

Science and Technology Indicators

2006 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 contained in the publication *Report on Science and Technology Indicators for Norway 2005, NIFU STEP, Oslo*, which will be published in June 2006. All expenditures are given in current prices, unless otherwise indicated. 1.00 PPP US\$ = 9.76 NOK in 2005 (Main Science and Technology Indicators 2005-2, OECD). By March 2006 1 Euro = 8.0 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. The statistics are carried out using guidelines by the OECD (2002), "Frascati manual." Further information may be obtained on the World Wide Web at NIFU STEP's home page: <http://www.nifustep.no/>, with links to the report mentioned above and the home pages of the Research Council of Norway and Statistics Norway.

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 issued in Norwegian by NIFU STEP (2004). Total R&D figures for Norway are available every year through administrative registers and questionnaires sent to the concerning units in the three performing sectors.

The survey of 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 usage, 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 estimates of R&D resources at museums and non-university hospitals that are not included in the Higher Education Sector.

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. Data on **international R&D statistics** are extracted from the *OECD's Main Science and Technology Indicators*, and national sources for the Nordic countries. The **doctoral degree statistics** are based on NIFU STEP's Norwegian doctoral degree register, which is updated biannually. **Bibliometric data** are extracted from the database *National Citation Report for Norway prepared by the Institute for Scientific Information* in the U.S. This database contains publication and citation statistics on articles from Norway. Information on **patent applications** is collected by NIFU STEP from the Norwegian Patent Office.

Basic definitions of Research and Experimental Development (R&D)

Research and experimental development comprises 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 in Norwegian R&D statistics (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

- In 2004 the expenditure on R&D in Norway amounted to 27.8 billion NOK. As a share of the Gross Domestic Product (GDP) the R&D expenditure accounted for 1.62% in 2004 compared to 1.73% in 2003.
- In fixed prices there was a decline in R&D expenditures from 2003 to 2004 in the Industrial Sector of almost 7%, an increase of close to 2% in the Institute sector and an increase of 7.5% in the Higher Education Sector. The industries with the largest decline were *other industry and mining and computer and related industries*.
- In Norway R&D expenditures as a share of GDP in the Business Enterprise Sector was 1.0% in 2003, while the OECD-average was 1.5%. In Sweden, Finland, Denmark and Iceland the Business Enterprise Sector share was respectively 3.0%, 2.5%, 1.8% and 1.5%.
- In 2003 expenditures on R&D per capita in Norway was highest in Sør-Trøndelag with close to 16 000 NOK and lowest in Hedmark with 800 NOK.
- In 2003 medical sciences was the largest field of science in the Higher Education Sector with current expenditures on R&D of 1.8 billion NOK, while engineering and technology was the largest field of science in the Institute Sector with current expenditures on R&D of 2.1 billion NOK.
- The largest field of R&D in Norway in 2003 was information technology with current expenditures on R&D of 5.1 billion NOK, of which 4.1 billion NOK were spent in the Industrial sector.
- Preliminary figures for 2005 show an increase of researchers/university graduates in the Higher Education Sector from 16 200 in 2003 to 17 500. Tenured academic/professional staff paid by general university funds were 5 800 in 2005 compared to 5 000 in 2003.
- According to preliminary figures the share of female professors was 17% in 2005, the same as in 2003.
- 2005 was a new year of record in number of doctoral degrees, 855 were awarded in Norway.
- In 2004 a total of 5 400 Norwegian scientific articles were published. More than half of these had international co-authorship.
- In the 1992–2003 period 70 500 patents were applied for in Norway, of which 21% were Norwegian.

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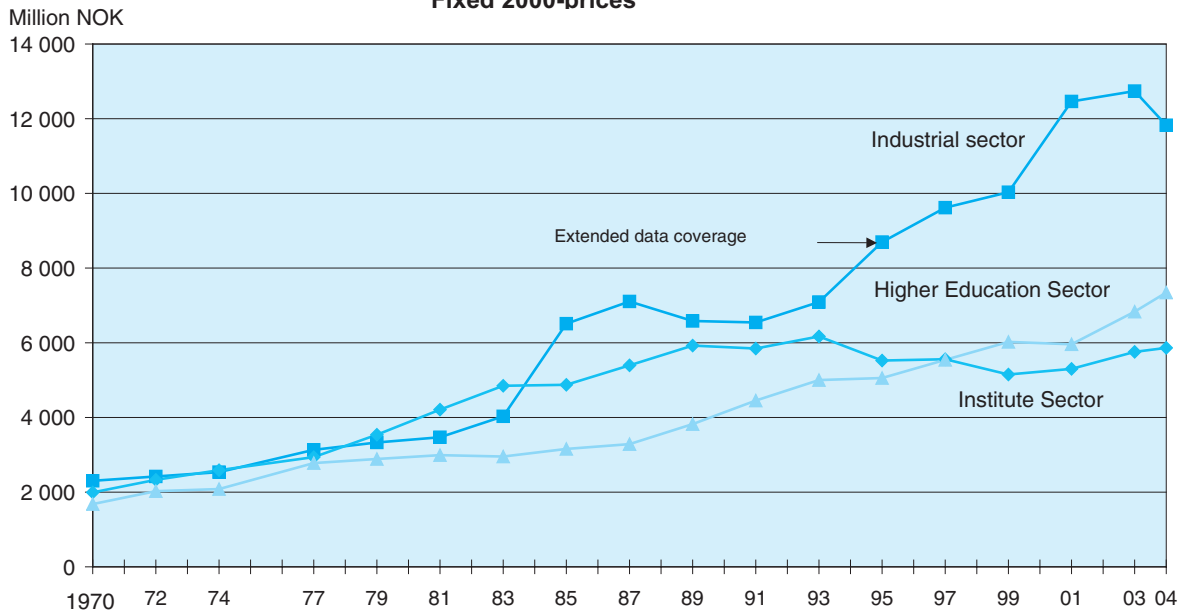
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Figure 1 R&D expenditure in Norway by sector of performance: 1970–2004.
Fixed 2000-prices



