



2012

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 under "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 2011-edition will be published in September. And in between, the internet version of the report is updated. You may also find information at www.foustatistikkbanken.no. All expenditures are given in current prices, unless otherwise indicated. In 2010 1.00 PPP US\$ = 9.02 NOK (Main Science and Technology Indicators 2010-2, OECD). By May 2012 1 Euro = 7.6 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, under "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 non-university 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

In this presentation Norwegian R&D statistics are divided into four: industrial sector, institute sector higher education sector, and health trusts. 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.

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 National Science Indicators prepared by the Thomson Scientific in the U.S. This database contains worldwide publication and citation statistics. Patent data are from the Norwegian Industrial Property Office and OECD.

Highlights

- Total R&D expenditure in Norway amounted to 42.8 billion NOK in 2010. This is a real decrease of 0.7 % from 2009.
- R&D expenditure in 2010 amounted to 1.69 % of GDP, down from 1.78 % in 2009. In the OECD area the average R&D share of GDP was 2.4 %, corresponding to 2.0 % for the EU-25.
- Norway spent 8 747 NOK on R&D per capita in 2010. Denmark and Sweden spent 11 093 and 12 054 NOK, respectively. Norway decreased from 2009, while Denmark and Sweden increased.
- The Norwegian health trusts had R&D expenditure of 2.3 billion NOK in 2010 and accounted for slightly over 5% of the total R&D expenditure this year. Industrial sector, Higher education sector and Institute sector accounted for 43, 28 and 23 % of Norway's R&D efforts, respectively.
- Norway was in second place, well behind Sweden, in terms of Government budget allocations for R&D per capita in 2011, just over Denmark and Finland.
- Approx. 64 000 people participated in R&D in Norway in 2010. 44 800 were researchers/academic staff. 36 % were women, and the share of women was highest at health trusts and in the Higher education sector, with approx. 45 % women. 29 % of the total research staff had doctorates, in the Institute sector this share was 46 %.
- 1 330 doctorates were awarded in Norway in 2011. This is an increase of 12 % from 2010 and is the highest number of doctoral degrees awarded ever. The share of women was 46 % in 2010 and 2011. One third of the doctoral candidates had non-Norwegian citizenships.
- Norwegian scientists publish far above the world average in zoology, ecology/environmental sciences, agricultural sciences, clinical medicine and earth sciences.
- Most patent applications in Norway in the period 2003–2010 were recorded in the industries machinery and equipment and ICT, electrical goods and instruments.

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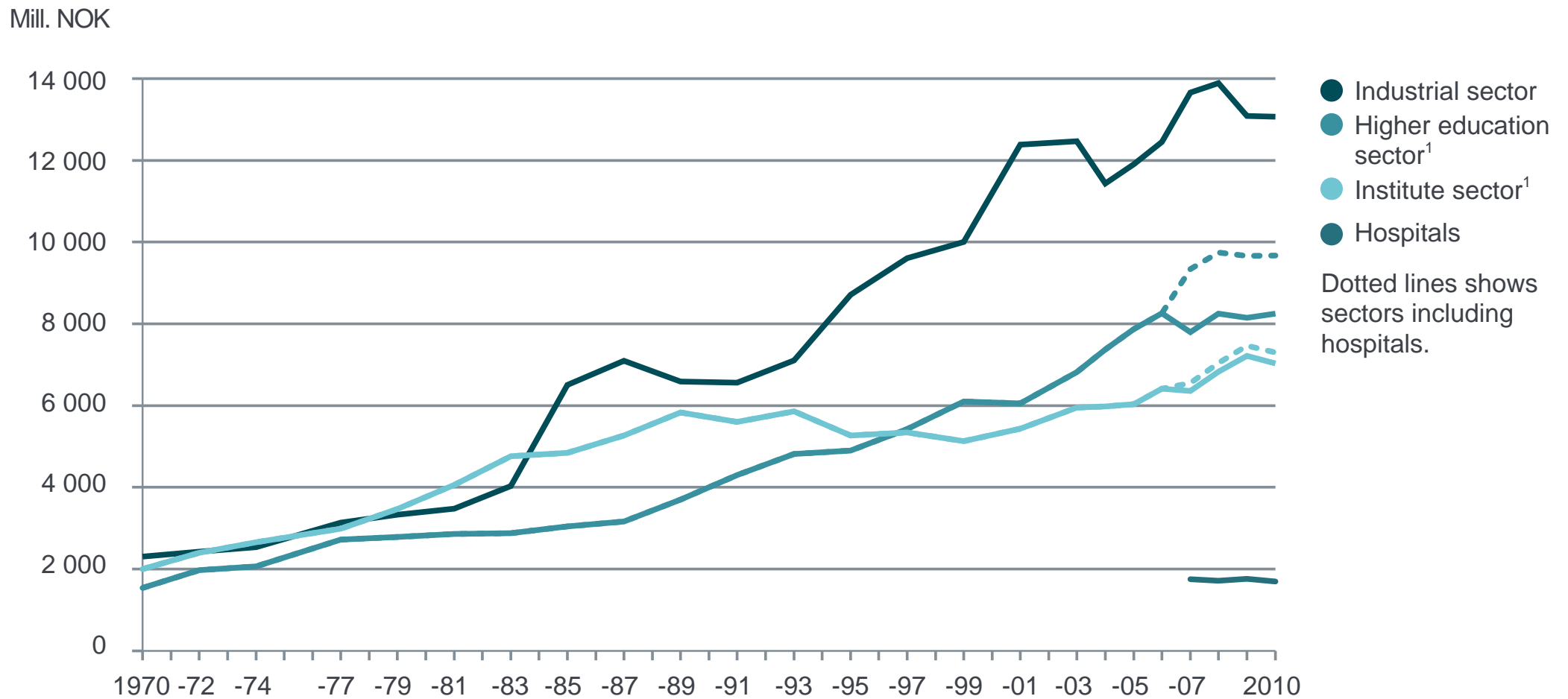
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1 R&D expenditure in Norway by sector of performance: 1970–2010.
Fixed 2000-prices.



¹ Excl. hospitals.

