



2019

# Science and Technology Indicators

R&D statistics

**NIFU**



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## About the booklet

This booklet contains tables and figures on R&D statistics and science and technology indicators and has been published annually since 1997. The web-edition, along with the data material, can be found at [www.nifu.no/fou-statistiske/fou-statistikk/fou-lommefolder/](http://www.nifu.no/fou-statistiske/fou-statistikk/fou-lommefolder/).

A broader coverage of science and technology input and output data is given in the electronic Report on Science and Technology Indicators for Norway, published by the Research Council of Norway and available at [www.forskningsradet.no/indikatorrapporten/](http://www.forskningsradet.no/indikatorrapporten/). The 2018 report and earlier editions are available for downloading. The 2019 report is electronic only, with current updates from June 2019. According to the plan a short version of the 2019 report will be published in English. You may also find information at [www.foustatistikbanken.no](http://www.foustatistikbanken.no).

All expenditures are given in current prices, unless otherwise indicated. In 2017 1.00 PPP \$ = 10.07 NOK (Main Science and Technology Indicators 2018-2, OECD). In 2017 (annual average) 1 Euro = 9.33 NOK (Norges Bank/central bank of Norway).

### ***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. Annual statistical surveys are carried out in the industrial and institute sectors, and until 2018 also in the health trusts. The survey is carried out every second year in the higher education sector, and from 2019 onwards also in the health trusts. For all sectors main figures are presented annually. Further information may be found at [www.nifu.no/fou-statistiske/fou-statistikk/](http://www.nifu.no/fou-statistiske/fou-statistikk/).

## ***How are R&D statistics compiled?***

**N**orwegian R&D statistics are compiled in accordance with the international guidelines proposed by the OECD in the “Frascati Manual” (Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities, OECD 2015). This edition applies for the R&D statistics for 2016 onwards.

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 and every second year a sample of companies with a minimum of 5 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 health trusts and PNP hospitals are included in the government sector/institute sector.

## **Basic definitions of research and experimental development (R&D)**

**R**esearch and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge - including knowledge of humankind, culture and society - and to devise new applications of available knowledge. The activity must be novel, creative, uncertain, systematic, transferable and/or reproducible.

### ***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 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 knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes.

### ***Sector classification***

**N**orwegian R&D statistics are generally divided into three sectors: the industrial sector, the institute sector and the higher education sector. The OECD higher education sector corresponds to the Norwegian higher education sector, university hospitals included. For international comparisons, the 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 separately.

### ***Other data sources***

Norwegian R&D statistics are collected from the national statistical producers NIFU and Statistics Norway. 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 of Clarivate analytics. This database contains worldwide publication and citation statistics.

### **Legend to tables**

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## Highlights

- R&D expenditure in Norway reached a total of 69.2 billion NOK in 2017. That equals an increase in real prices of 7 % from 2016, and 35 % from 10 years earlier.
- The industrial sector constituted 46 % of Norway's R&D expenditure in 2017, the higher education sector 34 % and the institute sector 20 %. R&D in health trusts to 6 %.
- 47 % of Norway's R&D expenditure in 2017 was financed by government sources, and 40 % by the industry. Foreign sources contributed with 9 %.
- R&D on energy amounted to nearly 10 billion NOK in 2017. Current R&D expenditure on environment and climate reached 4 and 3 billion NOK, respectively.
- Norway's R&D as share of GDP reached 2.09 % in 2017. The average for the OECD area was 2.37 %, and 1.96 % in EU 28.
- Norway spent 13 211 NOK per capita on R&D in 2017. The equivalents in Sweden and Denmark were 17 223 and 16 721 NOK, respectively.
- Nearly 85 000 persons were involved in R&D activity in Norway in 2017, equalling a total of over 46 000 R&D full-time equivalents.
- Of nearly 58 000 researchers in Norway in 2017, 38 % were women. There was gender balance in the higher education sector (49 % women). The share of women researchers in the institute and the industrial sectors was 42 % and 23 %, respectively.
- Male PhD candidates worked on average 43.4 hours per week in 2017, whereas the female worked 41.9 hours. Among the professors, women worked on average more: 49.9 hours per week, compared to 48.5 among the male.
- In 2016 Norway had 28 % women professors, compared to 24 % in EU 28. In Finland the share was 29 %, in Sweden 25 % and in Denmark 21 %.
- 1/3 of the doctoral theses presented in Norway in 2018 were within medicine and health. The share of doctorates within science, technology, engineering and mathematics (STEM) fell from 52 % in 1990 to 35 % in 2018.
- The number of male and female doctoral candidates was the exact same in 2018, totalling 1 564. 42 % of the candidates were foreign, a rise from 9 % in 1990.
- Of Norway's total publication points in 2017, the University of Oslo stood for 18 %, the Norwegian University of Science and Technology 15 % and the University of Bergen 9 %.



