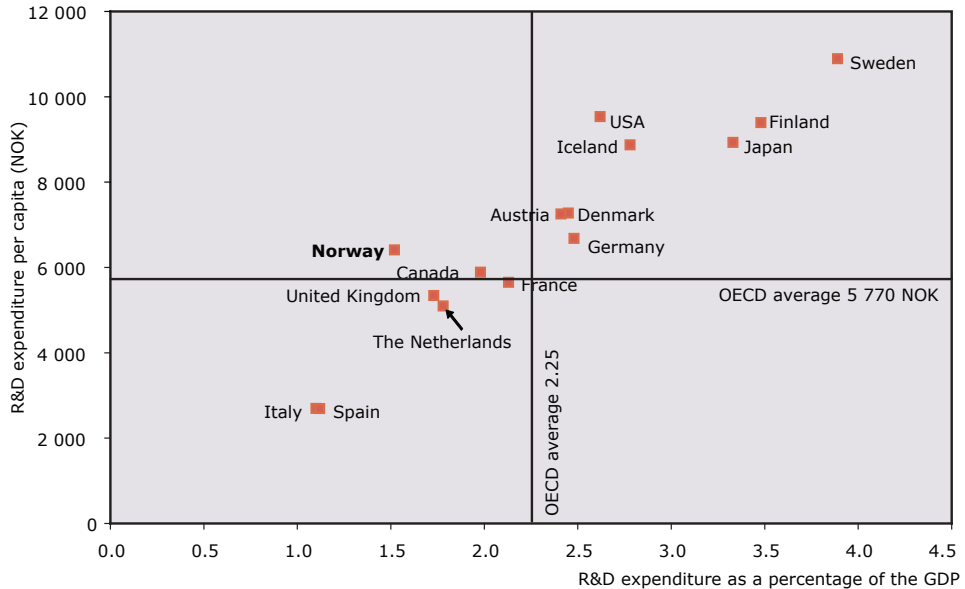
Percentage of GDP

Table 2 R&D expenditure as a percentage of the Gross Domestic Product (GDP) by source of funds and sector of performance, as well as per capita (NOK) in selected OECD-countries: 2005.

Country	R&D expenditure as a percentage of GDP						R&D expenditure per capita (NOK)
	Total	Source of funds		Sector of performance			
		Government	Industry, abroad, PNP	Business enterprise sector	Higher education sector	Government sector	
Austria	2.41	0.88	1.53	1.64	0.64	0.12	7 253
Canada	1.98	0.65	1.33	1.07	0.72	0.18	5 888
Denmark	2.45	0.68	1.77	1.67	0.60	0.16	7 276
Finland	3.48	0.89	2.59	2.47	0.66	0.33	9 396
France	2.13	0.81	1.32	1.34	0.40	0.37	5 651
Germany	2.48	0.70	1.78	1.72	0.41	0.35	6 679
Iceland	2.78	1.13	1.65	1.43	0.61	0.66	8 872
Ireland	1.26	0.40	0.86	0.83	0.34	0.09	4 270
Japan	3.33	0.56	2.77	2.54	0.45	0.28	8 929
Norway	1.52	0.67	0.85	0.82	0.47	0.24	6 410
Portugal	0.81	0.45	0.36	0.31	0.29	0.12	1 410
Spain	1.12	0.48	0.64	0.60	0.33	0.19	2 692
Sweden	3.89	0.91	2.98	2.88	0.81	0.18	10 892
United Kingdom	1.78	0.58	1.20	1.09	0.45	0.19	5 096
USA	2.62	0.80	1.82	1.83	0.37	0.31	9 533
<i>Total OECD</i>	<i>2.25</i>	<i>0.66</i>	<i>1.59</i>	<i>1.53</i>	<i>0.40</i>	<i>0.27</i>	<i>5 770</i>
<i>EU-25</i>	<i>1.77</i>	<i>0.61</i>	<i>1.16</i>	<i>1.11</i>	<i>0.40</i>	<i>0.24</i>	<i>4 969</i>