Source: R&D statistics, NIFU/Statistics Norway

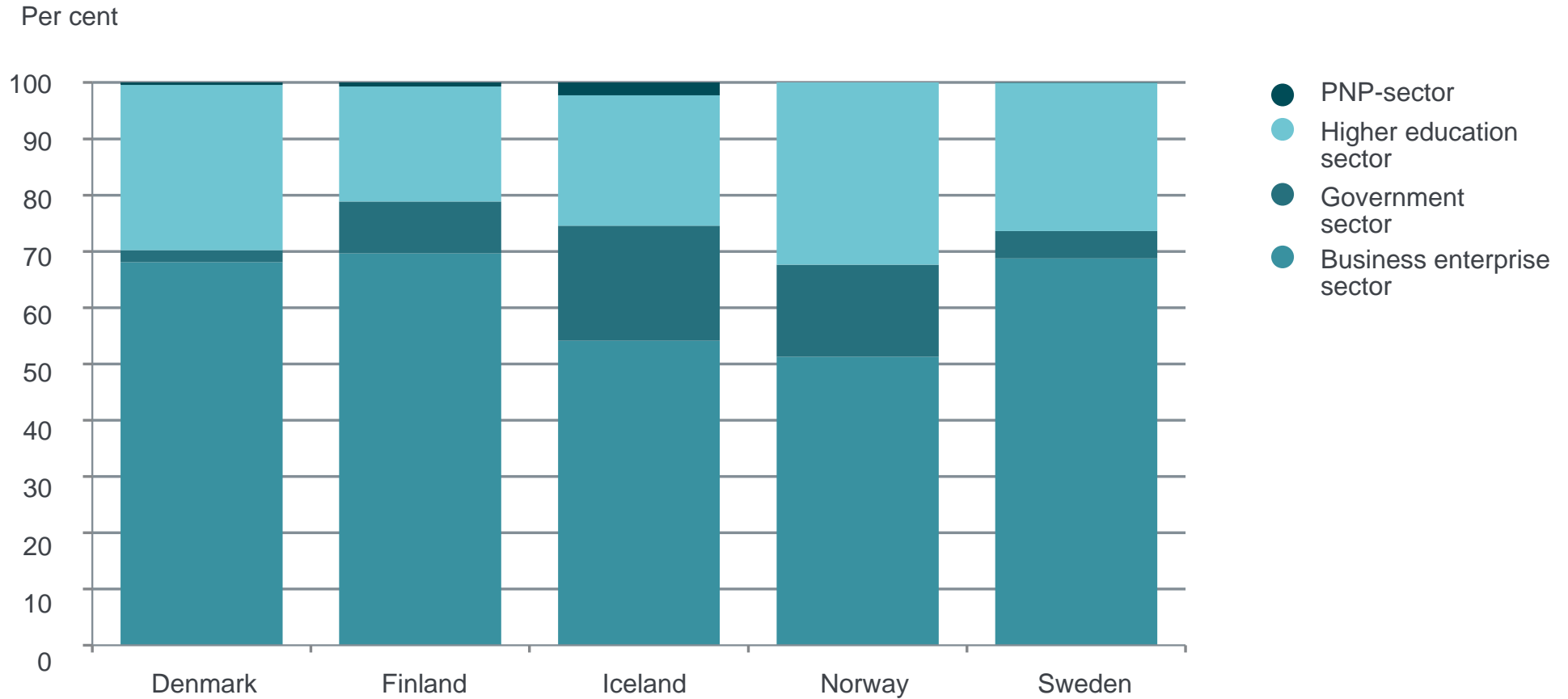
2 R&D expenditure in Norway by sector of performance and source of funds. 2010. Million NOK.

| Sector of performance | Total | Industry | | Government | | Other ¹ | Abroad | |
|---|-----------------|-----------------|-------------------------------------|-----------------|---|---------------------|----------------|---------------------------|
| | | Total | Of which: Oil- compa- nies | Total | Of which: Research Council of Norway | National sources | Total | Of which: EU- comm. |
| Industrial sector | 18 513.9 | 15 163.1 | 1 401.2 | 717.7 | 390.0 | 519.2 | 2 113.8 | 45.9 |
| Institute sector | 10 035.9 | 2 013.3 | 454.0 | 6 547.3 | 2 689.5 | 296.8 | 1 178.5 | 371.8 |
| Of which: | | | | | | | | |
| - Research inst. serving enterprises | 3 396.4 | 1 314.3 | 318.8 | 1 451.2 | 1 004.7 | 115.9 | 515.0 | 204.8 |
| - Government sector | 6 639.5 | 699.0 | 135.2 | 5 096.1 | 1 684.8 | 180.9 | 663.5 | 167.0 |
| Higher Education sector | 11 871.0 | 501.0 | .. | 10 715.0 | 2 387.0 | 334.0 | 321.0 | .. |
| Health trusts | 2 339.2 | 52.0 | - | 2 126.8 | 182.0 | 135.6 | 24.8 | 17.5 |
| - Health trusts with university functions | | | | | | | | |
| - Health trusts without university functions | 1 959.8 | 44.1 | - | 1 772.1 | 172.4 | 120.3 | 23.3 | 17.5 |
| | 379.4 | 7.9 | - | 354.7 | 9.6 | 15.3 | 1.5 | - |
| Total | 42 760.0 | 17 729.4 | .. | 20 106.8 | 5 648.5 | 1 285.6 | 3 638.1 | .. |

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

Source: R&D statistics, NIFU/Statistics Norway

3 R&D expenditure in the Nordic countries by sector of performance in 2010. Per cent.



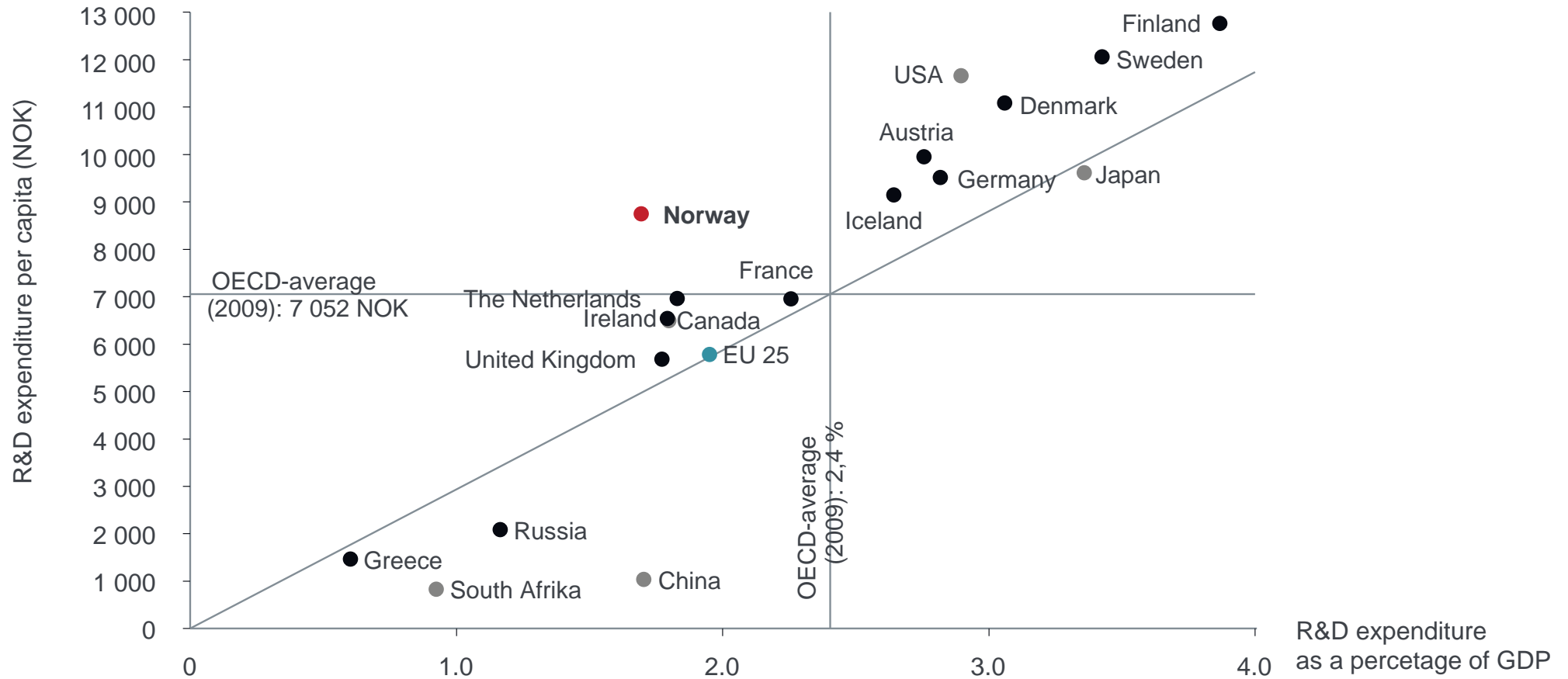
Source: Statistics Denmark, Statistics Finland, Rannis Island, Statistics Norway, NIFU, Statistics Sweden, OECD - MSTI 2011-2

