

Science and Technology Indicators

2007 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 2005*, The Norwegian Research Council, Oslo, 2006. All expenditures are given in current prices, unless otherwise indicated. 1.00 PPP US\$ = 10.03 NOK in 2006 (Main Science and Technology Indicators 2006-2, OECD), by April 2007 1 Euro = 8.1 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 <http://www.nifustep.no/>, with links to the report mentioned above, and at the home pages of The Research Council of Norway (<http://www.rcn.no/>) and Statistics Norway (<http://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 every year 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 estimates of R&D resources at museums and non-university hospitals that are not included in the Higher Education sector.

Other data sources:

Government budget appropriations or outlays for R&D (GBOARD) are estimated annually by NIFU STEP. 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.

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

- In 2005 total R&D expenditure in Norway amounted to 29.6 billion NOK. As a share of the Gross Domestic Product (GDP) R&D expenditure accounted for 1.53% in 2005 compared to 1.59% in 2004.
- From 2003 to 2005 total R&D expenditure in fixed prices increased by 3.4%. The Industrial sector fell by 3.7%, and the Institute sector had a growth of 3.8%, while the Higher Education sector, adjusted for the extended data coverage at the university hospitals, rose 11.3%. Estimates for 2006 show an increase in all sectors.
- 27% of government-financed R&D was channelled through The Research Council of Norway in 2005.
- In 2005, Norwegian R&D expenditure per capita was 6 410 NOK, whereas OECD average was 5 730 NOK.
- The two counties, Oslo and Sør-Trøndelag, had the highest level of R&D expenditure per capita.
- Funding from industry as a share of total R&D expenditure was highest in Vestfold county.
- The share of basic research and applied research had a small decrease, at the expense of experimental development from 2003 to 2005. Their shares of R&D expenses were; 19%, 37% and 44% in 2005.
- The Norwegian Government's technology areas in 2005 were ICT, Biotechnology and New Materials. R&D expenditure within these fields amounted to 6.4, 1.9 and 1.6 billion NOK, respectively.
- Medicine and Health sciences was the largest field of science in the Higher Education sector in 2005, with current R&D expenditure amounting to 2 570 million NOK.
- Own funds accounted for 77% of R&D funding in the Industrial sector.
- In 2005, almost 55 000 persons participated in R&D in Norway; 68% researchers/university graduates.
- In 2005, slightly more than 30 000 FTE were performed in Norway: 45% in the Industrial sector, 24% in the Institute sector and 31% in the Higher Education sector.
- In 2005, the women's share of researchers/university graduates in Norway was 32%. The Universities had the highest share of doctorates; 46%, followed by research institutes serving enterprises with 35%.
- In 2006, 905 doctoral degrees were earned in Norway, of which 347 or 38% by women.
- Since 2003 the share of scientific articles with international co-authorship is higher than the share without.

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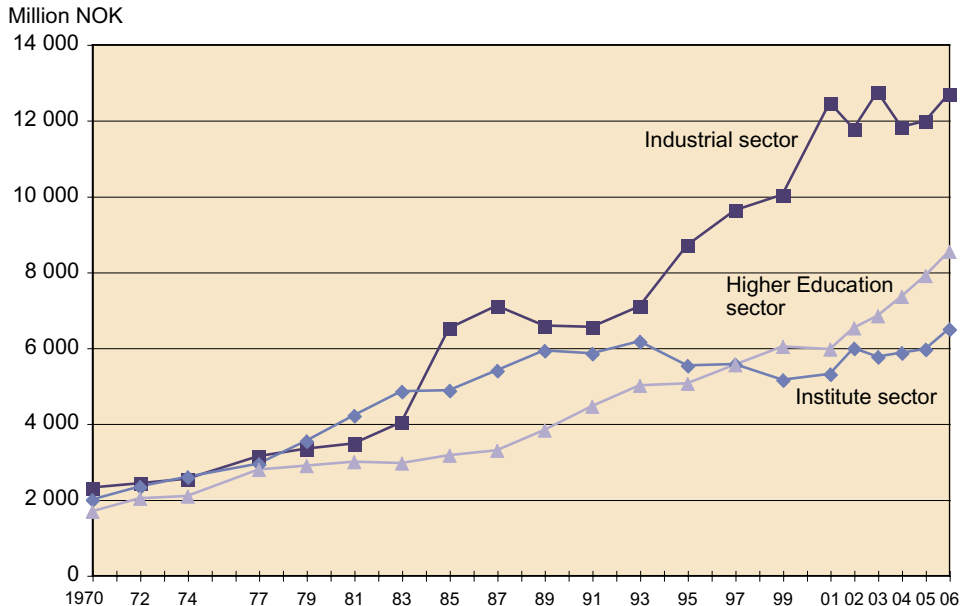
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Figure 1 R&D expenditure in Norway by sector of performance: 1970–2005. Estimates for 2006.
Fixed 2000-prices.