Source: OECD - Main Science and Technology Indicators 2007-2

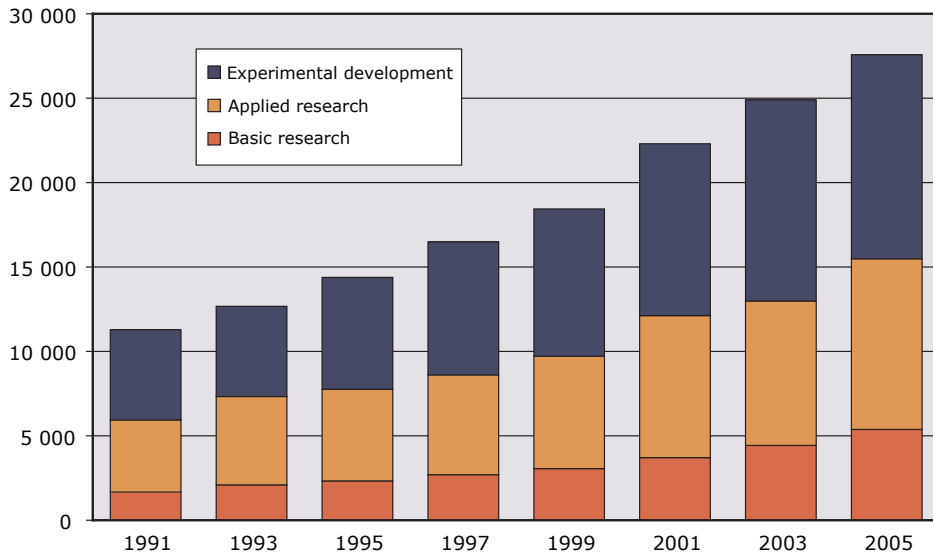
Figure 3 R&D expenditure per capita (NOK) and as a percentage of the Gross Domestic Product (GDP) in selected OECD-countries: 2005.



Source: OECD - Main Science and Technology Indicators 2007-2

Figure 4 Current R&D expenditure in Norway by sector of performance and type of R&D: 1991–2005.

Mill. NOK



Source: NIFU STEP, Statistics Norway/R&D-statistics

**Table 3 R&D personnel (head count) in Norway by sector of performance: 2005.
Estimates for 2007.**

Sector of performance	2005			2007
	Researchers	Technicians & support staff	Total R&D personnel	Researchers
Industrial sector	12 442	8 288	20 730	..
Institute sector	6 484	2 941	9 425	7 050
Higher education sector	18 087	6 118	24 205	19 100
<i>Of which: Universities</i>	<i>11 757</i>	<i>4 672</i>	<i>16 429</i>	<i>11 950</i>
<i>Specialized univ. institutions</i> ¹	<i>1 261</i>	<i>253</i>	<i>1 514</i>	<i>1 550</i>
<i>State university colleges</i> ²	<i>5 069</i>	<i>1 193</i>	<i>6 262</i>	<i>5 600</i>
Total	37 013	17 347	54 360	..

¹ Specialized university institutions includes Norwegian School of Economics and Business Administration, Norwegian school of Veterinary science, Norwegian school of sport sciences, Norwegian academy of music, The Oslo school of Architecture and Design, Norwegian school of theology, School of mission and theology, Norwegian Teacher Academy, Norwegian school of management, The University centre in Svalbard, Norwegian Police University College, Diakon-hjemmet University College, Queen Mauds College, The Oslo National Academy of the Arts and Bergen National Academy of the Arts.

² The University of Agder (UiA) became a university by 01.08.2007, but is still included among State university colleges in the R&D statistics for 2007.