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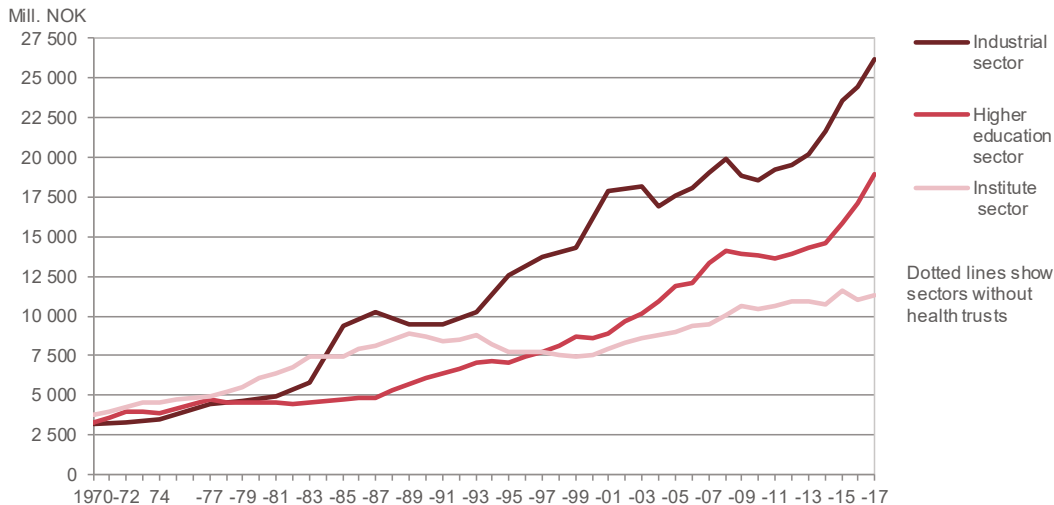
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## R&D expenditure in Norway by sector of performance: 1970–2017. Mill. NOK. Fixed 2010-prices.



Sources: NIFU and Statistics Norway, R&D statistics

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## R&D expenditure by sector of performance. Norway. 1970–2017. Mill. NOK. Fixed 2010-prices

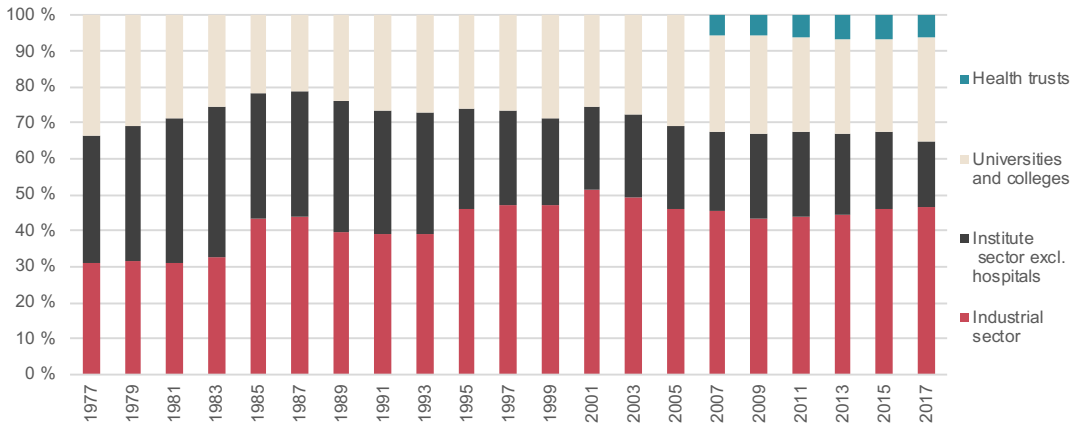
Type of institution	Total	Source of fund						
		Industrial sector		Government sources			Abroad	
	Total	Total	Of which: Oil com- panies	Total	Of which: Research council of Norway	Other <sup>1</sup>	Total	Of which: EU-comm.
<b>Industrial sector</b>	<b>31 990</b>	<b>24 504</b>	..	<b>1 403</b>	<b>733</b>	<b>2 020</b>	<b>4 063</b>	<b>180</b>
<b>Institute sector</b>	<b>12 942</b>	<b>2 367</b>	<b>381</b>	<b>8 822</b>	<b>3 391</b>	<b>443</b>	<b>1 311</b>	<b>420</b>
<i>Of which: Research inst. serving enter- prises</i>	4 403	1 692	292	2 018	1 323	171	523	216
<i>Government sector</i>	8 539	675	89	6 804	2 069	272	788	203
<b>Universities and colleges</b>	<b>19 867</b>	<b>474</b>	..	<b>18 140</b>	<b>3 065</b>	<b>543</b>	<b>710</b>	<b>521</b>
<b>Health trusts</b>	<b>4 377</b>	<b>90</b>	..	<b>3 971</b>	<b>310</b>	<b>282</b>	<b>34</b>	<b>18</b>
<i>Of which: University hospitals</i>	3 455	55	..	3 128	285	238	33	17
<i>Other health trusts and PNP hospitals</i>	922	35	..	843	25	44	1	1
<b>Total</b>	<b>69 176</b>	<b>27 435</b>	..	<b>32 336</b>	<b>7 500</b>	<b>3 287</b>	<b>6 118</b>	<b>1 139</b>