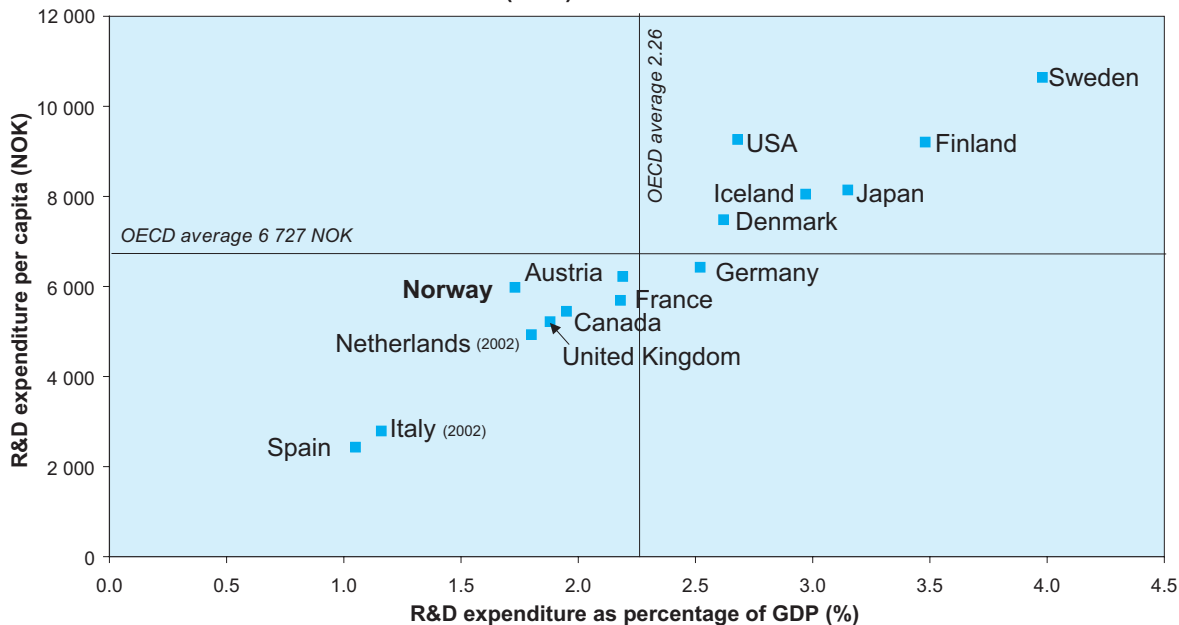
Source: NIFU STEP/Statistics Norway

Table 1 R&D expenditure in Norway by sector of performance and source of funds: 2003.
Million NOK

Sector of performance	Total	Source of funds						
		Industry		Government		Other national sources	Abroad	
		Total	Of which: Oil companies	Total	Of which: The Research Council of Norway		Total	Of which: EU-comm.
Industrial Sector	13 477.1	11 062.4	875.1	794.5	155.8	531.5	1 088.7	106.7
Institute Sector	6 360.0	1 377.0	301.2	4 035.3	1 568.6	212.2	735.5	217.7
<i>Of which: Research institutes serving enterprises</i>	2 208.2	961.5	234.9	842.7	510.2	100.8	303.2	101.1
<i>Government Sector</i>	4 151.8	415.5	66.3	3 192.6	1 058.4	111.4	432.3	116.6
Higher Education Sector	7 495.1	373.5	101.4	6 531.3	1 370.2	372.1	218.1	137.8
<i>Of which: Universities and Spec. University Inst.</i>	6 599.4	349.6	96.7	5 703.4	1 303.3	336.7	210.2	131.9
<i>State University Colleges</i>	895.7	23.9	4.7	827.9	66.9	36.0	7.9	5.9
Total	27 332.2	12 812.9	1 277.7	11 361.1	3 094.6	1 115.8	2 042.3	462.2

Source: NIFU STEP/Statistics Norway

Figure 2 R&D expenditure per capita (NOK) and as a percentage of the Gross Domestic Product (GDP) in selected OECD countries: 2003