4 R&D expenditure as a percentage of the Gross Domestic Product (GDP) by source of funds and sector of performance in 2010.

| Country | R&D expenditure as a percentage of GDP | | | | | | | R&D expenditure Per capita (NOK) |
|----------------|--|-------------------------------------|---------------------|-----------------|------------------------------|----------|-------------------|-------------------------------------|
| | Total | Sector of performance | | | Source of funds ¹ | | | |
| | | Business enterprise ¹ | Higher ed. sect. | Govern- ment | Govern- ment | Industry | Abroad & other | |
| Austria | 2.8 | 1.9 | 0.7 | 0.2 | 1.1 | 1.2 | 0.5 | 9 949 |
| Canada | 1.8 | 0.9 | 0.7 | 0.2 | 0.6 | 0.9 | 0.3 | 6 337 |
| China | 1.7 | 1.3 | 0.1 | 0.3 | 0.4 | 1.2 | 0.1 | 1 031 |
| Denmark | 3.1 | 2.1 | 0.9 | 0.1 | 0.9 | 1.8 | 0.4 | 11 083 |
| Finland | 3.9 | 2.7 | 0.8 | 0.4 | 1.0 | 2.6 | 0.3 | 12 760 |
| France | 2.3 | 1.4 | 0.5 | 0.4 | 0.9 | 1.2 | 0.2 | 6 952 |
| Germany | 2.8 | 1.9 | 0.5 | 0.4 | 0.8 | 1.9 | 0.1 | 9 509 |
| Iceland | 2.6 | 1.4 | 0.7 | 0.5 | 1.0 | 1.3 | 0.3 | 9 142 |
| Ireland | 1.8 | 1.2 | 0.5 | 0.1 | 0.6 | 0.9 | 0.3 | 6 540 |
| Japan | 3.4 | 2.5 | 0.5 | 0.4 | 0.6 | 2.5 | 0.3 | 9 610 |
| Norway | 1.7 | 0.9 | 0.5 | 0.3 | 0.8 | 0.7 | 0.2 | 8 747 |
| Russia | 1.2 | 0.7 | 0.1 | 0.4 | 0.8 | 0.3 | 0.1 | 2 087 |
| Sweden | 3.4 | 2.3 | 0.9 | 0.2 | 0.9 | 2.0 | 0.5 | 12 054 |
| United Kingdom | 1.8 | 1.1 | 0.5 | 0.2 | 0.6 | 0.8 | 0.4 | 5 676 |
| USA | 2.9 | 2.0 | 0.4 | 0.5 | 0.9 | 1.8 | 0.2 | 11 655 |
| Average OECD | 2.4 | 1.6 | 0.4 | 0.4 | 0.7 | 1.5 | 0.2 | 7 052 |
| Average EU-25 | 2.0 | 1.2 | 0.5 | 0.3 | 0.7 | 1.1 | 0.2 | 5 777 |

¹ Where 2009 data is not available, data from 2008/2009 is used. (Iceland, Japan, China, USA and OECD).
Source: OECD - Main Science and Technology Indicators 2011-2

5 R&D expenditure per capita (NOK) and as a percentage of the Gross Domestic Product (GDP) in selected OECD countries: 2010¹



¹ Where 2010 data is not available, 2008/2009 data has been used (Iceland, Japan, Korea, USA and OECD).
Source: OECD - Main Science and Technology Indicators 2011-2

6 Current R&D expenditure in Norwegian health trusts by type of health trust and region¹ in 2010. Mill. NOK.

| Region | Health trust with university function 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 | 6 318 | 200 | 3.2 | 6 946 | 48 | 0.7 |
| Northern Norway | 5 012 | 198 | 4.0 | 5 541 | 28 | 0.5 |
| South-Eastern Norway | 22 206 | 1 265 | 5.7 | 27 062 | 255 | 0.9 |
| Western Norway | 11 536 | 368 | 3.2 | 4 423 | 24 | 0.5 |
| Total | 45 072 | 2 031 | 4.5 | 43 972 | 355 | 0.8 |

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

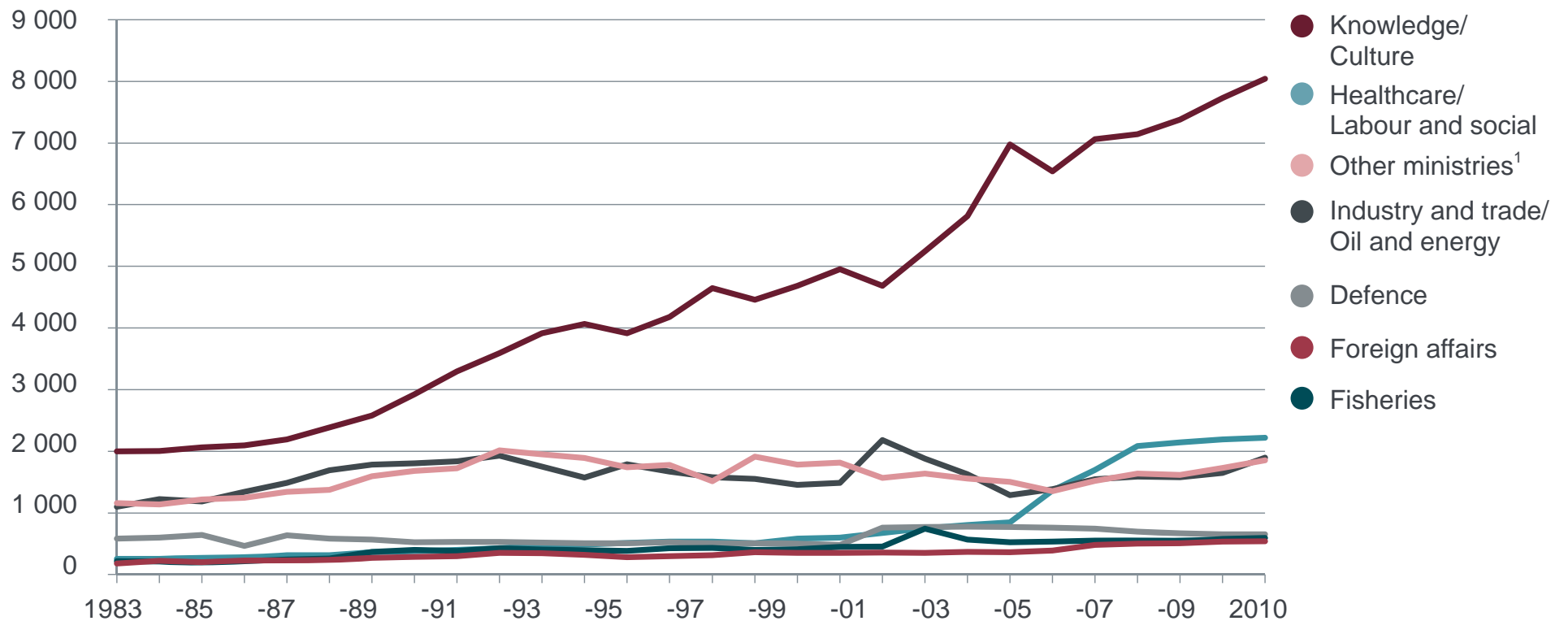
² Includes Oslo University Hospital HF, Akershus University Hospital HF, Bergen Health Trust HF, Stavanger Health Trust HF, St. Olavs hospital HF and University Hospital Northern Norway HF.

³ Source: Regional health trust.

⁴ Source: NIFU / Use of resources in the health trusts.