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

Sources: NIFU and Statistics Norway, R&D statistics

3

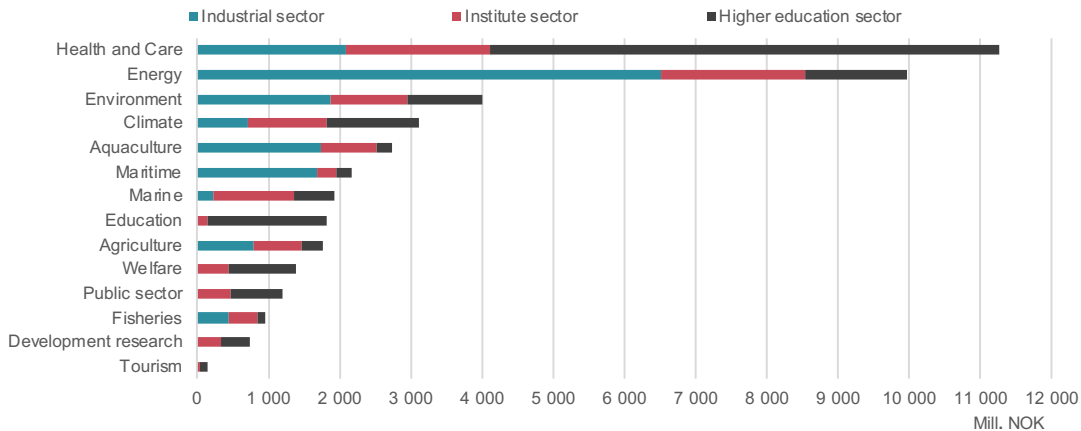
## Share of R&amp;D expenditure across sectors. Norway. 1977–2017



Sources: NIFU and Statistics Norway, R&D statistics

4

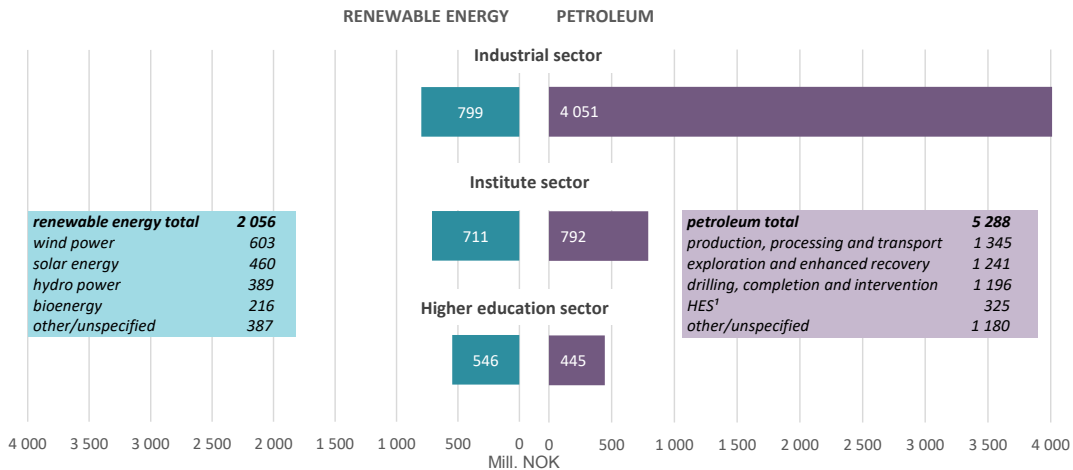
## Current R&D expenditure by thematic area and performing sector. Norway. 2017. Mill. NOK