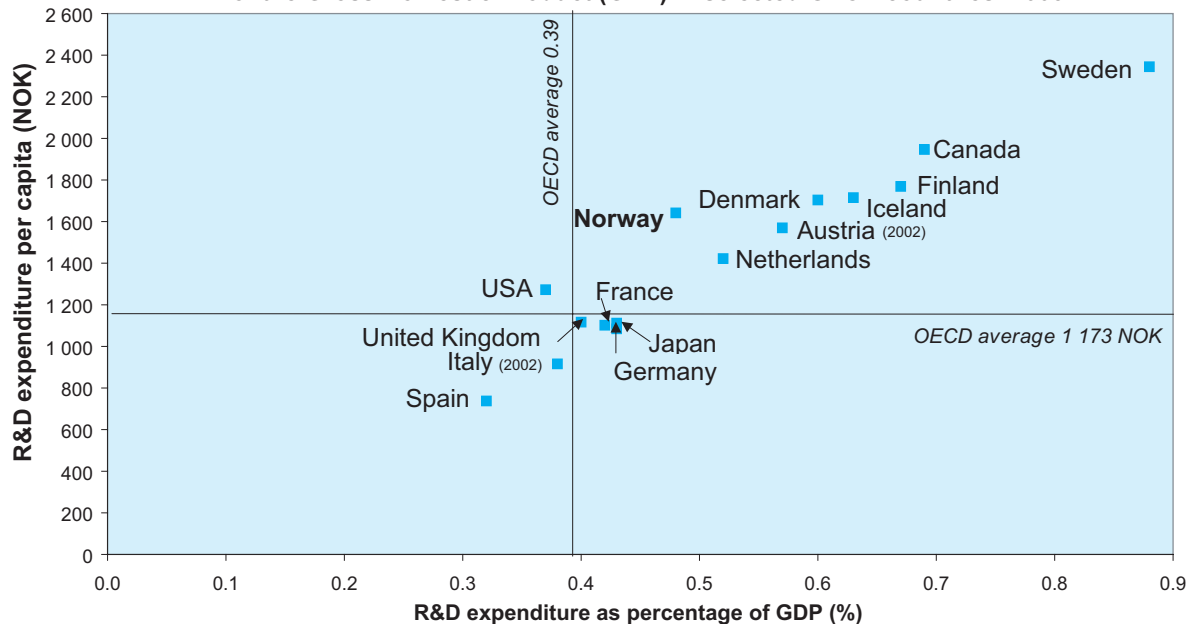
Source: OECD - Main Science and Technology Indicators 2005-2

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 in 2003

Country	R&D expenditure as a percentage of the GDP						R&D expenditure per capita (NOK)
	Total	Source of funds		Sector of performance			
		Government	Industry, abroad and PNP	Business Enterprise Sector	Higher Education Sector	Government Sector	
Austria	2.19	0.76	1.43	6 220
Canada	1.95	0.67	1.28	1.03	0.69	0.21	5 450
Denmark	2.62	0.69	1.93	1.83	0.60	0.18	7 480
Finland	3.48	0.90	2.58	2.45	0.67	0.34	9 210
France	2.18	0.85	1.33	1.37	0.42	0.36	5 690
Germany	2.52	0.79	1.74	1.76	0.43	0.34	6 430
Iceland	2.97	1.19	1.78	1.54	0.63	0.74	8 050
Japan	3.15	0.56	2.59	2.36	0.43	0.29	8 140
Norway	1.73	0.73	1.00	1.00	0.48	0.26	5 980
Portugal	0.78	0.47	0.31	0.26	0.30	0.13	1 350
Spain	1.05	0.42	0.63	0.57	0.32	0.16	2 430
Sweden	3.98	0.93	3.05	2.95	0.88	0.14	10 640
United Kingdom	1.88	0.59	1.29	1.24	0.40	0.18	5 220
USA	2.68	0.83	1.85	1.87	0.37	0.33	9 260
<i>Totalt OECD</i>	<i>2.26</i>	<i>0.69</i>	<i>1.57</i>	<i>1.53</i>	<i>0.39</i>	<i>0.28</i>	<i>6 730</i>
<i>EU - 15</i>	<i>1.91</i>	<i>0.67</i>	<i>1.24</i>	<i>1.23</i>	<i>0.42</i>	<i>0.24</i>	<i>4 890</i>

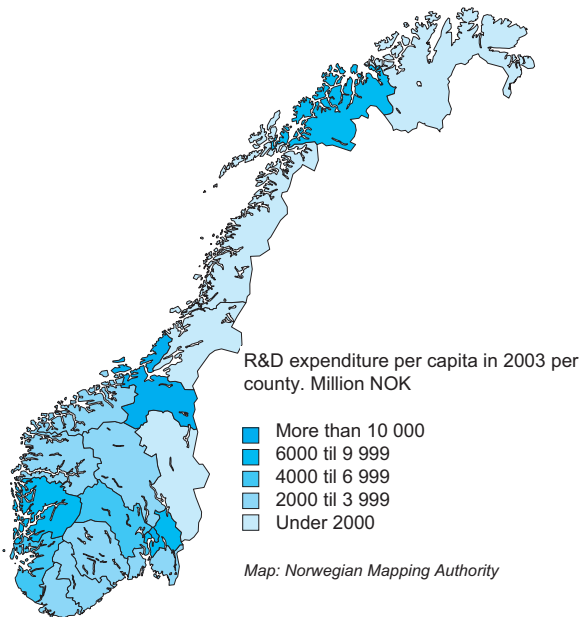
Source: OECD - Main Science and Technology Indicators 2005-2

Figure 3 R&D expenditure in the Higher Education Sector per capita (NOK) and as percentage of the Gross Domestic Product (GDP) in selected OECD countries: 2003