Source: NIFU STEP, Statistics Norway/R&D-statistics

Table 4 Tenured academic/professional staff paid by general university funds in the Higher education sector in Norway by position and type of institution: 2005 and 2007.¹

Position	2005		2007		
	Univ. and Spec. univ. institutions	State university colleges	Univ. and spec. univ. institutions	UiA ³	State university colleges
Full professor	2 420	246	2 505	(70)	330
College reader	1	22	5	(5)	25
Deans and head of departments	114	105	185	(5)	145
Associate professor	1 857	905	1 945	(100)	990
Assistant professor	236	108	200	(10)	90
Senior lecturer	123	481	155	(65)	585
University/college lecturer ²	899	2 674	980	(165)	2 740
Total	5 650	4 541	5 975	(420)	4 905

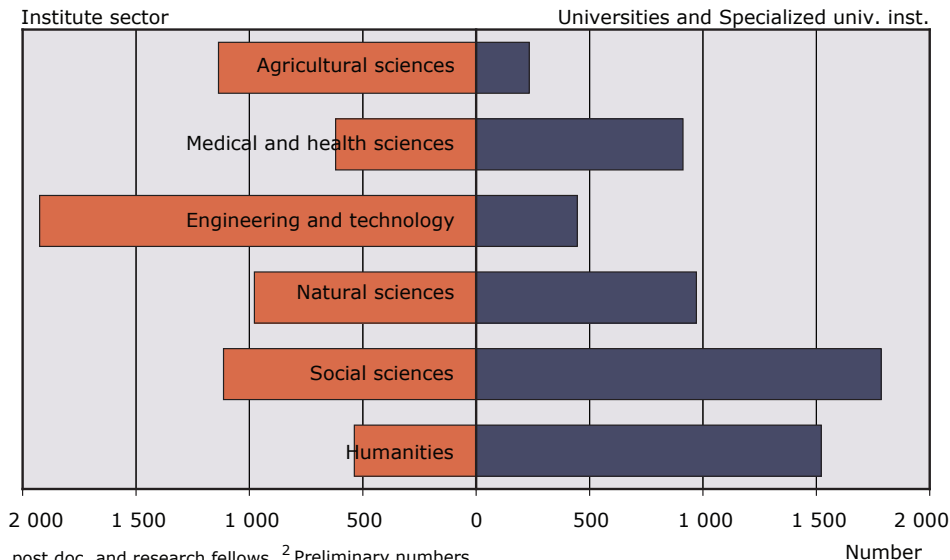
¹Preliminary numbers for 2007.

²Includes professional positions which require education at Master level.

³The University of Agder (UiA) became a university by 01.08.2007, but is still included among State university colleges in the R&D statistics for 2007.

Source: NIFU STEP/Register of Research personnel

Figure 5 Tenured academic/professional staff paid by general university funds at Universities and Specialized university institutions and researchers¹ in the Institute sector in Norway by field of science: 2007.²

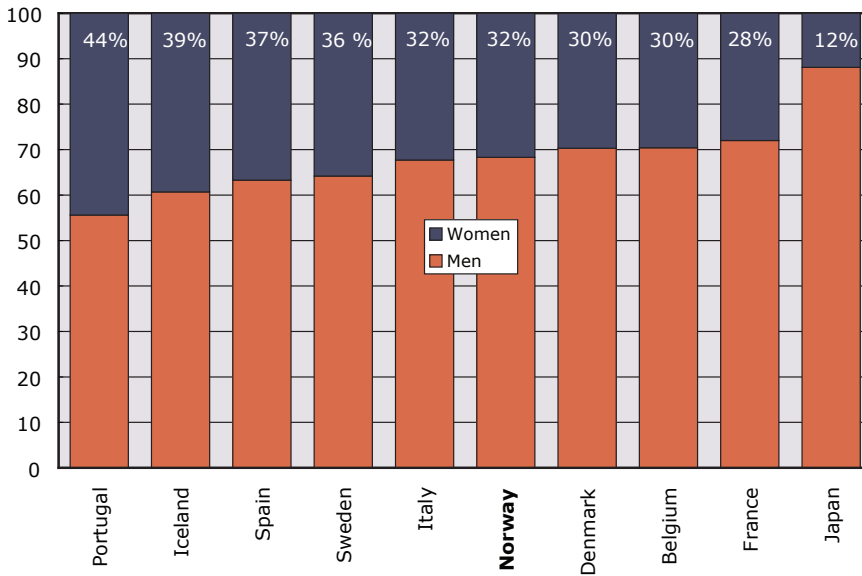


¹ Excl. post.doc. and research fellows. ² Preliminary numbers.