Source: NIFU and Statistics Norway, R&D statistics

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## R&D expenditure to renewable energy and petroleum across sectors. Norway. 2017. Mill. NOK

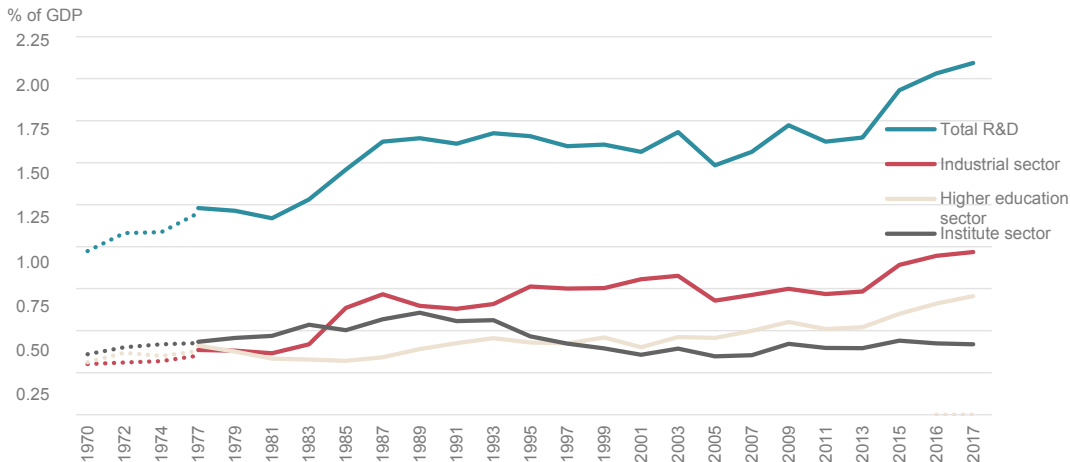


<sup>1</sup> HES: health, environment and safety.

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## R&D expenditure as share of GDP by sector and total. Norway. 1970–2017.

Per cent



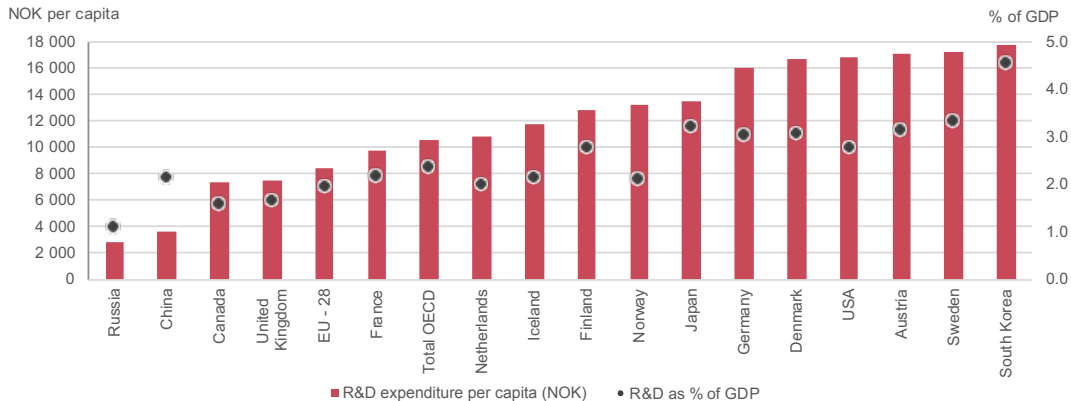
Dotted lines show breaks in the series.