Source: NIFU STEPI/Statistics Norway

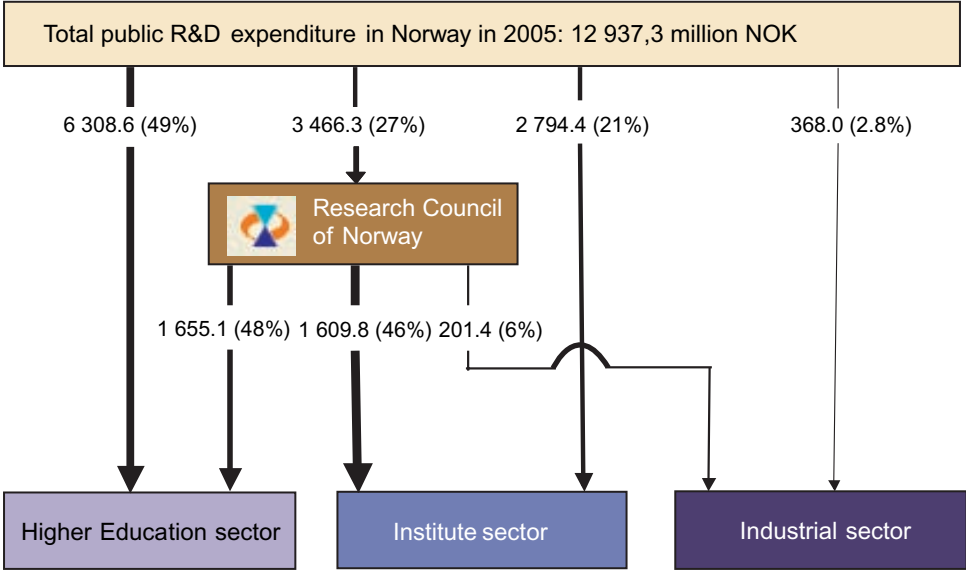
Table 1 R&D expenditure in Norway by sector of performance and source of funds: 2005. Million NOK.

Sector of performance	Total	Source of funds						
		Industry		Government		Other national sources ¹	Abroad	
		Total	Of which: Oil companies	Total	Of which: The 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
Of which: <i>Research institutes serving enterprises</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
Of which: <i>Universities and Spec. university inst.</i>	8 112.8	415.6	139.3	7 113.3	1 573.9	327.5	256.4	149.7
<i>State university 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 STEPI/Statistics Norway

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

Figure 2 Flow chart of government-financed R&D to performing sectors in Norway: 2005.



Source: NIFU STEPI Statistics Norway

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 2005.