Source: NIFU STEP/Register of Research personnel

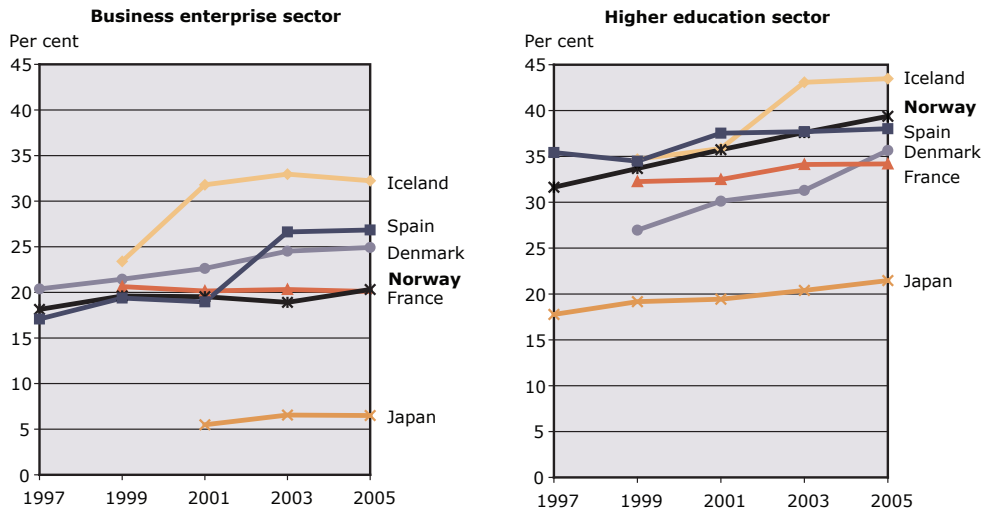
Figure 6 Female and male researchers in selected OECD-countries: 2005.

Per cent



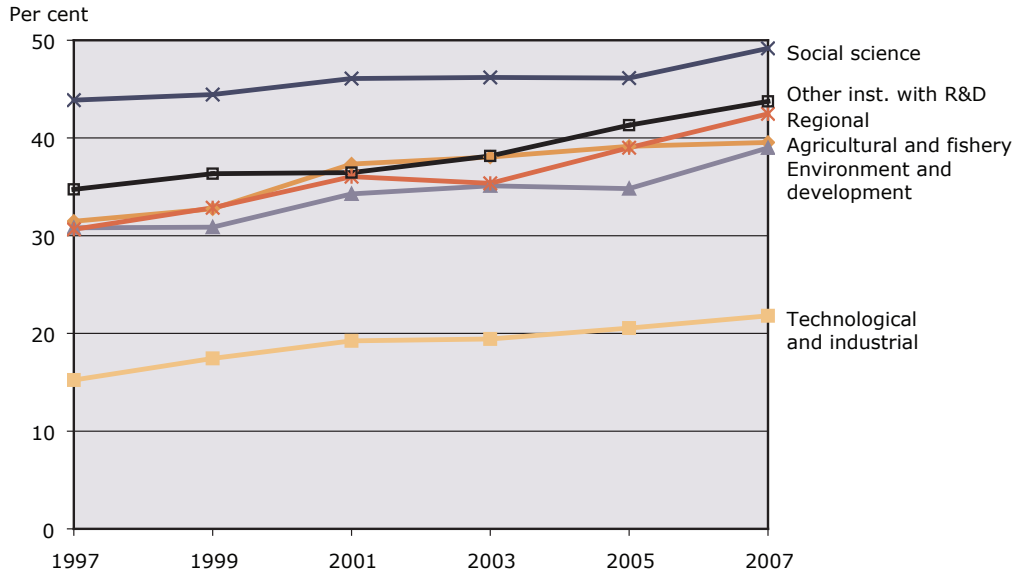
Source: OECD - Main Science and Technology Indicators 2007-2

Figure 7 Share of female researchers in selected OECD-countries: 1997–2005.