Sources: NIFU and Statistics Norway, R&D statistics



## 7

## R&D expenditure per capita and as share of GDP. Selected countries. 2017. NOK and per cent



Sources: OECD–Main Science and Technology Indicators 2018–2 and national sources

## R&D personnel by type of institution and type of position. Norway. 2017.

### Head count and full-time equivalents

Type of institution	Persons as of 1.10.2017			Full-time equivalents	
	Total R&D personnel	Of which: Researchers/ academic staff	Tech. & supp. staff	Total	Of which: Researchers/ academic staff
<b>Industrial sector</b>	<b>36 088</b>	<b>22 451</b>	<b>13 637</b>	<b>21 205</b>	<b>14 432</b>
<b>Institute sector</b>	<b>10 664</b>	<b>7 234</b>	<b>3 430</b>	<b>8 566</b>	<b>6 197</b>
<i>Of which: Research inst. serving enterprises</i>	2 781	1 967	814	2 562	1 910
<i>Government sector</i>	7 883	5 267	2 616	6 004	4 287
<b>Universities and univ. colleges</b>	<b>30 721</b>	<b>23 414</b>	<b>7 307</b>	<b>12 953</b>	<b>11 024</b>
<i>Of which: Universities</i>	22 373	16 320	6 053	10 349	8 556
<i>Spec. university institutions etc.</i>	2 525	2 293	232	814	789
<i>State university colleges</i>	5 823	4 801	1 022	1 790	1 679
<b>Health trusts</b>	<b>7 503</b>	<b>4 835</b>	<b>2 668</b>	<b>3 511</b>	<b>1 979</b>
<i>Of which: University hospitals</i>	5 585	3 679	1 906	2 722	1 514
<i>Other health trusts and PNP hospitals</i>	1 918	1 156	762	789	465
<b>Total</b>	<b>84 976</b>	<b>57 934</b>	<b>27 042</b>	<b>46 235</b>	<b>33 632</b>

Source: NIFU and Statistics Norway, R&D statistics

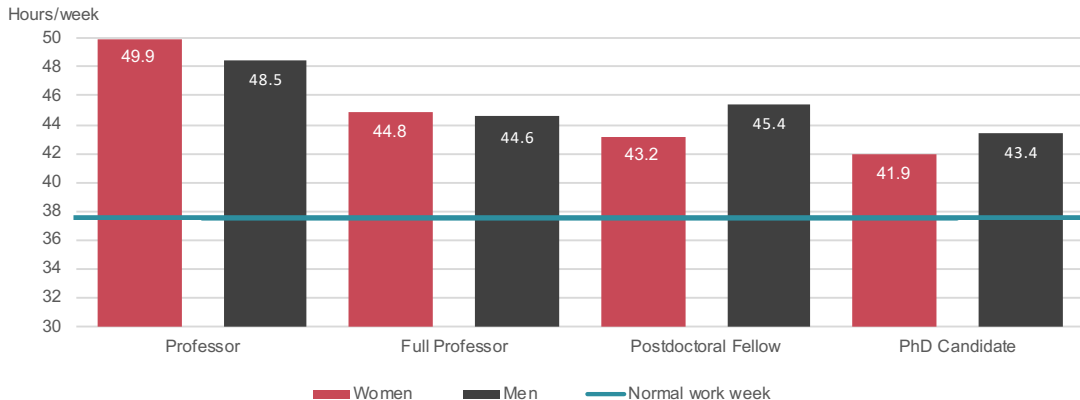
## Researchers/academic staff by type of institution and share of women and doctorates. Norway. 2017. Head count and per cent

Type of institution	Total			Women			
	Total number	With a doctoral degree <sup>1</sup>				With a doctoral degree <sup>1</sup>	
		Number	%	Number	%	Number	%
<b>Industrial sector</b>	<b>22 451</b>	<b>2 249</b>	<b>10</b>	<b>5 208</b>	<b>23</b>	<b>574</b>	<b>11</b>
<b>Institute sector</b>	<b>7 234</b>	<b>4 113</b>	<b>57</b>	<b>3 048</b>	<b>42</b>	<b>1 652</b>	<b>54</b>
<i>Of which: Research inst. serving enterprises</i>	1 967	1 203	61	631	32	391	62
<i>Government sector</i>	5 267	2 910	55	2 417	46	1 261	52
<b>Universities and university colleges</b>	<b>23 414</b>	<b>11 141</b>	<b>48</b>	<b>11 319</b>	<b>48</b>	<b>4 617</b>	<b>41</b>
<i>Of which: Universities</i>	16 320	8 483	52	7 447	46	3 367	45
<i>State university colleges</i>	4 801	1 774	37	2 818	59	922	33
<i>Spec. university institutions etc.</i>	2 293	884	39	1 054	46	328	31
<b>Health trusts</b>	<b>4 835</b>	<b>2 395</b>	<b>50</b>	<b>2 477</b>	<b>51</b>	<b>1 085</b>	<b>44</b>
<i>Of which: University hospitals</i>	3 679	1 999	54	1 870	51	910	49
<i>Other health trusts and PNP hospitals</i>	1 156	396	34	607	53	175	29
<b>Total</b>	<b>57 934</b>	<b>19 898</b>	<b>34</b>	<b>22 052</b>	<b>38</b>	<b>7 928</b>	<b>36</b>

<sup>1</sup> Including licenciates.