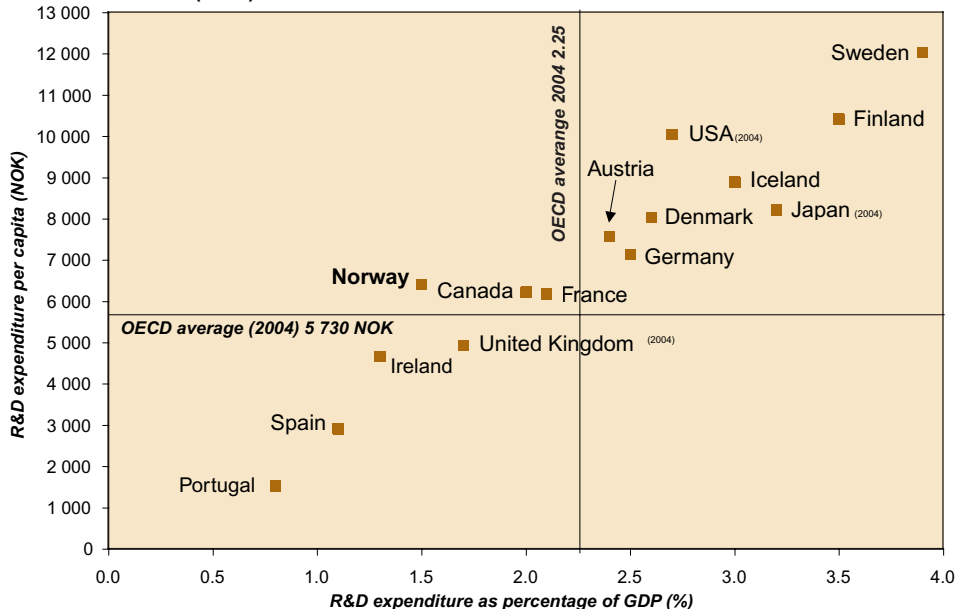
Country	R&D expenditure as a percentage of the GDP							R&D expenditure per capita (NOK)
	Total	Sector of performance			Source of funds			
		Business Enterprise sector	Higher Education sector	Government sector	Government	Industry	Abroad and PNP	
Canada	2.0	1.1	0.7	0.2	0.6	1.0	0.4	6 230
Denmark	2.6	1.8	0.6	0.2	0.7	1.5	0.4	8 030
Finland	3.5	2.5	0.7	0.3	0.7	2.3	0.5	10 420
France	2.1	1.3	0.4	0.4	0.8	1.1	0.2	6 180
Germany	2.5	1.7	0.4	0.3	0.8	1.7	0.0	7 140
Iceland	3.0	1.5	0.8	0.7	1.2	1.3	0.5	10 000
Ireland	1.3	0.8	0.4	0.1	0.4	0.7	0.2	4 660
Japan ⁽²⁰⁰⁴⁾	3.2	2.4	0.4	0.4	0.6	2.4	0.2	8 210
Norway	1.5	0.8	0.5	0.2	0.6	0.7	0.2	6 410
Portugal	0.8	0.3	0.3	0.2	0.5	0.2	0.1	1 530
Spain	1.1	0.6	0.3	0.2	0.5	0.5	0.1	2 910
Sweden	3.9	2.9	0.8	0.2	1.0	2.5	0.4	12 030
United Kingdom ⁽²⁰⁰⁴⁾	1.7	1.1	0.4	0.2	0.6	0.8	0.3	4 940
USA ⁽²⁰⁰⁴⁾	2.7	1.9	0.4	0.4	0.8	1.7	0.2	10 050
Austria	2.4	1.6	0.7	0.1	0.9	0.9	0.6	7 570
Total OECD ⁽²⁰⁰⁴⁾	2.3	1.5	0.4	0.4	0.7	1.4	0.2	5 730
EU - 25	1.8	1.1	0.4	0.3	0.6	1.0	0.2	4 690

Source: OECD - Main Science and Technology Indicators 2006-2

¹ Includes Industrial sector and institutions serving enterprises.

² Where data is not available, data covers 2003/2004 (Denmark, France, Iceland, Japan, Portugal, USA and EU 25).

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 2006-2

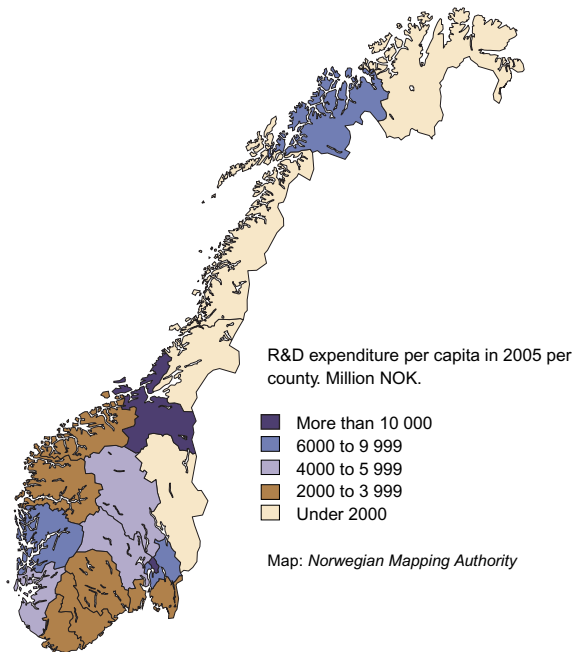
Table 3 R&D expenditure in Norway by source of funds and county: 2005. Million NOK.