Source: OECD - Main Science and Technology Indicators 2007-2

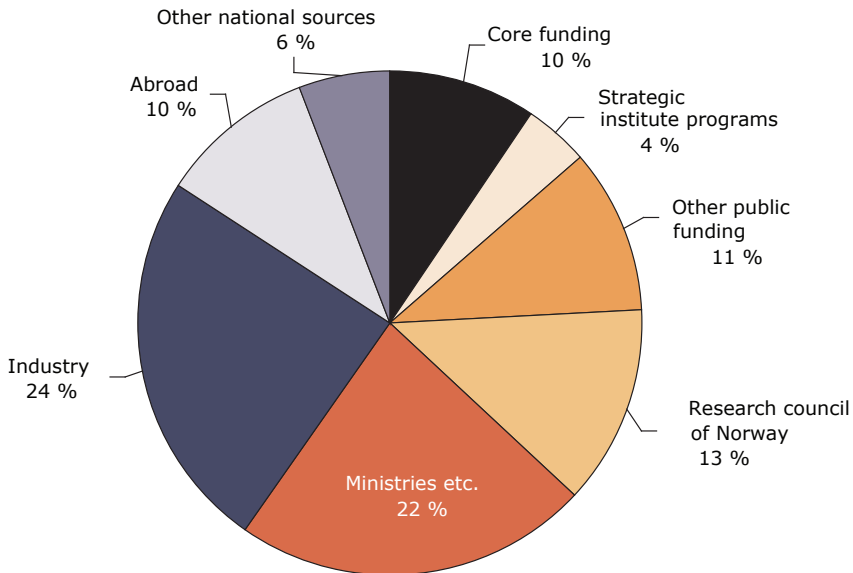
Figure 8 Representation of women in the Institute sector in Norway by type of institution: 1997–2007.



¹ Includes health institutes.

Source: NIFU STEP/Register of research personnel

Figure 9 Current income at Research institutes in Norway by source of funds: 2006.



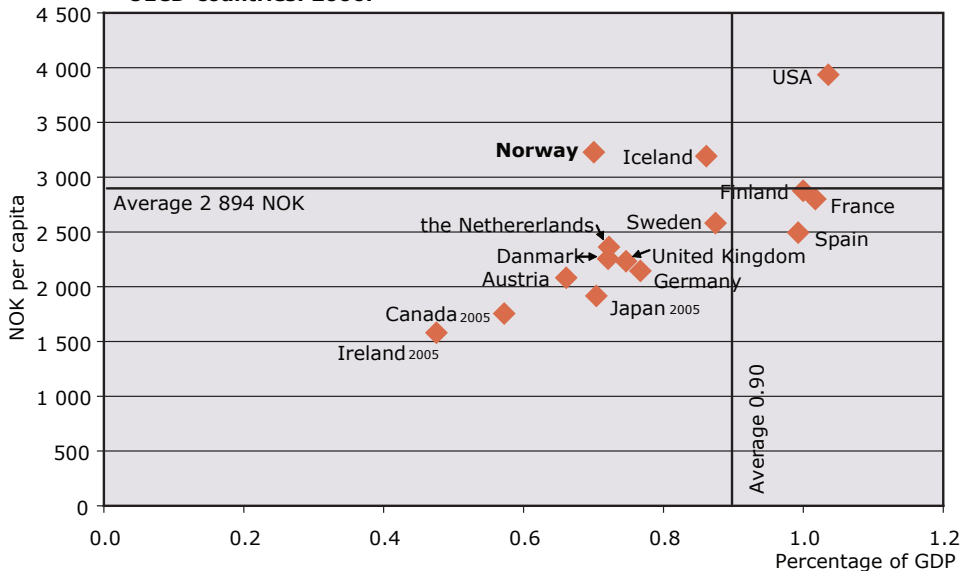
Source: NIFU STEP/Key figures for Research institutes

Table 5 R&D resources in the Industrial sector in Norway by industry: 2005 and 2006.