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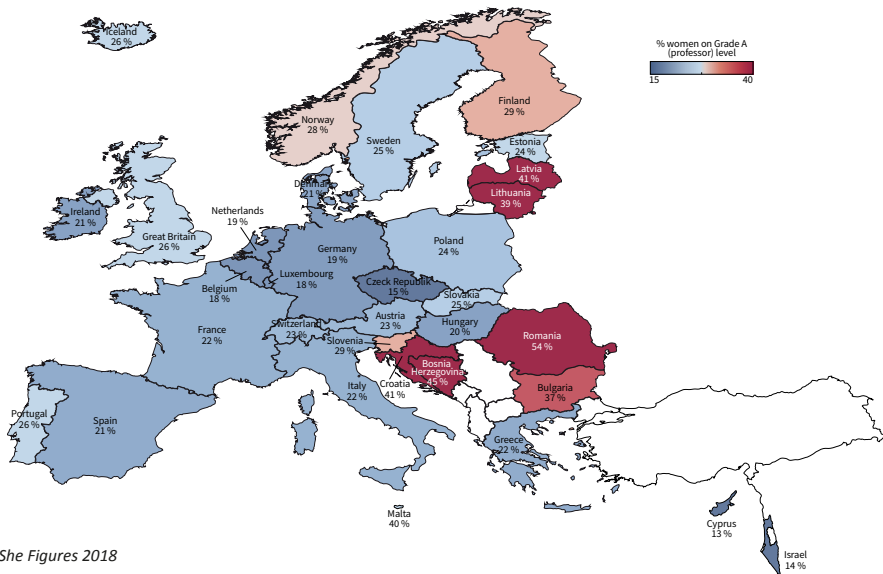
## Average work week in the higher education sector by position and gender. 2016. Hours per week



Source: NIFU/Time Use Survey

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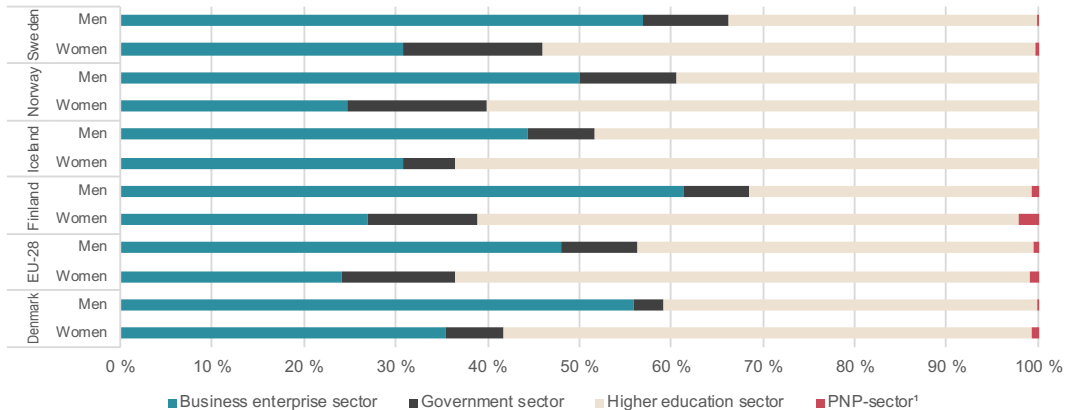
## Share of female professors (Grade A) in selected countries. 2016



Source: Eurostat, *She Figures 2018*

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## Distribution of researchers across sectors by sex in the Nordic countries and EU 28. 2015



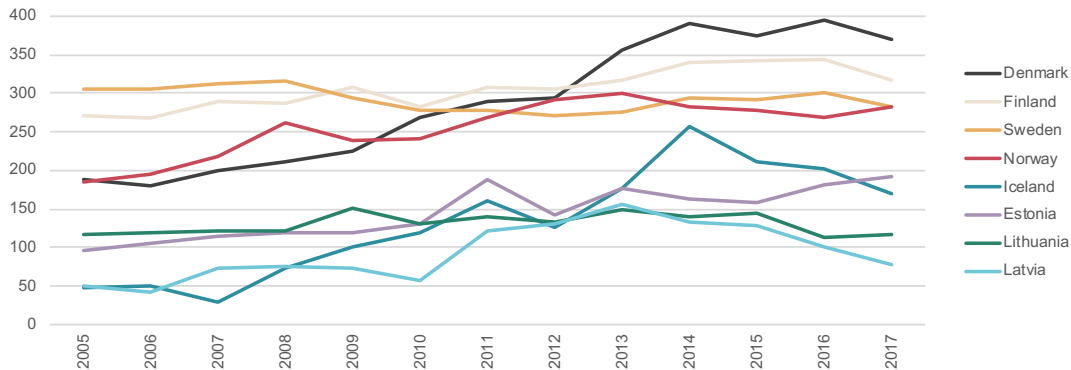
<sup>1</sup> Private non-profit.