7 Government budget appropriations or outlays for R&D (GBAORD) in Norway by ministry 1983–2010. Mill NOK.

Mill NOK

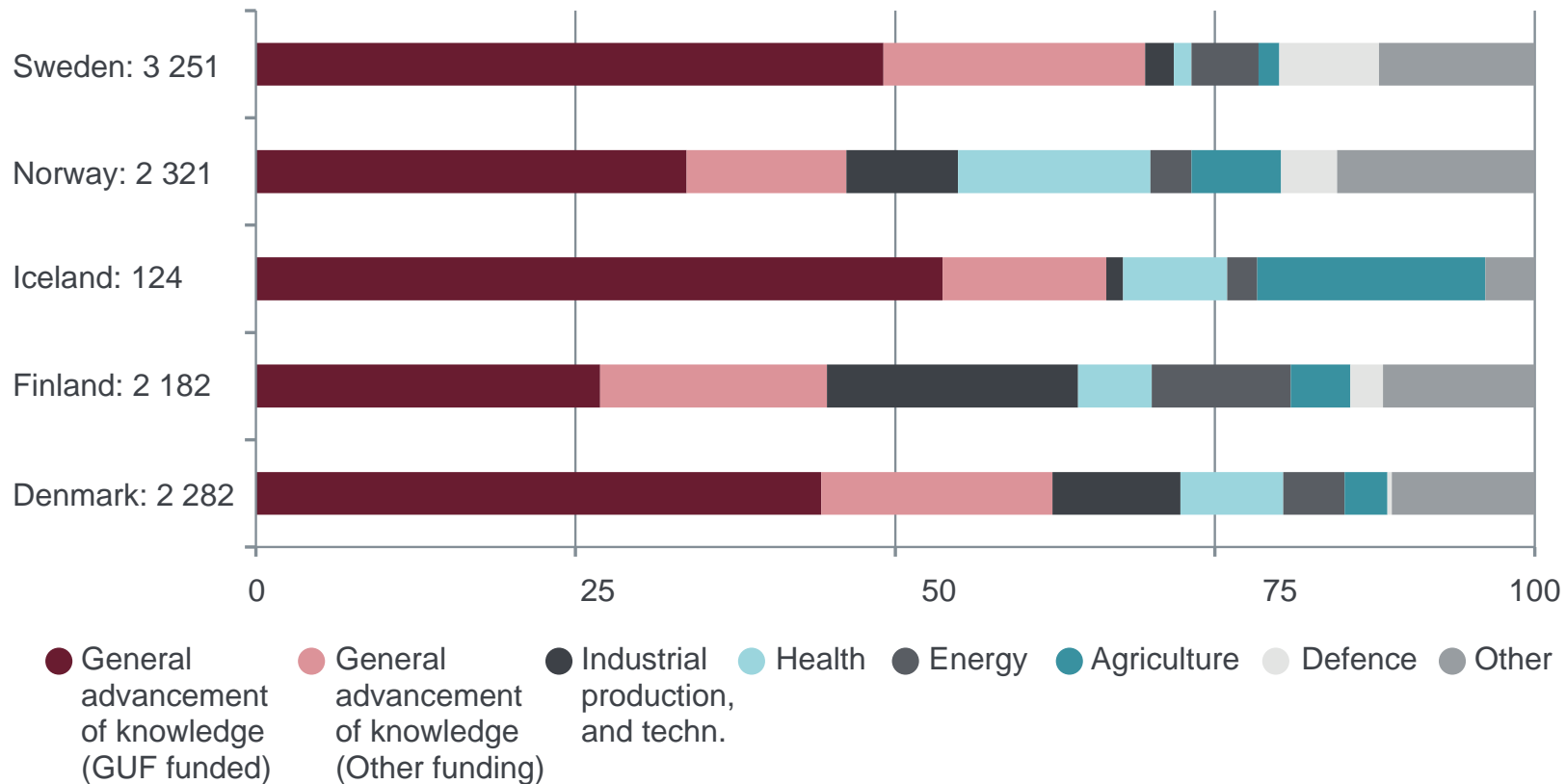


¹ Ministries of: Environment; Local government and regional development; Administration and reforms; Children, equality and social inclusion; Agriculture and food; State banks; Transport and comm; Finance; Justice.

Source: NIFU

8 Government budget appropriations or outlays for R&D (GBAORD) by socio-economic objective for the Nordic countries. 2010. Per cent and total in mill PPP\$.

Country: GBAORD in Mill. PPP\$



Source: OECD Ilibrary

9 R&D personnel by sector of performance in Norway. 2010.
Head count and full time equivalents.

| Sector of performance | R&D personnel as of 01.10.2010 | | | FTE | |
|--|--------------------------------|---------------------------------------|---------------------|---------------|---------------------------------------|
| | Total R&D personnel | Of which: researchers/univ. graduates | Tech. & supp. staff | Total | Of which: researchers/univ. graduates |
| Industrial sector | 22 939 | 14 854 | 8 085 | 15 321 | 10 662 |
| Institute sector | 11 001 | 7 715 | 3 286 | 8 471 | 6 131 |
| Of which: | | | | | |
| - Research inst. serving enterprises | 3 040 | 2 228 | 812 | 2 500 | 1 881 |
| - Government sector | 7 961 | 5 487 | 2 474 | 5 971 | 4 250 |
| Higher Education sector | 24 778 | 18 603 | 6 175 | 9 915 | 8 235 |
| Of which: | | | | | |
| - Universities | 16 305 | 11 585 | 4 720 | 7 964 | 6 495 |
| - Spec. university institutions | 2 875 | 1 742 | 1 133 | 795 | 691 |
| - State university colleges | 5 598 | 5 276 | 322 | 1 156 | 1 049 |
| Health trusts | 5 158 | 3 602 | 1 556 | 2 414 | 1 463 |
| Of which: | | | | | |
| - Health trusts with university functions | 4 307 | 3 043 | 1 264 | 2 053 | 1 234 |
| - Health trusts without university functions | 853 | 562 | 291 | 361 | 229 |
| Total | 63 876 | 44 774 | 19 102 | 36 121 | 26 491 |