Source: OECD - Main Science and Technology Indicators 2005-2

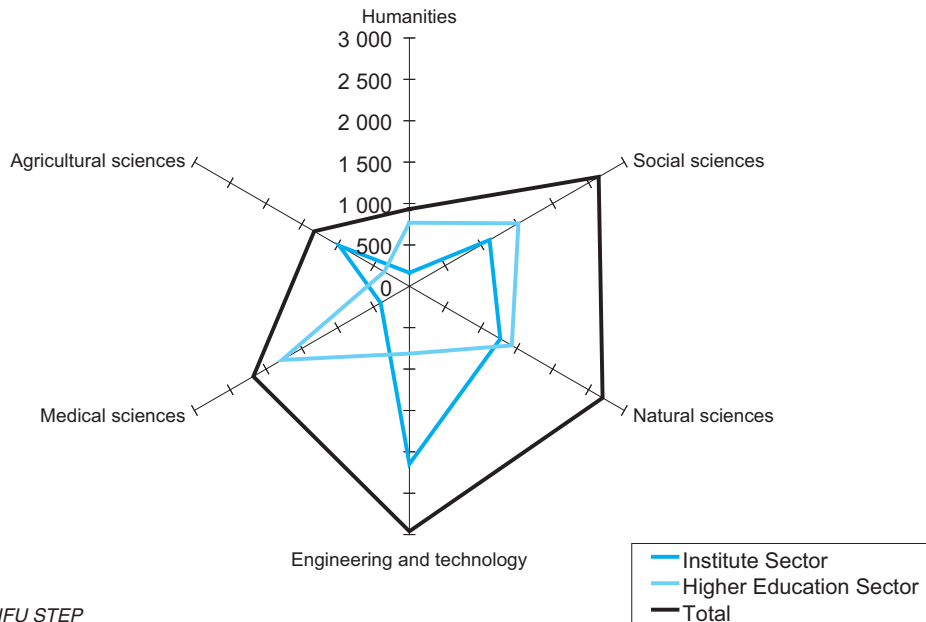
Figure 4 Total R&D expenditure and R&D expenditure per capita in Norway by county: 2003



County	Million NOK	NOK per capita
Østfold	843.0	3 300
Akershus	3 615.3	7 480
Oslo	7 443.2	14 390
Hedmark	151.7	810
Oppland	466.3	2 540
Buskerud	1 188.4	4 920
Vestfold	743.0	3 410
Telemark	466.9	2 820
Aust-Agder	227.5	2 210
Vest-Agder	374.4	2 350
Rogaland	1 569.4	4 080
Hordaland	3 177.7	7 200
Sogn og Fjordane	250.8	2 340
Møre og Romsdal	665.0	2 720
Sør-Trøndelag	4 244.5	15 830
Nord-Trøndelag	228.9	1 790
Nordland	384.8	1 620
Troms	1 183.7	7 780
Finnmark	68.4	930
Svalbard	39.4	..
Total	27 332.4	5 980

Source: NIFU STEP/Statistics Norway

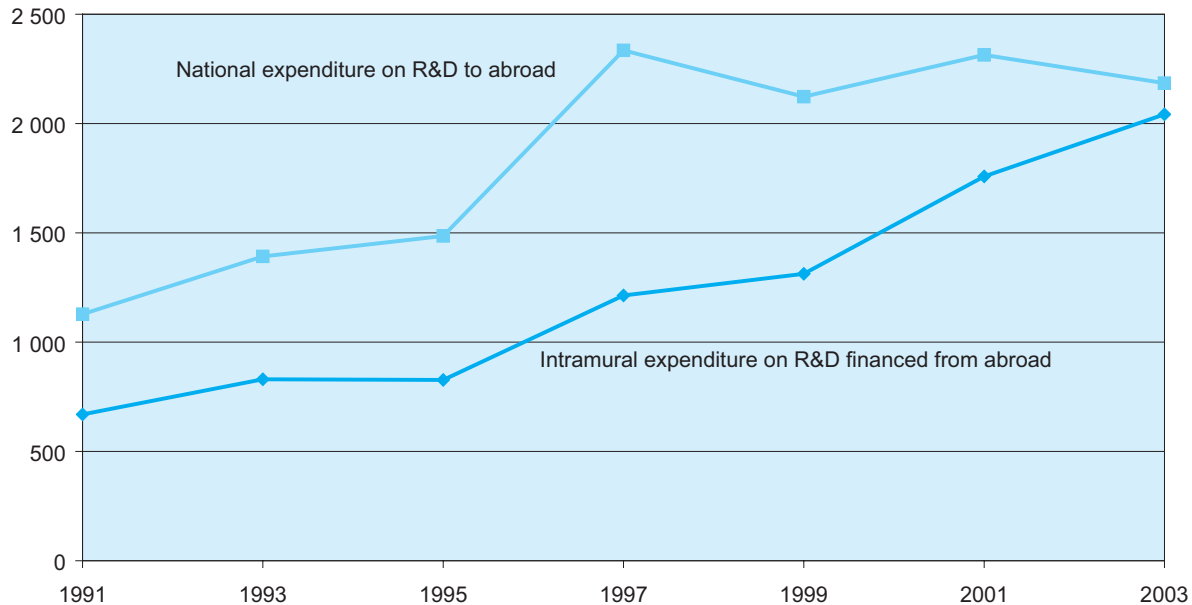
Figure 5 Current R&D expenditure in the Institute Sector, the Higher Education Sector and total in Norway by field of science: 2003. Million NOK