Industry (SN 2002)	R&D expenditure		R&D person years (FTE)	
	2005 Mill. NOK	2006 Mill. NOK	2005 Numbers	2006 Numbers
Fishing, operations of fish hatcheries and fish farms (5)	218.0	224.4	162	161
Extraction of crude petroleum and natural gas (11)	864.7	918.3	528	512
Total industry and mining (13–37)	6 702.1	7 405.1	7 074	7 070
<i>Of which: Chemicals and chemical products (23–24)</i>	<i>1 189.9</i>	<i>1 263.6</i>	<i>1 196</i>	<i>1 144</i>
<i>Machinery and equipment (29)</i>	<i>992.2</i>	<i>1 537.7</i>	<i>1 315</i>	<i>1 376</i>
<i>Electrical and optical equipment (30–33)</i>	<i>2 056.4</i>	<i>1 991.5</i>	<i>2 017</i>	<i>1 976</i>
<i>Transport equipment, furniture and other (34–37)</i>	<i>755.5</i>	<i>888.3</i>	<i>820</i>	<i>846</i>
<i>Other industry and mining</i>	<i>1 708.1</i>	<i>1 724.0</i>	<i>1 726</i>	<i>1 728</i>
Electricity, gas and water supply (40–41)	57.2	61.8	53	60
Construction (45)	154.9	210.6	162	188
Total services (50–99)	5 643.3	6 417.1	5 835	6 404
<i>Of which: Transport and telecommunication (60–64.2)</i>	<i>573.9</i>	<i>845.9</i>	<i>507</i>	<i>682</i>
<i>Financial intermediation (65–67)</i>	<i>778.9</i>	<i>968.9</i>	<i>699</i>	<i>682</i>
<i>Computer and related activities (72)</i>	<i>2 299.1</i>	<i>2 576.1</i>	<i>2 646</i>	<i>3 110</i>
<i>Other business activities and consultant services (74)</i>	<i>1 047.4</i>	<i>1 236.7</i>	<i>1 082</i>	<i>1 197</i>
<i>Other services</i>	<i>944.0</i>	<i>789.5</i>	<i>901</i>	<i>733</i>
Total	13 640.3	15 237.4	13 815	14 395

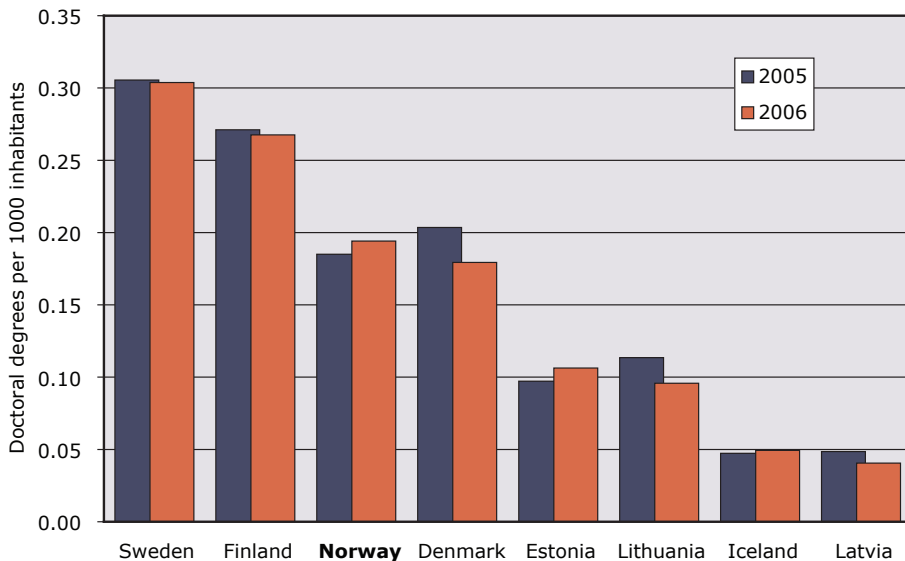
Source: Statistics Norway/R&D statistics

Figure 10 Government budget appropriations for R&D (GBAORD) as a percentage of the Gross Domestic Product (GDP) and NOK per capita in selected OECD-countries: 2006.