Source: R&D statistics, NIFU/Statistics Norway

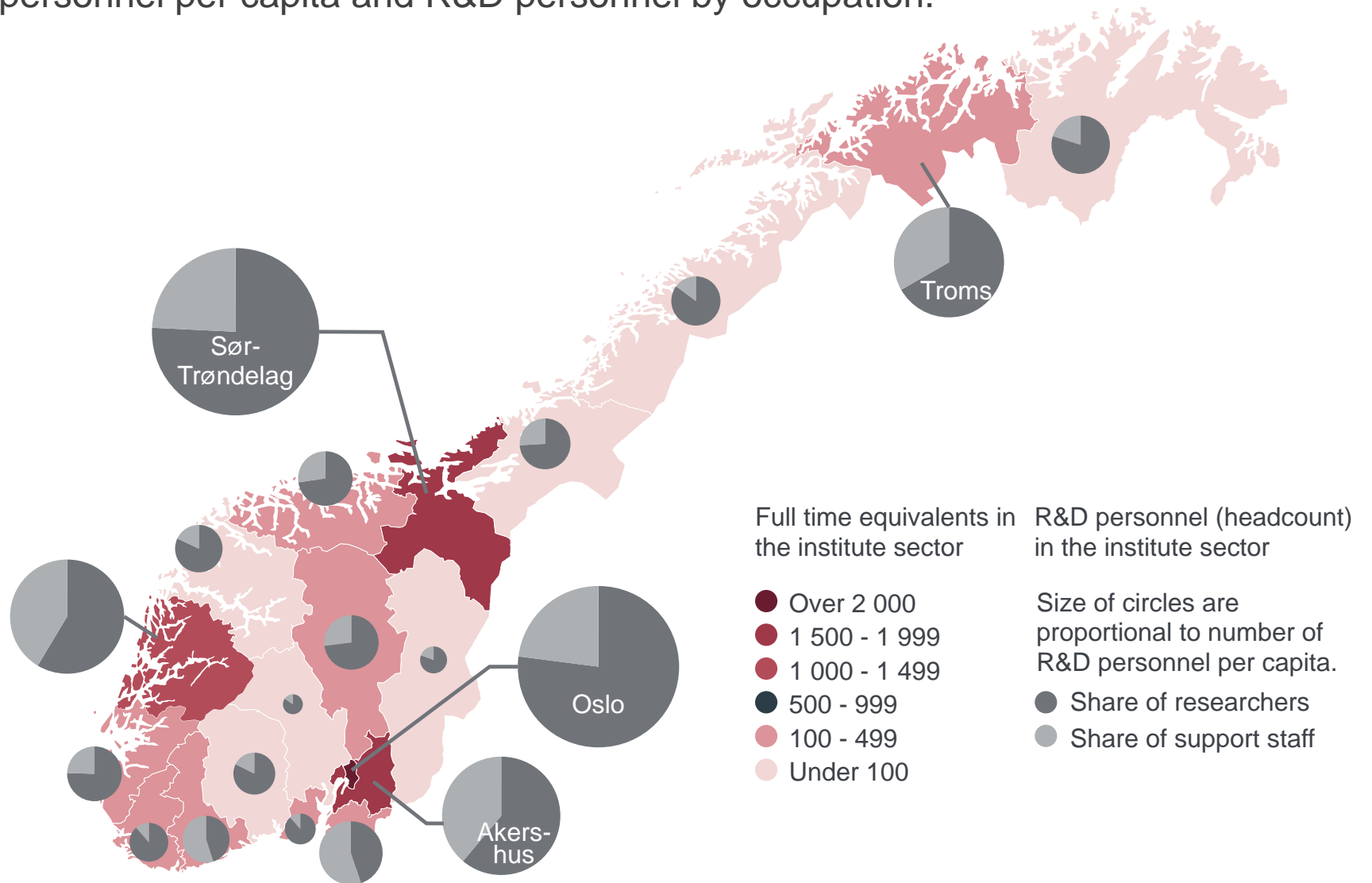
10 Researchers/university graduates (head count) in Norway by sector of performance: 2009. Doctorates and women.

| Sector of performance | Total | | | Doctorates ¹ | | | |
|--|-----------------|-----------------|-----------|-------------------------|-----------|-----------------|-----------|
| | Total Number | Women Number | % | Total Number | % | Women Number | % |
| Industrial sector | 14 854 | 3 121 | 21 | 1 562 | 11 | 301 | 10 |
| Institute sector | 7 715 | 3 026 | 39 | 3 382 | 44 | 1 192 | 39 |
| Of which: | | | | | | | |
| - Research inst. serving enterprises | 2 228 | 689 | 31 | 1 013 | 45 | 300 | 44 |
| - Government sector | 6 051 | 2 337 | 39 | 2 368 | 39 | 892 | 38 |
| Higher Education sector | 18 603 | 8 231 | 44 | 7 392 | 40 | 2 583 | 31 |
| Of which: | | | | | | | |
| - Universities | 11 585 | 4 771 | 41 | 5 480 | 47 | 1 884 | 39 |
| - Spec. university institutions | 1 742 | 708 | 41 | 633 | 36 | 207 | 29 |
| - State university colleges | 5 276 | 2 752 | 52 | 1 279 | 24 | 492 | 18 |
| Health trusts | 3 602 | 1 620 | 45 | 1 590 | 44 | 587 | 36 |
| Of which: | | | | | | | |
| - Health trusts with university functions | 3 043 | 1 376 | 45 | 1 440 | 47 | 539 | 39 |
| - Health trusts without university functions | 562 | 244 | 43 | 150 | 27 | 48 | 20 |
| Total | 44 774 | 15 998 | 36 | 13 926 | 31 | 4 663 | 29 |

¹Also includes licenciates.