County	Total	Industry	Government	Other national sources ¹	Abroad
Østfold	875.0	513.0	141.0	28.7	192.3
Akershus	3 446.3	1 718.5	1 221.8	139.6	366.4
Oslo	9 047.9	3 889.1	4 288.4	348.2	522.2
Hedmark	149.7	57.0	83.5	5.4	3.8
Oppland	521.3	253.1	140.1	26.1	102.0
Buskerud	1 151.2	827.1	244.8	45.3	34.0
Vestfold	567.9	435.7	94.0	21.3	16.9
Telemark	439.4	229.1	84.9	17.5	107.9
Aust-Agder	243.2	113.0	61.6	19.7	48.9
Vest-Agder	387.6	208.1	123.2	18.8	37.5
Rogaland	1 753.6	1 058.7	359.5	87.4	248.0
Hordaland	3 589.3	1 040.4	2 187.3	165.1	196.5
Sogn og Fjordane	255.9	168.9	59.3	15.5	12.2
Møre og Romsdal	634.8	447.3	137.2	42.1	8.2
Sør-Trøndelag	4 637.6	1 732.3	2 376.8	106.2	422.3
Nord-Trøndelag	195.3	91.3	88.5	12.1	3.4
Nordland	357.4	189.3	154.5	8.3	5.3
Troms	1 235.4	153.7	985.1	39.7	56.9
Finnmark	75.6	10.1	56.0	3.6	5.9
Svalbard	79.0	26.8	49.8	0.0	2.4
Total	29 643.4	13 162.5	12 937.3	1 150.6	2 393.3

Source: NIFU STEP/Statistics Norway

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

Figure 4 Total R&D expenditure and R&D expenditure per capita in Norway by county: 2005.

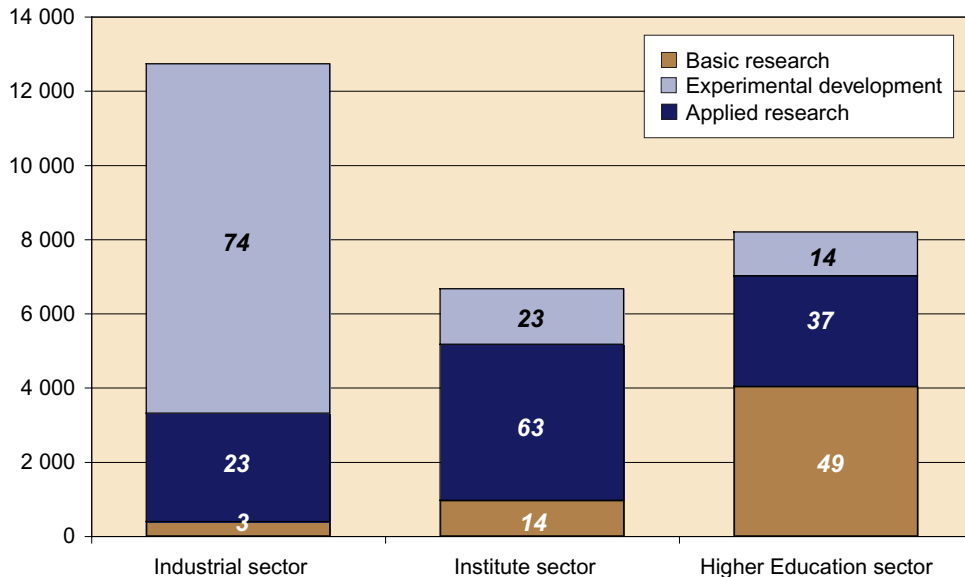


County	Million NOK	NOK per capita
Østfold	875.0	3 130
Akershus	3 446.3	6 470
Oslo	9 047.9	17 040
Hedmark	149.7	940
Oppland	521.3	4 980
Buskerud	1 151.2	4 260
Vestfold	567.9	2 520
Telemark	439.4	2 640
Aust-Agder	243.2	2 280
Vest-Agder	387.6	2 210
Rogaland	1 753.6	4 610
Hordaland	3 589.3	8 010
Sogn og Fjordane	255.9	3 210
Møre og Romsdal	634.8	2 650
Sør-Trøndelag	4 637.6	16 600
Nord-Trøndelag	195.3	1 740
Nordland	357.4	1 480
Troms	1 235.4	7 950
Finnmark	75.6	1 490
Svalbard	79.0	..
Total	29 643.4	6 440