Source: NIFU STEP

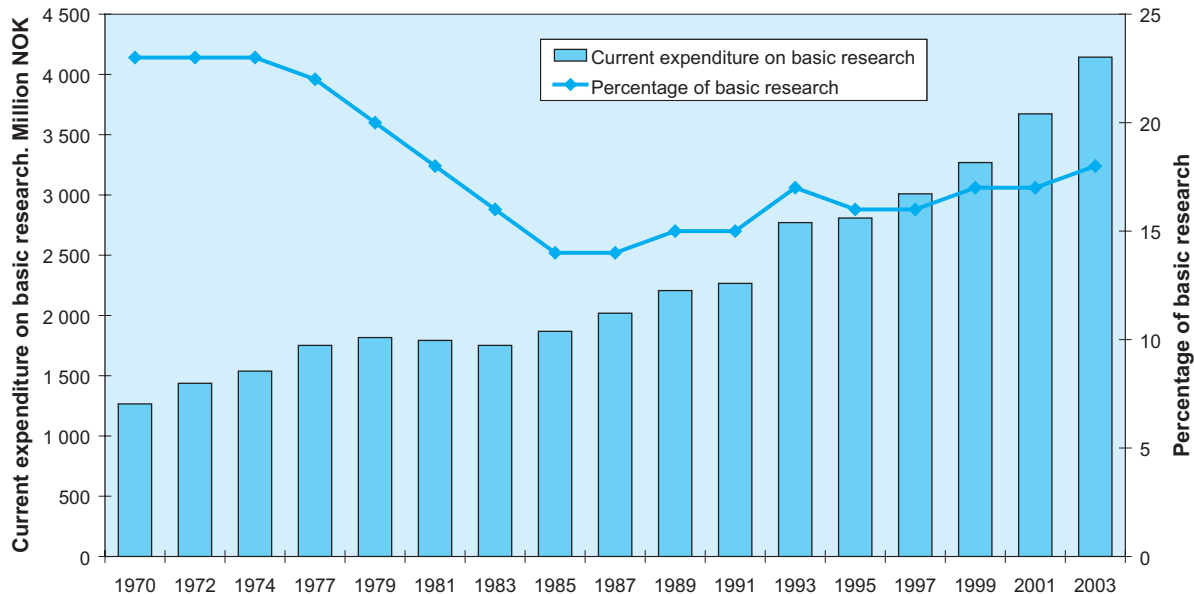
Figure 6 National expenditure on R&D to abroad and intramural expenditure on R&D in Norway financed from abroad: 1991-2003. Million NOK

Million NOK



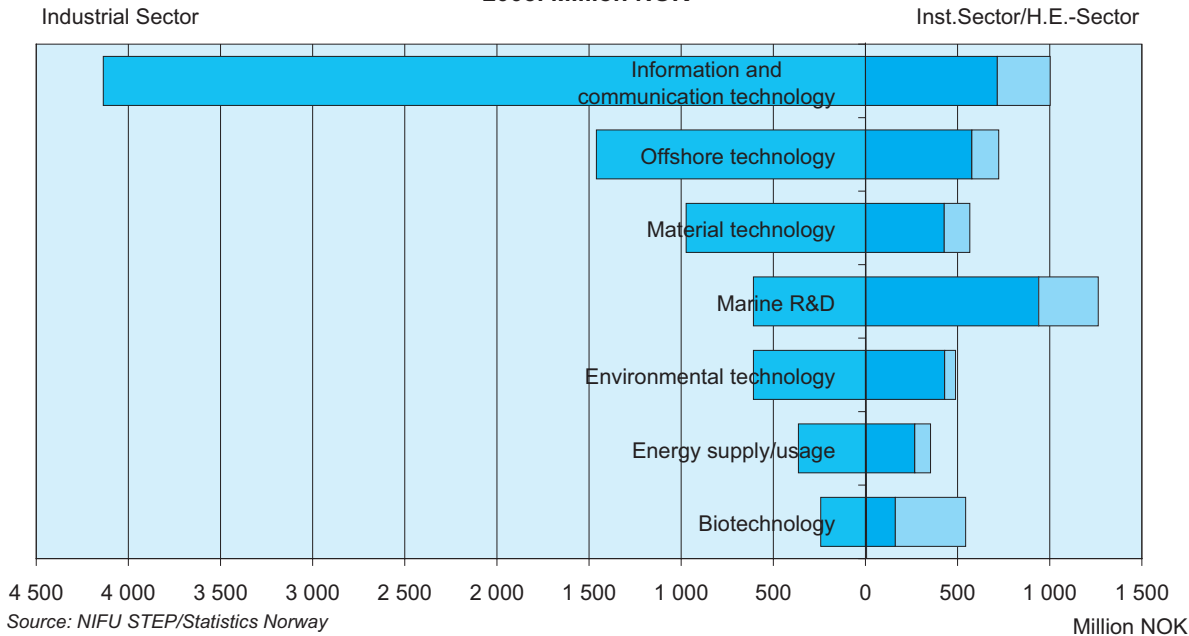
Source: NIFU STEP/Statistics Norway

Figure 7 Current R&D expenditure on basic research in fixed 2000 prices and as a percentage of total current R&D expenditure in Norway: 1970–2003. Million NOK and percentage