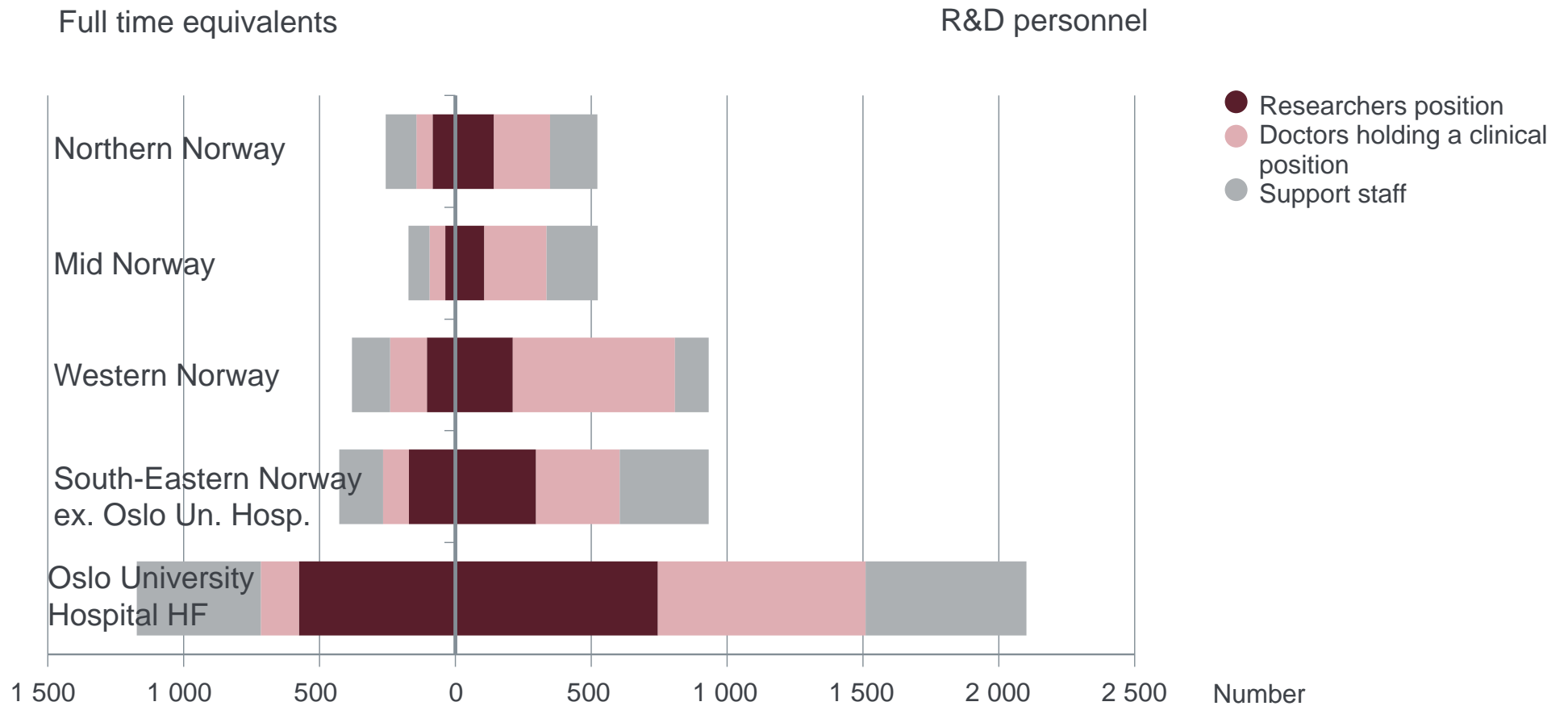
Source: NIFU/SSB

11 R&D personnel in the institute sector 2010. Number of FTE, R&D personnel per capita and R&D personnel by occupation.



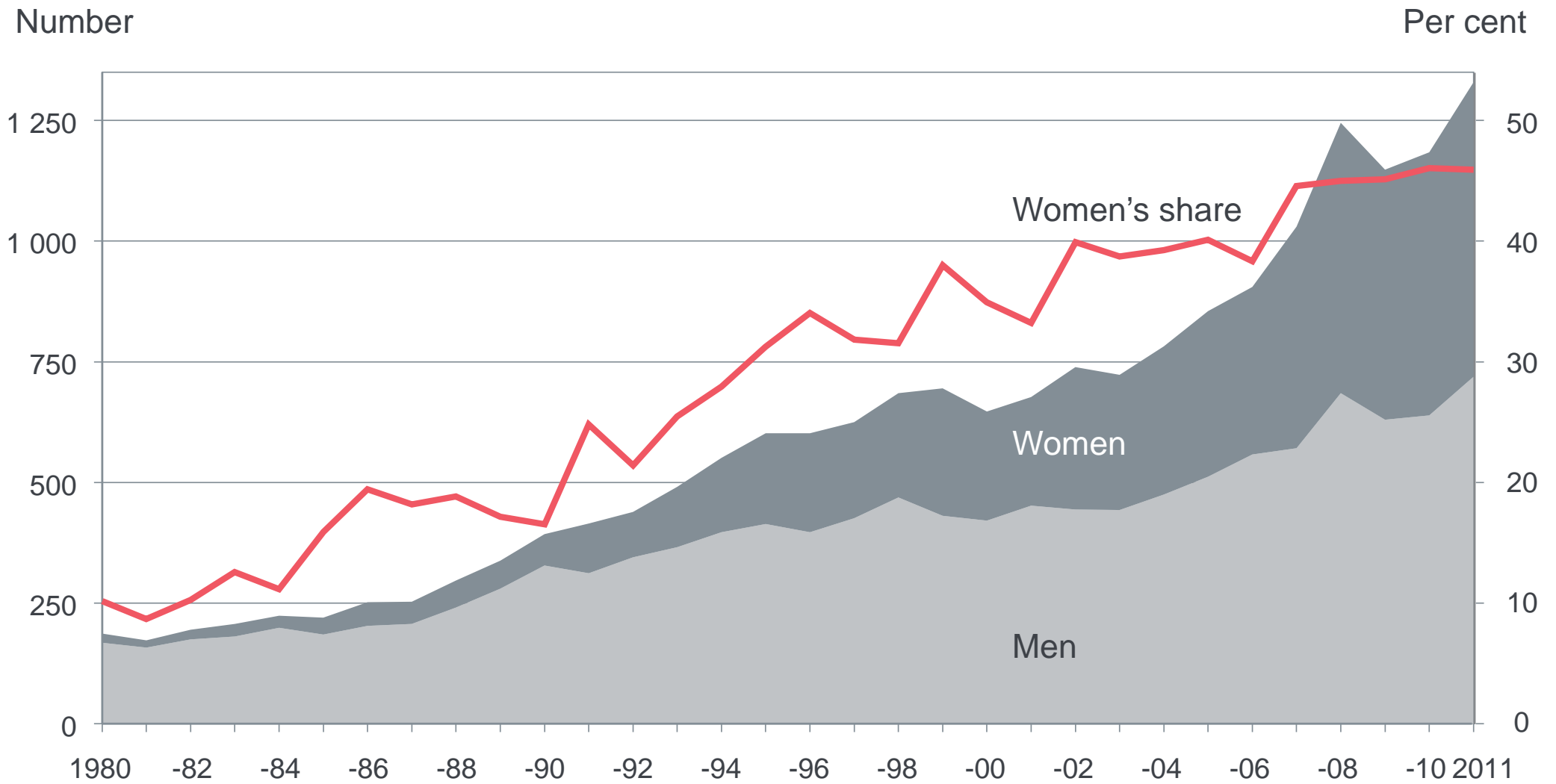
Source: R&D statistics, NIFU/Statistics Norway