Source: NIFU STEP/Statistics Norway

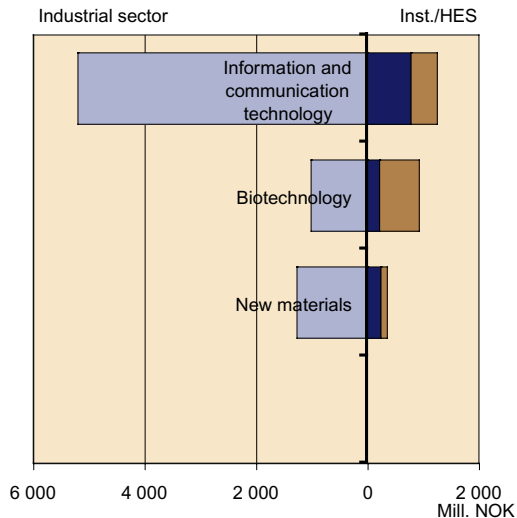
Figure 5 Current R&D expenditure in Norway by sector of performance and type of R&D: 2005.

Mill. NOK Million NOK and per cent.



Source: NIFU STEPI/Statistics Norway

Figure 6a Current expenditure on R&D in Norway by sector of performance and technology areas: 2005. Mill. NOK.



Source: NIFU STEP/Statistics Norway

Figur 6b Current expenditure on R&D in Norway by sector of performance and thematic priorities: 2005. Mill. NOK.

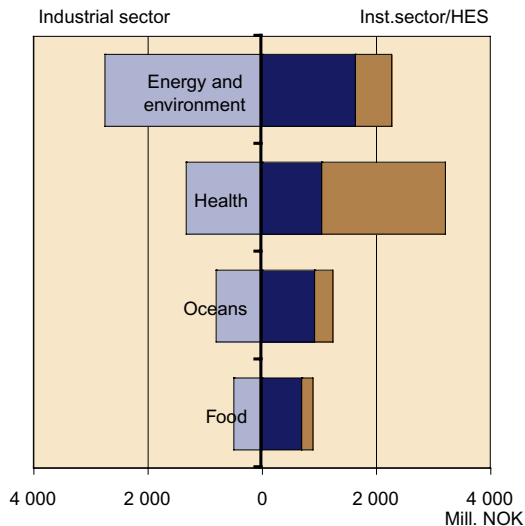


Table 4 Current R&D expenditure in the Institute sector and the Higher Education sector in Norway by field of science and technology: 2005. Million NOK.

Sector of performance	Total	Humanities	Social sciences	Natural sciences	Engineering and technology	Medicine and Health sciences	Agricultural sciences
Institute sector	6 660.9	174.3	1 221.5	1 327.8	2 265.5	576.3	1 095.5
<i>Of which: Research institutes serving enterprises</i>	2 213.8	2.1	146.7	337.6	1 552.0	66.5	108.9
<i>Government sector</i>	4 447.1	172.2	1 074.8	990.2	713.5	509.8	986.6
Higher Education sector	8 190.4	868.1	1 770.0	1 674.6	904.4	2 568.1	405.1
<i>Of which: Universities</i>	6 706.7	687.1	1 065.5	1 574.7	765.5	2 372.9	240.9
<i>Specialised university institutions</i>	540.1	73.6	265.3	23.8	7.6	38.3	131.6
<i>State university colleges</i>	943.6	107.5	439.2	76.1	131.3	156.9	32.6
Total	14 851.3	1 042.4	2 991.5	3 002.4	3 169.9	3 144.4	1 500.6

Source: NIFU STEP

Table 5 R&D expenditure and R&D person years (FTE) in the Industrial sector in Norway by industry: 2005.