Source: NIFU STEP/Statistics Norway

Figure 8 Current R&D expenditure in Norway by sector of performance and selected R&D fields: 2003. Million NOK



Source: NIFU STEP/Statistics Norway

Million NOK

Table 3 Researchers/university graduates (head count) in Norway by sector of performance: 2003. Preliminary figures for 2005

Sector of performance	2003			2005
	Researchers/ university graduates	Technicians & supporting staff	Total	Researchers/ university graduates
Industrial Sector	13 174	6 682	19 856	..
Institute Sector	6 350	3 061	9 411	6 500
Higher Education Sector	16 216	5 745	21 961	17 500
<i>Of which: Universities¹</i>	9 436	3 916	13 352	11 100
<i>Specialised University Inst.</i>	1 653	552	2 205	1 300
<i>State University Colleges</i>	5 127	1 277	6 404	5 100
Total	35 740	15 488	51 228	..

¹ *The University of Stavanger and the Norwegian University of Life Sciences (UMB) became universities by 01.01.2005.*

Source: NIFU STEP/Statistics Norway

Table 4 Tenured academic/professional staff paid by general university funds in the Higher Education Sector in Norway by position and type of institution: 2003 and 2005¹

Position	2003		2005		
	Universities and Specialised University Institutions	State University Colleges	Universities and Specialised University Institutions	Hereof: Univ. of Stavanger	State University Colleges
Professor	2 319	228	2 432	(55)	246
College reader	0	38	1	(0)	22
Deans and head of departments	31	75	120	(19)	116
Associate professor	1 668	962	1 872	(126)	906
Senior lecturer	272	156	236	(17)	104
Assistant professor	69	420	123	(23)	481
University/College lecturer ²	666	2 814	1 037	(193)	2 705
Sum tenured position	5 025	4 693	5 821	(433)	4 580

¹ Preliminary figures. The University of Stavanger became a university by 01.01.2005.

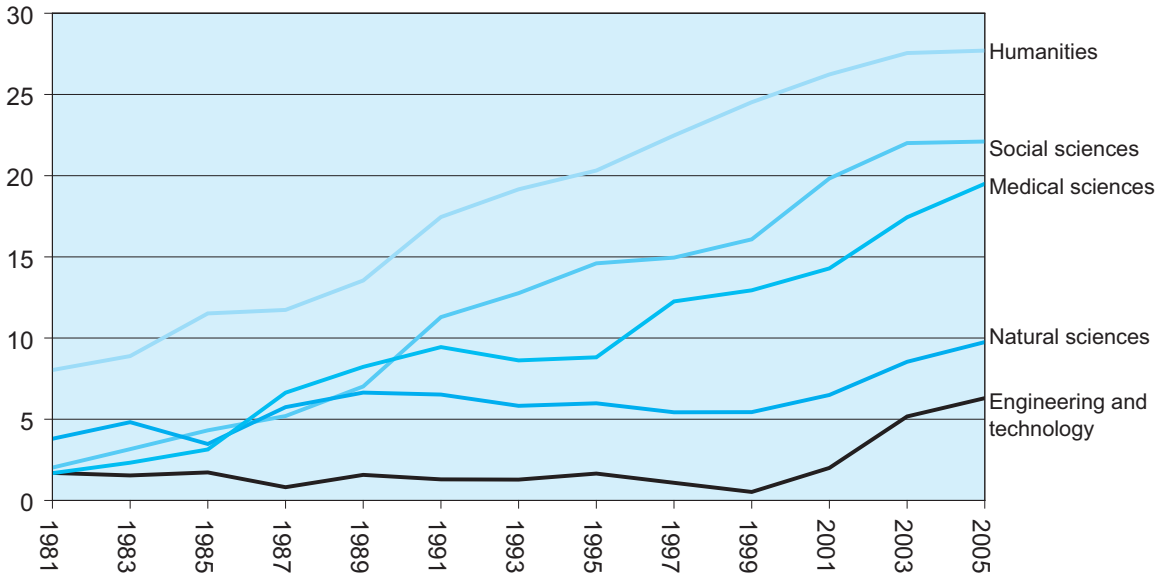
² Includes professional positions which require education at Master level.

Source: NIFU STEP

Figure 9 Share of women among the university professors in Norway by field of science:

Per cent

1981-2005



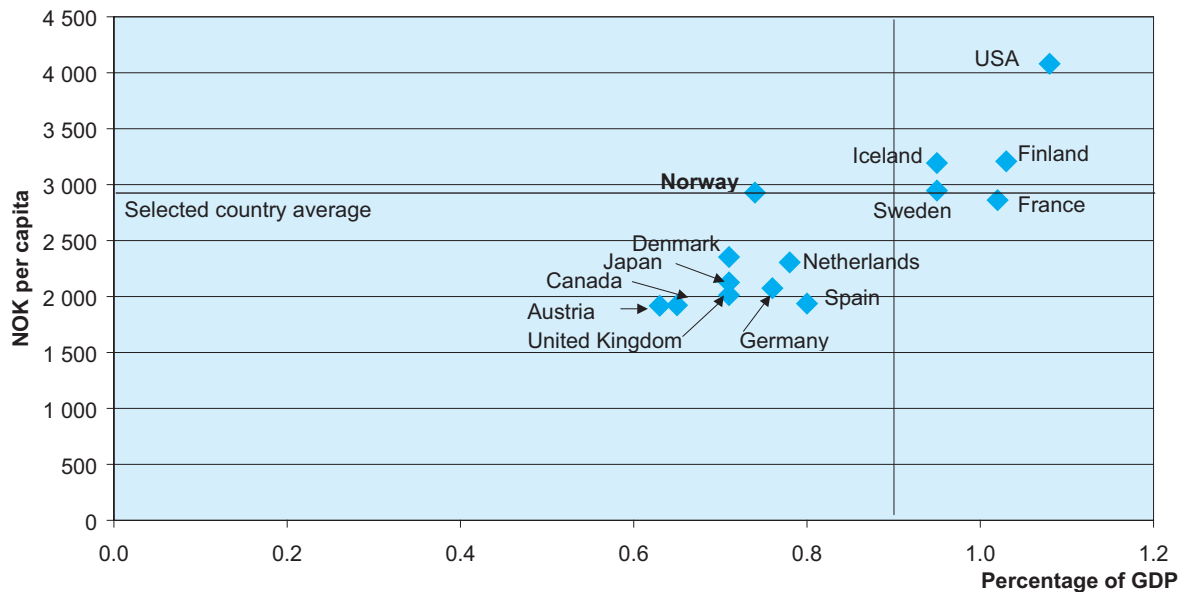
Source: NIFU STEP

**Table 5 R&D expenditure and R&D person years (FTE) performed in the Industrial Sector in Norway
by industry: 2003 and 2004**

Industry (SN 94)	R&D expenditure		R&D person years (FTE)	
	2003 Mill. NOK	2004 Mill. NOK	2003 Number	2004 Number
Fishing, operations of fish hatcheries and fish farms (5)	332.3	227.6	173	171
Extraction of crude petroleum and natural gas (11)	860.0	791.8	513	505
Total industry and mining (13-37)	7 152.8	6 697.5	7 088	7 145
<i>Of which: Chemicals and chemical products (23-24)</i>	<i>1 012.9</i>	<i>1 204.9</i>	<i>1 003</i>	<i>1 092</i>
<i>Machinery and equipment (29)</i>	<i>1 048.3</i>	<i>1 051.7</i>	<i>1 363</i>	<i>1 447</i>
<i>Electrical and optical equipment (30-33)</i>	<i>2 088.6</i>	<i>1 957.8</i>	<i>2 125</i>	<i>2 026</i>
<i>Transport equipment, furniture and other (34-37)</i>	<i>895.3</i>	<i>706.1</i>	<i>729</i>	<i>743</i>
<i>Other industry and mining</i>	<i>2 107.7</i>	<i>1 777.0</i>	<i>1 868</i>	<i>1 837</i>
Electricity, gas and water supply (40-41)	59.5	48.1	60	49
Construction (45)	250.4	196.9	275	246
Total services (50-99)	4 822.1	4 960.6	5 793	5 905
<i>Of which: Transport and telecommunication (60-64.2)</i>	<i>664.9</i>	<i>634.6</i>	<i>591</i>	<i>633</i>
<i>Financial intermediation (65-67)</i>	<i>431.4</i>	<i>504.7</i>	<i>598</i>	<i>663</i>
<i>Computer and related activities (72)</i>	<i>2 109.0</i>	<i>1 815.5</i>	<i>2 751</i>	<i>2 521</i>
<i>Other business activities and consultant services (74)</i>	<i>922.9</i>	<i>1 200.4</i>	<i>1 057</i>	<i>1 194</i>
<i>Other services</i>	<i>693.9</i>	<i>805.4</i>	<i>796</i>	<i>894</i>
Total	13 477.1	12 940.8	13 901	14 025