12 R&D personnel in the in Norwegian health trusts by health region and position. 2010. Head count and FTE.



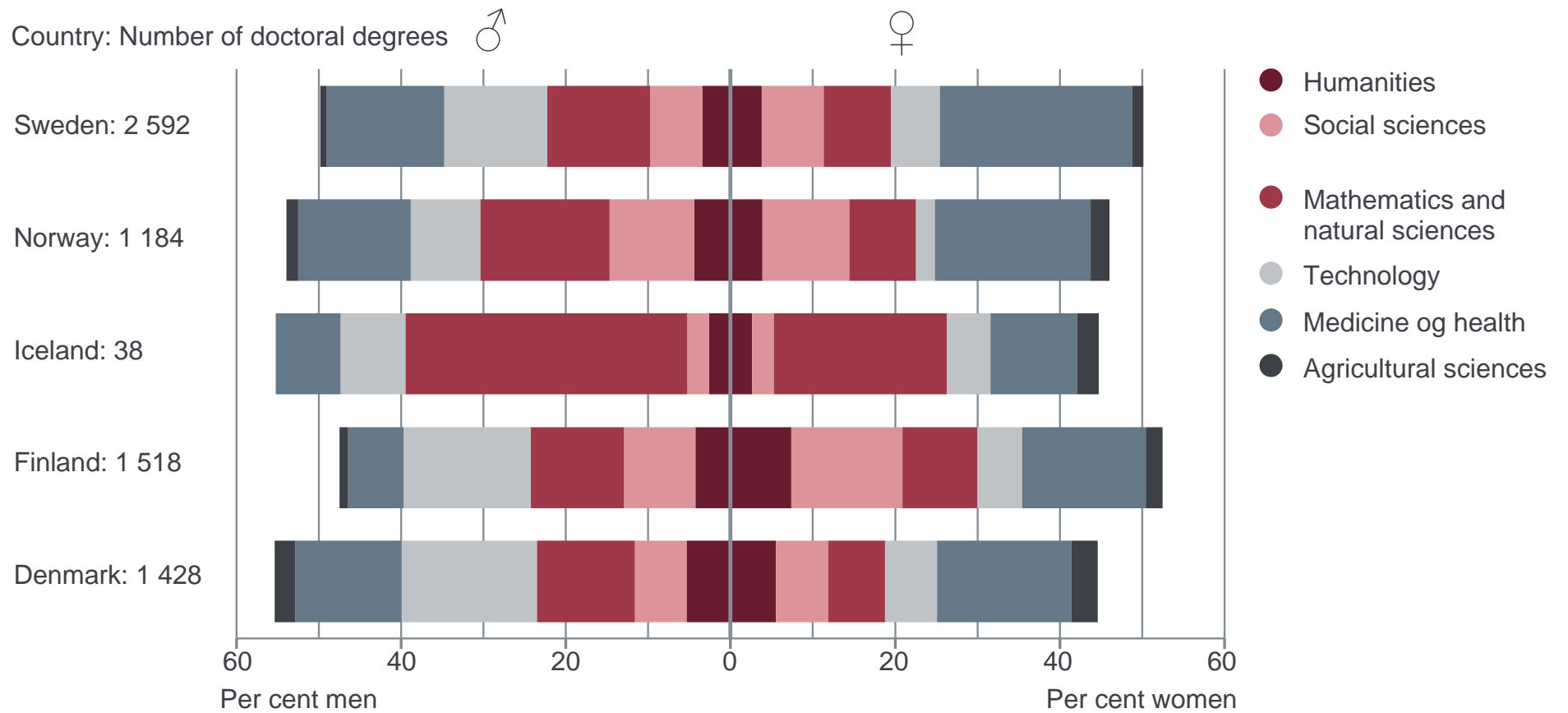
Source: NIFU

13 Awarded doctoral degrees in Norway by sex. 1980–2011.



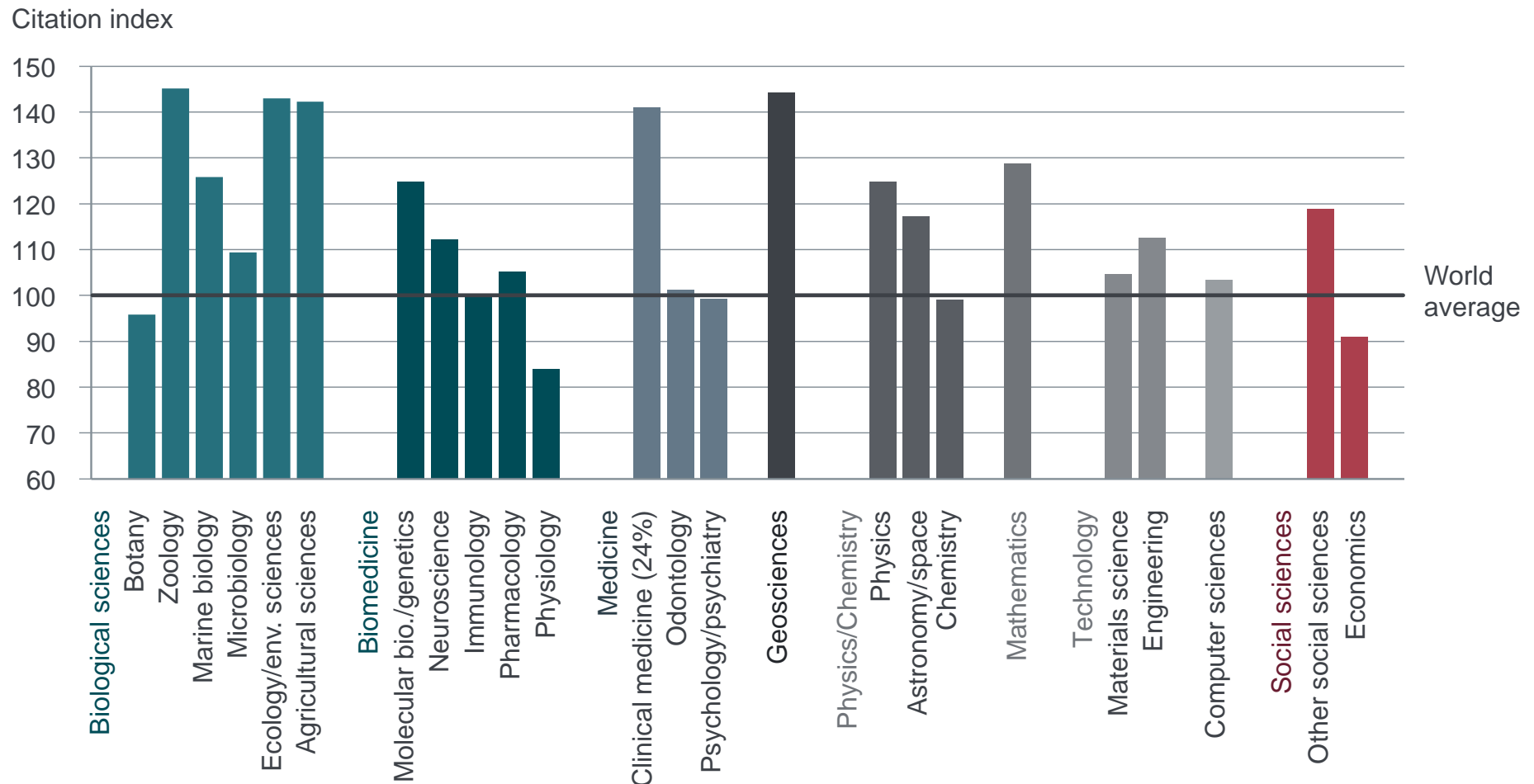
Source: NIFU/The Doctoral Degree Register