Industry (SN 2002)	R&D expenditure	Own funds	R&D person years (FTE)
	Mill. NOK	Per cent	Number
Fishing, operations of fish hatcheries and fish farms (5)	218.0	66	162
Extraction of crude petroleum and natural gas (11)	864.7	81	528
Total industry and mining (13-37)	6 702.1	77	7 074
<i>Of which: Chemicals and chemical products (23-24)</i>	1 205.8	84	1 204
<i>Machinery and equipment (29)</i>	992.2	58	1 315
<i>Electrical and optical equipment (30-33)</i>	2 056.4	74	2 017
<i>Transport equipment, furniture and other (34-37)</i>	755.5	76	820
<i>Other industry and mining</i>	1 692.2	87	1 718
Electricity, gas and water supply (40-41)	57.2	81	53
Construction (45)	154.9	86	162
Total services (50-99)	5 643.3	78	5 835
<i>Of which: Transport and telecommunication (60-64.2)</i>	573.9	84	507
<i>Financial intermediation (65-67)</i>	778.9	100	699
<i>Computer and related activities (72)</i>	2 299.1	83	2 646
<i>Other business activities and consultant services (74)</i>	1 047.4	56	1 082
<i>Other services</i>	944.0	67	901
Total	13 640.3	77	13 815

Source: Statistics Norway

Table 6 R&D personnel (head count and FTE) in Norway by sector of performance: 2005.

Sector of performance	R&D personnel as of 01.10.2005			R&D person years (FTE)	
	Total R&D personnel	Of which: Researchers/ university graduates	Technicians & support staff	Total	Of which: Researchers/ university graduates
Industrial sector	20 730	12 442	8 288	13 815	9 070
Institute sector	9 425	6 484	2 959	7 276	5 088
<i>Of which: Research institutes serving enterprises</i>	<i>2 580</i>	<i>1 927</i>	<i>653</i>	<i>2 111</i>	<i>1 622</i>
<i>Government sector</i>	<i>6 845</i>	<i>4 539</i>	<i>2 306</i>	<i>5 165</i>	<i>3 466</i>
Higher education sector	24 205	18 087	6 118	9 420	7 511
<i>Of which: Universities</i>	<i>16 429</i>	<i>11 757</i>	<i>4 672</i>	<i>7 810</i>	<i>6 110</i>
<i>Specialised university inst.</i>	<i>1 514</i>	<i>1 261</i>	<i>253</i>	<i>580</i>	<i>498</i>
<i>State university colleges</i>	<i>6 262</i>	<i>5 069</i>	<i>1 193</i>	<i>1 030</i>	<i>903</i>
Total	54 360	37 013	17 365	30 511	21 669

Source: NIFU STEP/Statistics Norway

Figure 7 Personnel in selected scientific positions in the Higher Education sector in Norway by type of institution and position: 2005.