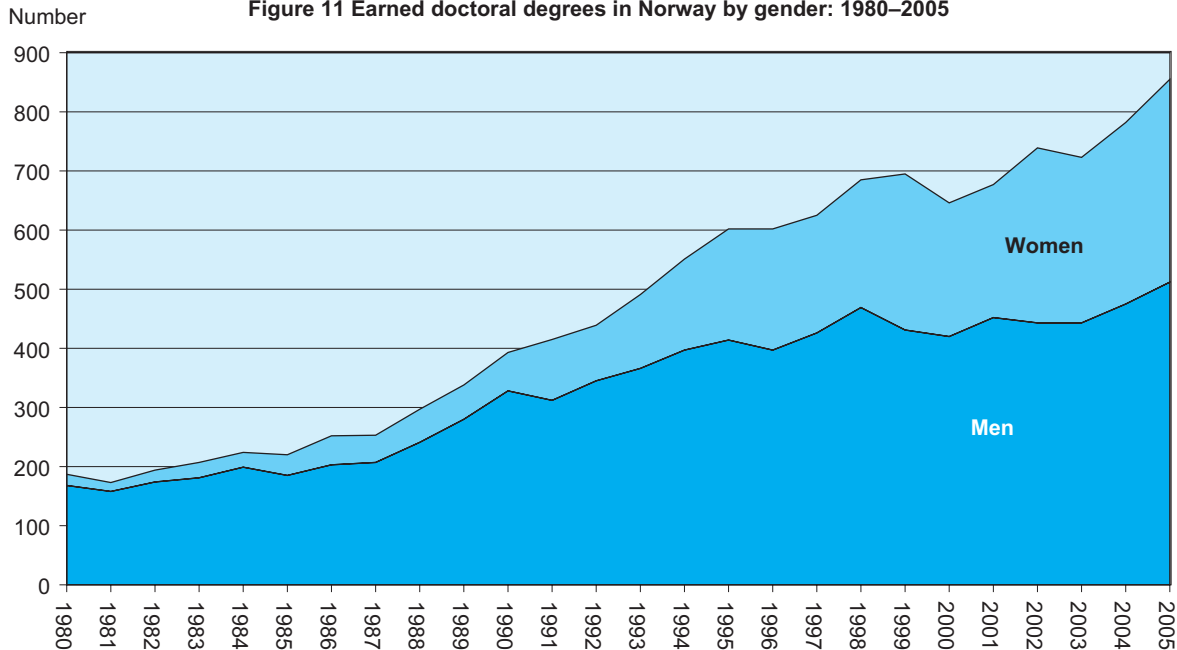
Source: Statistics Norway

**Figure 10 Government budget appropriations or outlays for R&D (GBAORD) as a percentage of the Gross Domestic Product (GDP) and NOK per capita in selected OECD-countries: 2004.
For the Nordic countries: 2005**



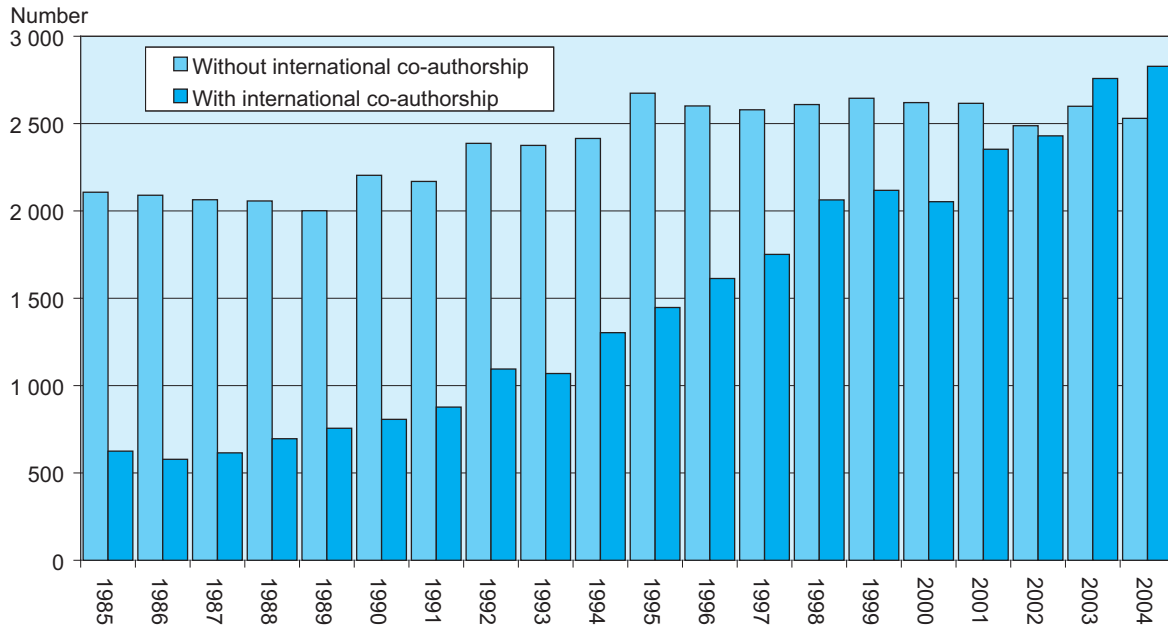
Source: OECD - Main Science and Technology Indicators 2005-2, national sources for the Nordic countries

Figure 11 Earned doctoral degrees in Norway by gender: 1980–2005



Source: NIFU Step/The Doctoral Degree Register

Figure 12 Norwegian articles with and without international co-authorship: 1985-2004



Source: National Citation Report for Norway 2005 (Thomson ISI), NIFU STEP

Table 6 Patent applications in Norway by the applicant's country of origin: 1992-2003

Country	1992-1995	1996-1999	2000-2003	1992-2003
Norway	4 163	5 232	5 109	14 504
<i>Percentage of total</i>	20,3	21,2	20,1	20,6
Canada	235	312	307	854
Denmark	404	450	460	1 314
Finland	540	768	615	1 923
Frankrike	1 367	1 561	1 307	4 235
Germany	2 338	2 631	2 713	7 682
Japan	704	921	1 142	2 767
Netherlands	546	689	997	2 232
Other countries	366	537	750	1 653
Other European countries	1 038	1 200	1 361	3 599
Sweden	1 162	1 589	1 381	4 132
Switzerland	872	974	1 045	2 891
United Kingdom	1 169	1 423	1 302	3 894
USA	5 582	6 391	6 876	18 849
Total of applications	20 486	24 678	25 365	70 529

Source: NIFU STEP and Norwegian Patent Office