14 Awarded doctoral degrees by field of science in the Nordic countries in 2010.



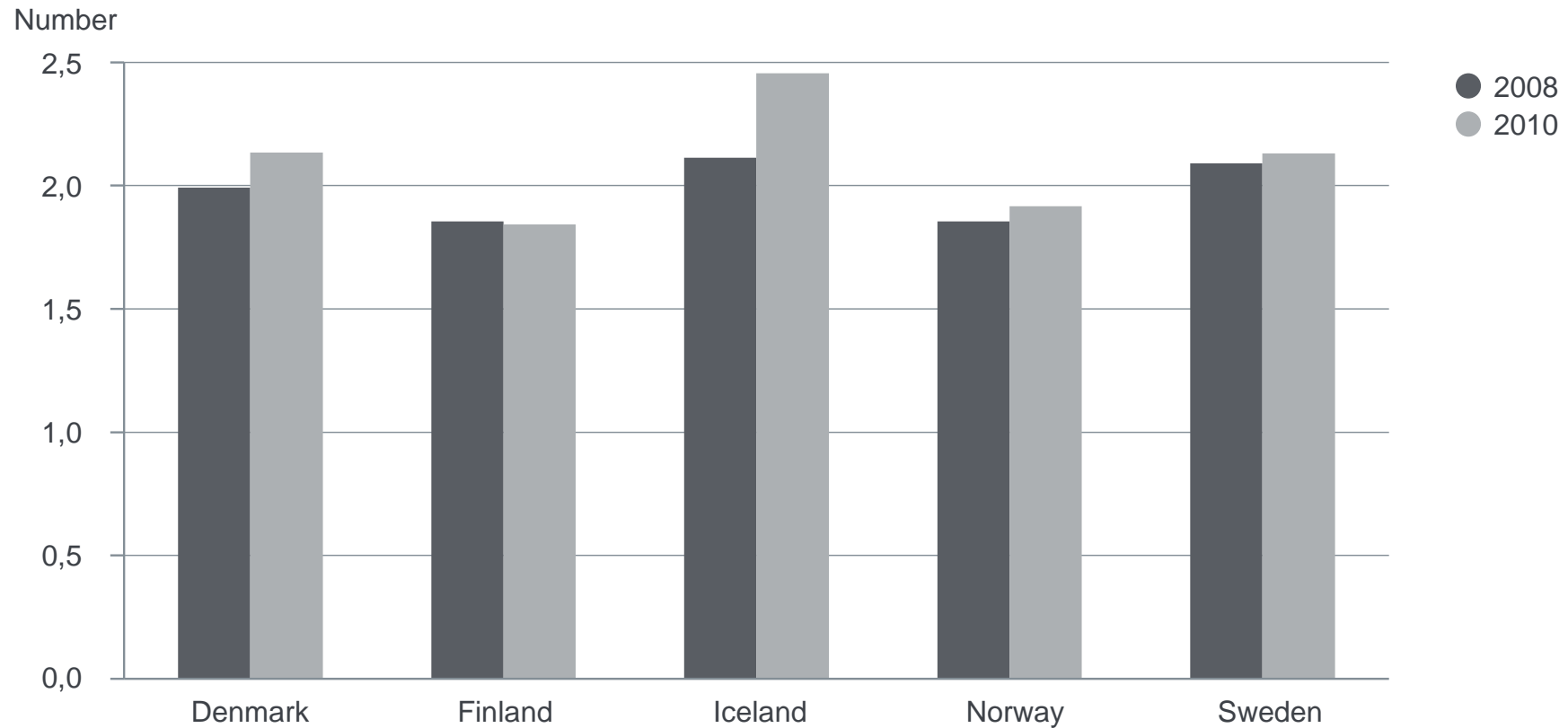
Source: NORBAL

15 Citation index for Norwegian publications by selected science disciplines. 2007–2009



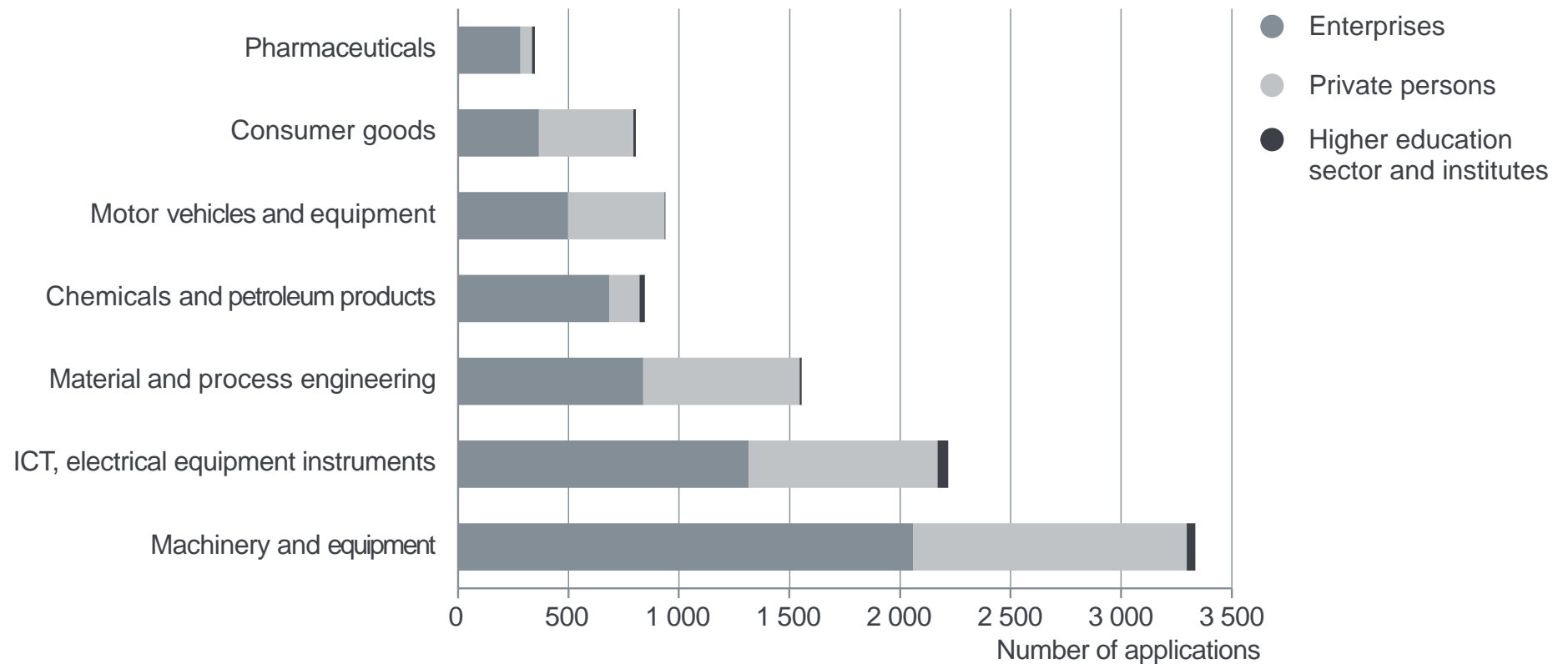
¹ Number of citations for Norwegian articles published in 2007, 2008 and 2009 divided by world average in the science discipline.
Source: National Science Indicators/Thomson Reuters/NIFU

16 Articles per 1 000 capita for the Nordic countries. 2008 and 2010.



Source: National Science Indicators/Thomson Reuters/NIFU

17 Patent applications in Norway by technology field¹ and sector of applicant. 2003–2010.

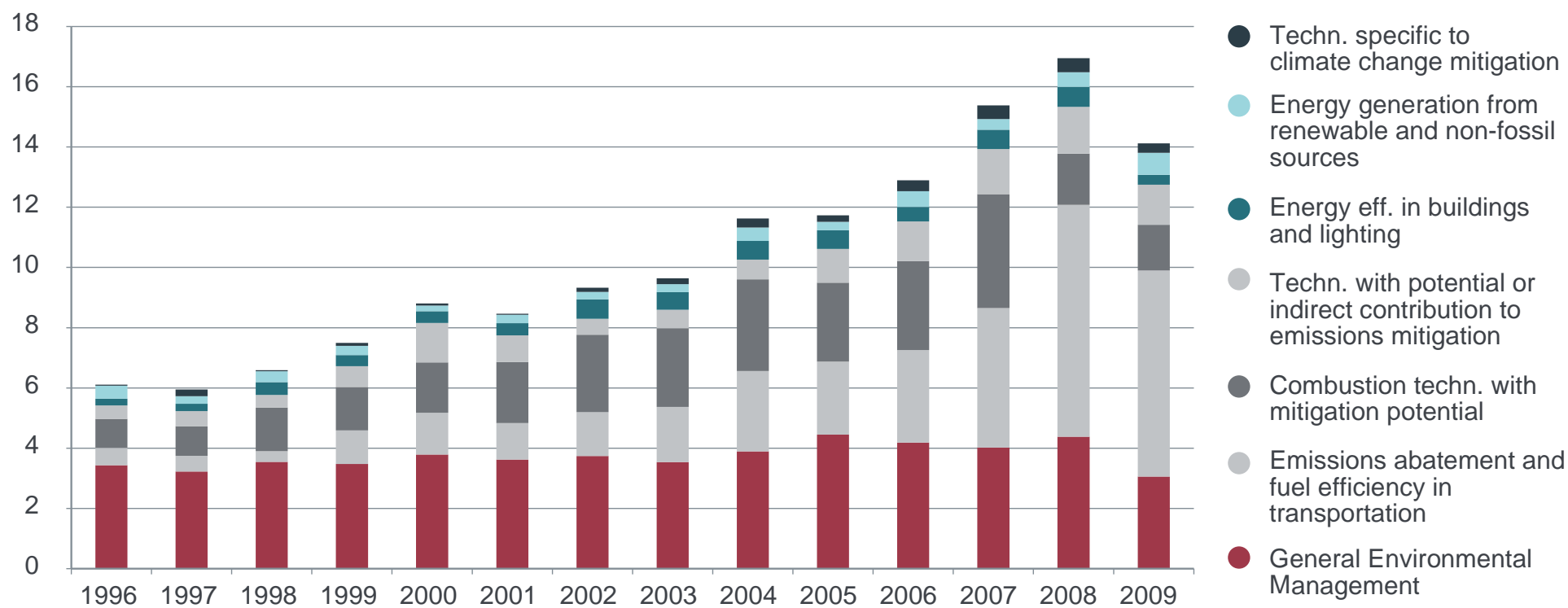


¹ Technology fields are based on a calculation from IPC to NACE industry (Schmooch 2003)

Source: NIFU/Norwegian Industrial Property Office

18 Environmental patents as a proportion of all Nordic patent applications in Europe (EP-A). 1996–2009.

Share



Source: OECD Stats <http://stats.oecd.org/index.aspx>