Kilde: Eurostat, She Figures 2018

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## Awarded doctoral degrees per mill. capita in the Nordic and Baltic countries. 2005–2017

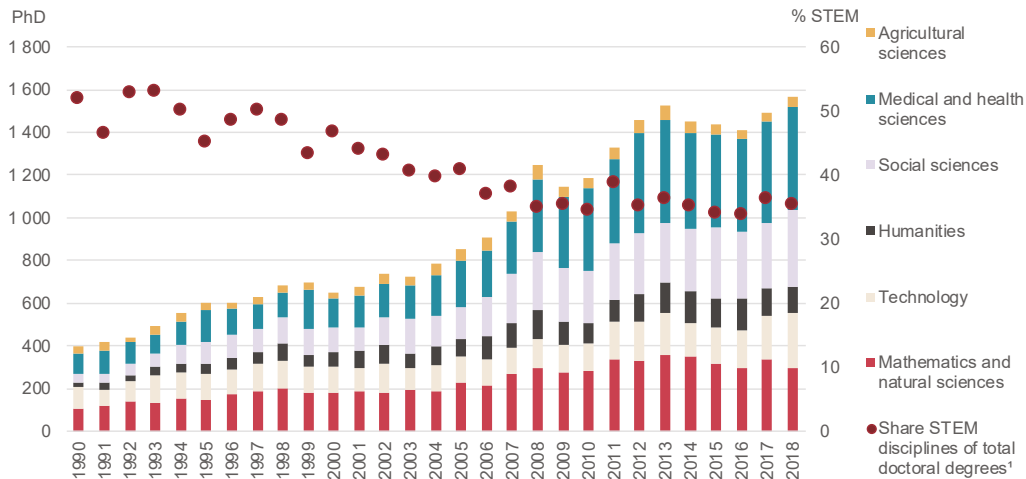
PhD/mill. capita



Source: NORBAL

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## Awarded doctoral degrees across field of science and share within STEM. 1990–2018



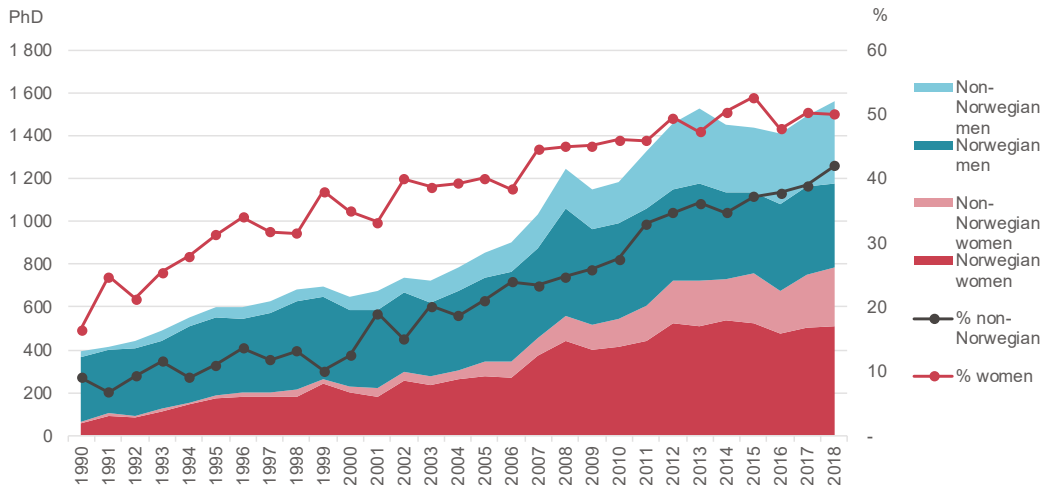
<sup>1</sup> STEM: Science, technology, engineering and mathematics.