Source: OECD - Main Science and Technology Indicators 2007-2

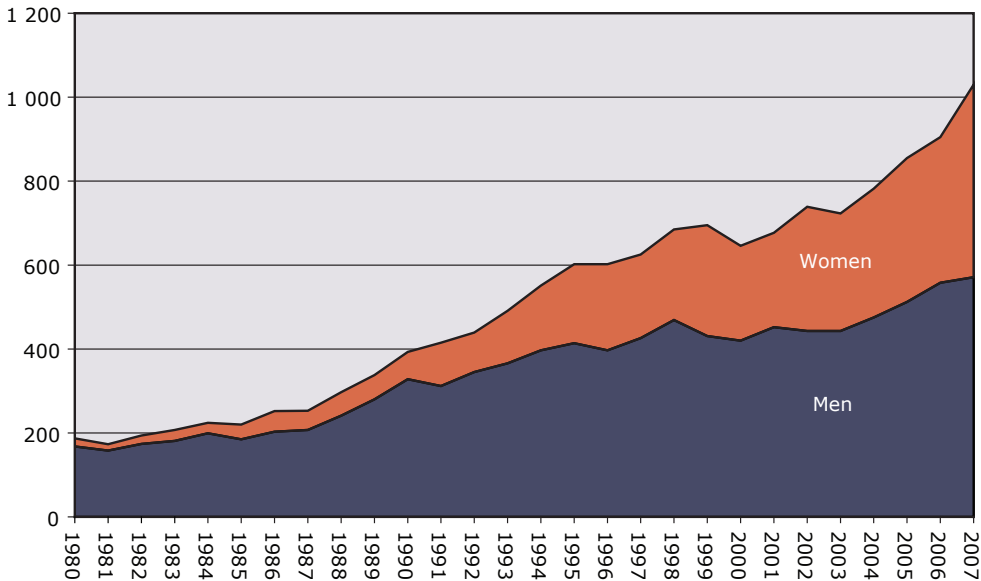
Figure 11 Earned doctoral degrees per 1000 inhabitants in the Nordic and Baltic countries: 2005 and 2006.



Sources: NIFU STEP/NORBAL. Population numbers from OECD - MSTI 2007-2 for the Nordic countries, national sources for the Baltic countries

Figure 12 Earned doctoral degrees in Norway by sex: 1980-2007.

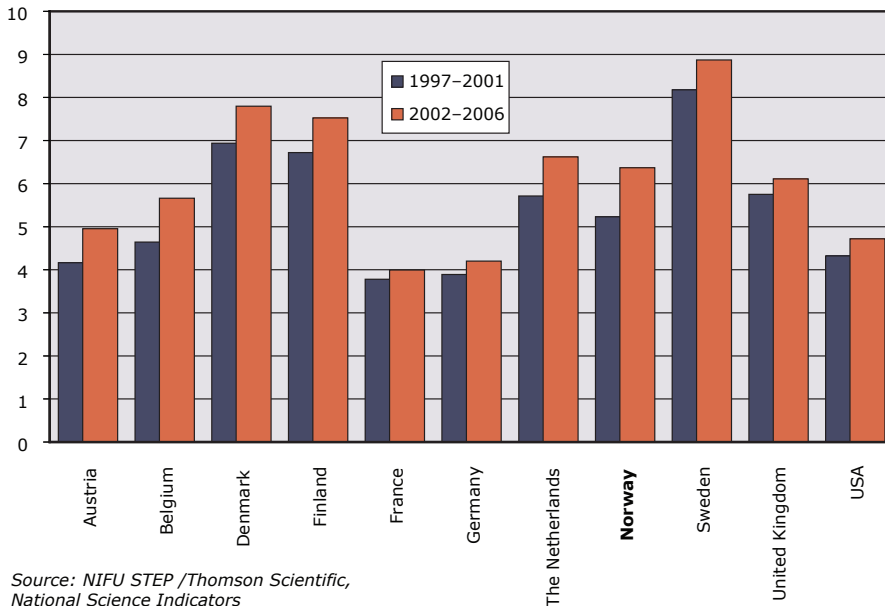
Numbers



Source: NIFU STEP/Doctoral Degree Register

Figure 13 Articles per 1000 inhabitants in selected countries: 1997–2001 and 2002–2006.

Numbers



Source: NIFU STEP /Thomson Scientific,
National Science Indicators