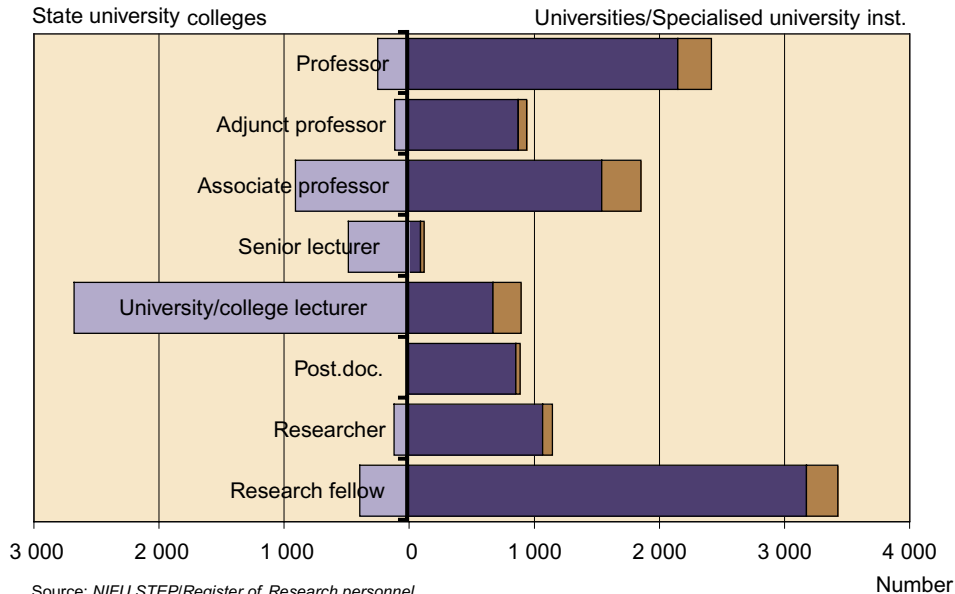
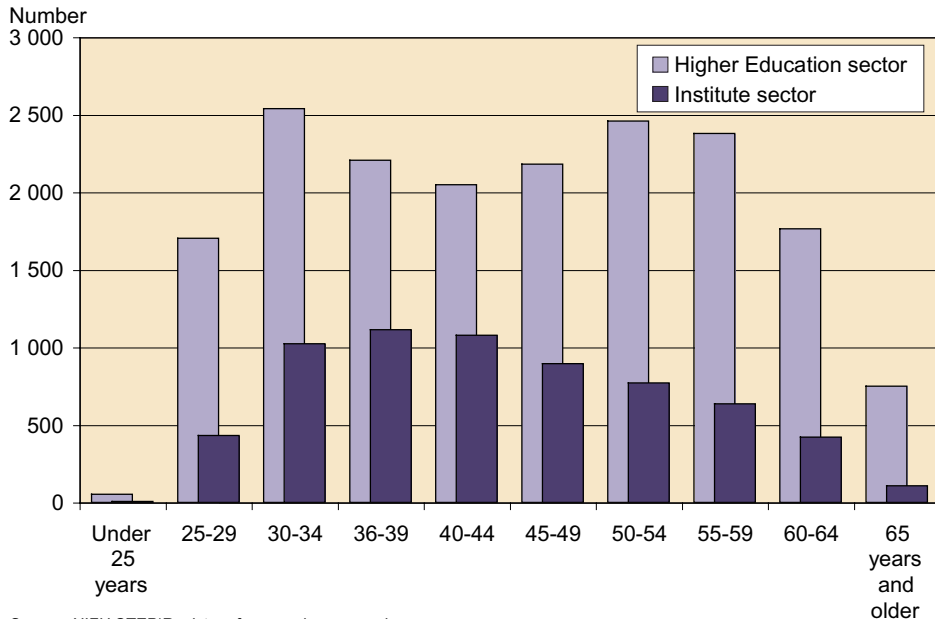


Table 7 Researchers/university graduates (head count) in Norway by sector of performance: 2005. Doctorates and women.

Sector of performance	Total			Doctorates			
	Total	Women		Total		Women	
	Number	Number	%	Number	%	Number	%
Higher Education sector	18 087	7 121	39	6 617	37	1 889	27
<i>Of which: Universities</i>	11 757	4 318	37	5 353	46	1 524	35
<i>Specialised university inst.</i>	1 261	451	36	434	34	116	26
<i>State university colleges</i>	5 069	2 352	46	830	16	249	11
Institute sector	6 484	2 207	34	2 273	35	666	30
<i>Of which: Research institutes serving enterprises</i>	1 927	498	26	664	34	142	29
<i>Government sector</i>	4 539	1 698	37	1 603	35	521	31
Industrial sector	12 442	2 422	19	1 213	10	250	10
Total	37 013	11 750	32	10 103	27	2 805	24

Source: NIFU STEPI/Statistics Norway

Figure 8 University graduated R&D personnel in Norway as of 1.10.2005 by age group and sector of performance.



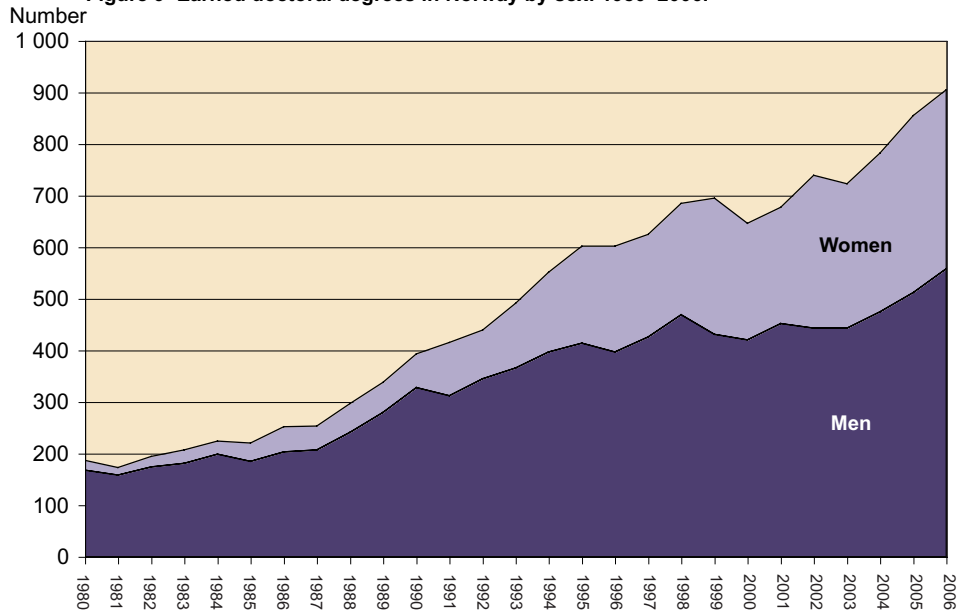
Source: NIFU STEPI Register of research personnel