Source: NIFU/Norwegian Doctoral degree register



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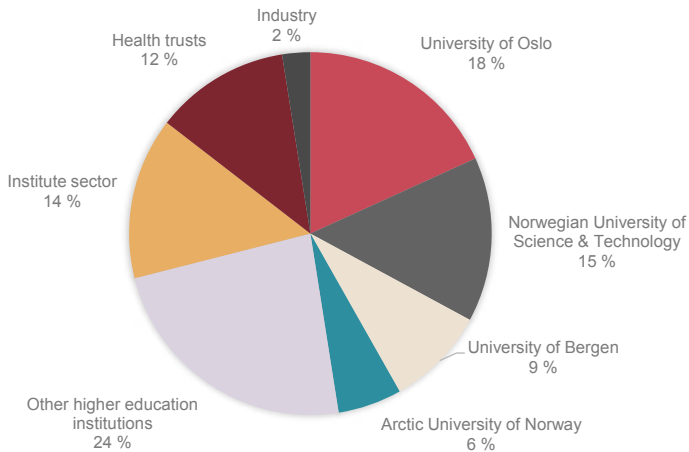
## Awarded doctoral degrees by gender and citizenship and share of women and non-Norwegian. 1990–2018



Source: NIFU/Norwegian Doctoral degree register

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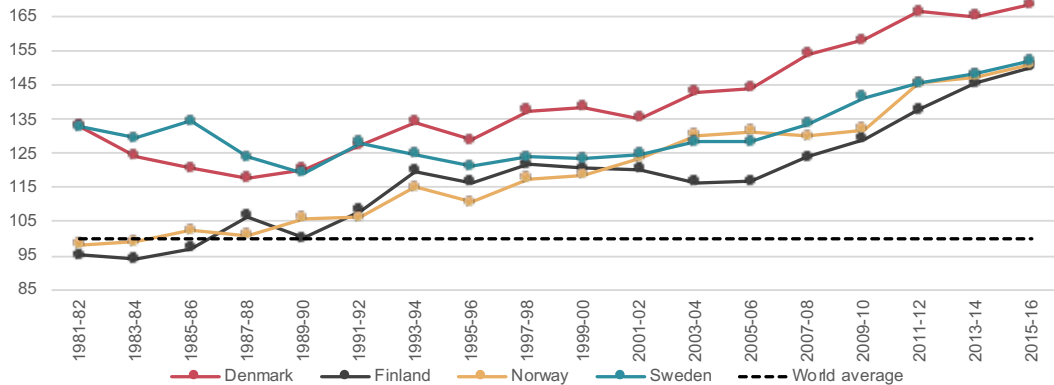
## Scientific publishing in Norway by institutions and sectors. 2017. Proportion of publication points of national total



Source: NIFU (Data: Cristin, Web of Science)

Relative citation index, four Nordic countries. 1981–2016<sup>1</sup>

Relative citation index

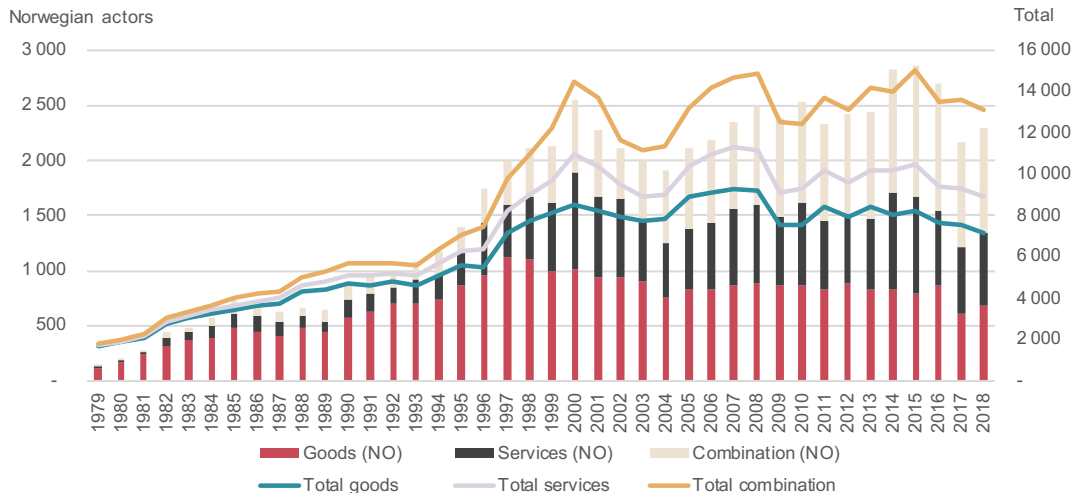


<sup>1</sup> Based on annual publication years and accumulated number of citations up to and including 2017. The index is weighted according to each countries' relative field distribution of articles. World average = 100.

Source: NIFU (Data: Web of Science)

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## Number of trademarks registered in Norway by category. Norwegian holders (left axis) and total (right axis). 1979–2018



Source: NIFU (Data: Norwegian Industrial Property Office)