Table 8 Government budget appropriations or outlays for R&D (GBAORD) in Norway by socio-economic objectives. Includes resources for R&D performed in Norway and abroad. Final budget: 2005, 2006 and 2007. Million NOK.

Socio-economic objectives	2005	2006	2007
Agriculture, forestry and fishery	1 158	1 273	1 321
<i>Of which: fishery</i>	662	740	769
Industrial development	1 058	1 189	1 208
Production and distribution of energy	401	499	467
Transport and telecommunications	254	332	386
Living conditions and physical planning	16	26	24
Environment	280	293	311
Health	1 517	1 633	1 809
Social conditions	241	285	304
Culture, mass media and leisure	140	152	162
Education	122	132	137
Working conditions	38	39	41
Economic planning and public administration	329	343	357
Exploration and exploitation of the earth and atmosphere	256	373	356
General advancement of knowledge	6 764	7 197	7 661
Space research	303	296	453
Defence	880	895	885
EU contingent	525	764	765
Total	14 283	15 723	16 646

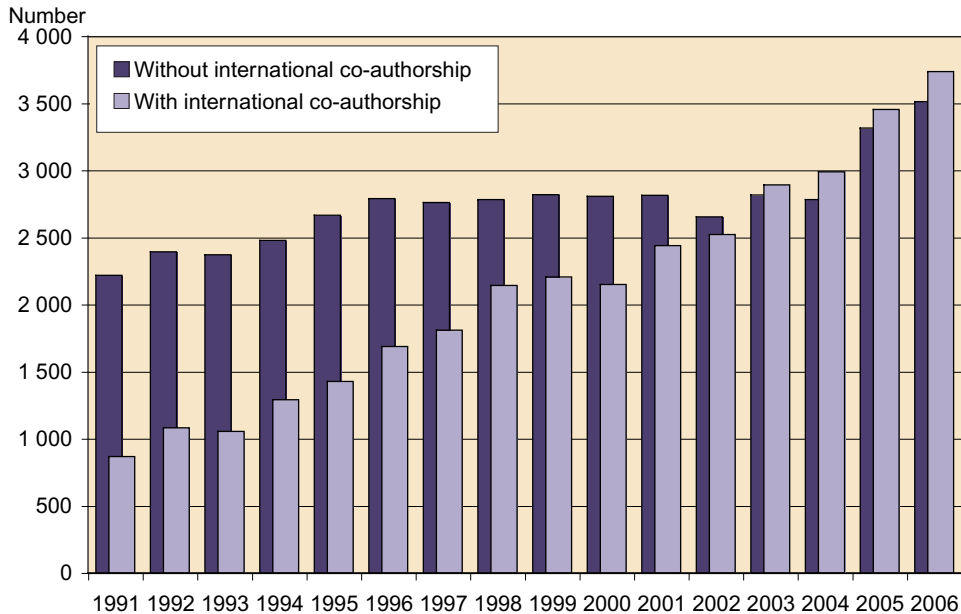
Source: NIFU STEP

Figure 9 Earned doctoral degrees in Norway by sex: 1980–2006.



Source: NIFU STEP/The Doctoral Degree Register

Figure 10 Norwegian articles with and without international co-authorship: 1991-2006.



Source: *National Citation Report for Norway, Institute for Scientific Information (ISI)*