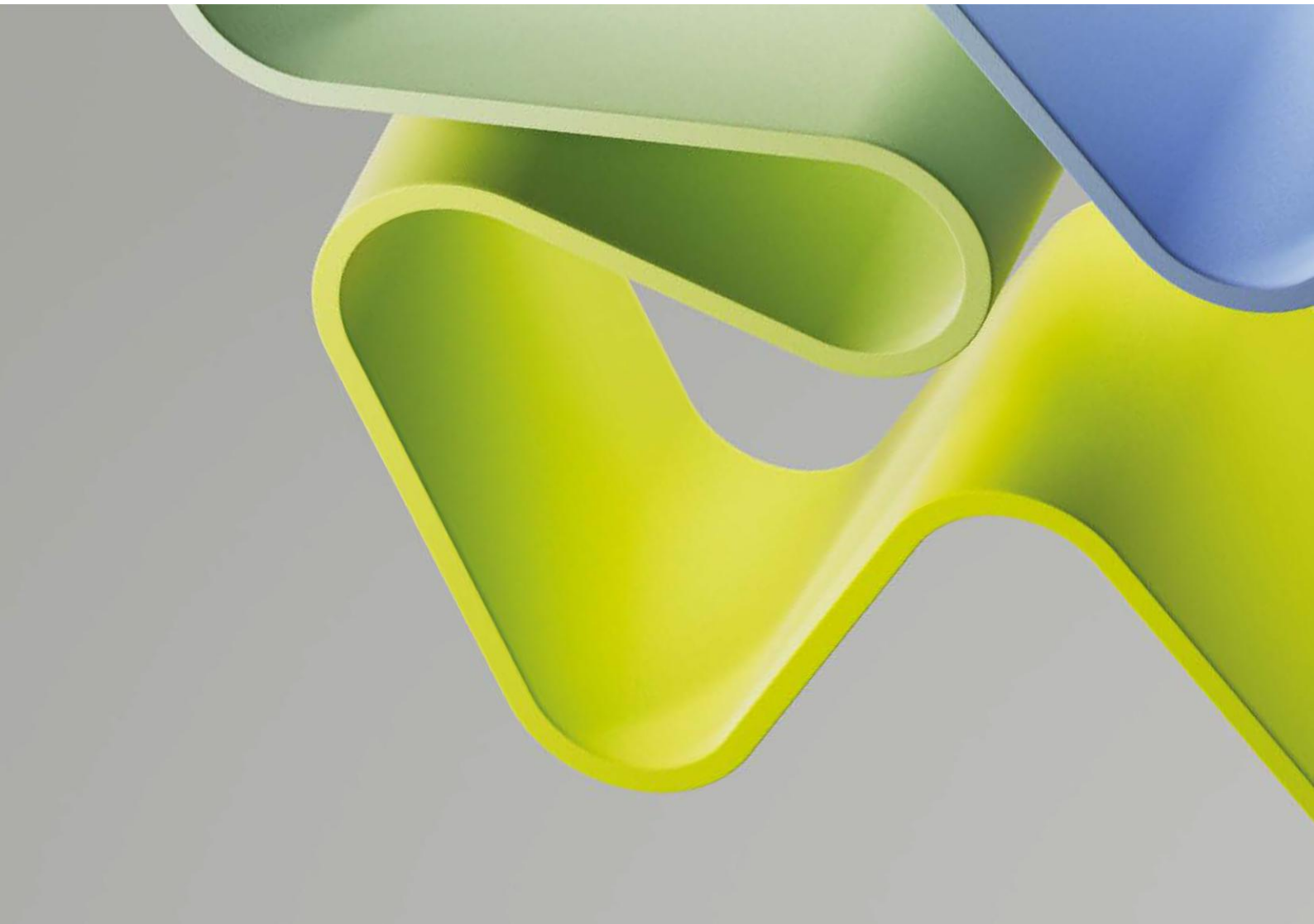
The Research Council of Norway

Science and Technology Indicators for Norway 2024/2025



About this report

This report presents science and technology (S&T) indicators for Norway. It is based on a more comprehensive Norwegian report, the current version of which can be found here: http://www.forskningsradet.no/indikatorrapporten.

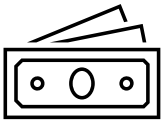
The Norwegian report is published by the Research Council of Norway with the aid of an editorial board consisting of representatives from Statistics Norway, the Nordic Institute for Studies in Innovation, Research and Education (NIFU), Innovation Norway, the Norwegian Directorate for Higher Education and Skills, the University of Oslo and the Research Council of Norway.

Most parts of the Norwegian report are updated once a year. Because the Norwegian report is web-based, different parts of the report are updated at different points throughout the year. At the end of each year the parts that were updated that year is archived as that year's edition. This English report mainly contains data from the 2024 edition which is found here and where available by August 2025, data from the current 2025 edition. The Research Council of Norway has translated and selected the data presented in this English version.

The abridged English report has been published periodically since 2001, aiming at providing useful information and perspectives on a range of S&T issues for foreign readers who may not be familiar with the Norwegian S&T system and its context. It therefore contains an introduction to the system not found in the Norwegian report. In this way it complements the full Norwegian version.

Contents

Findings and trends

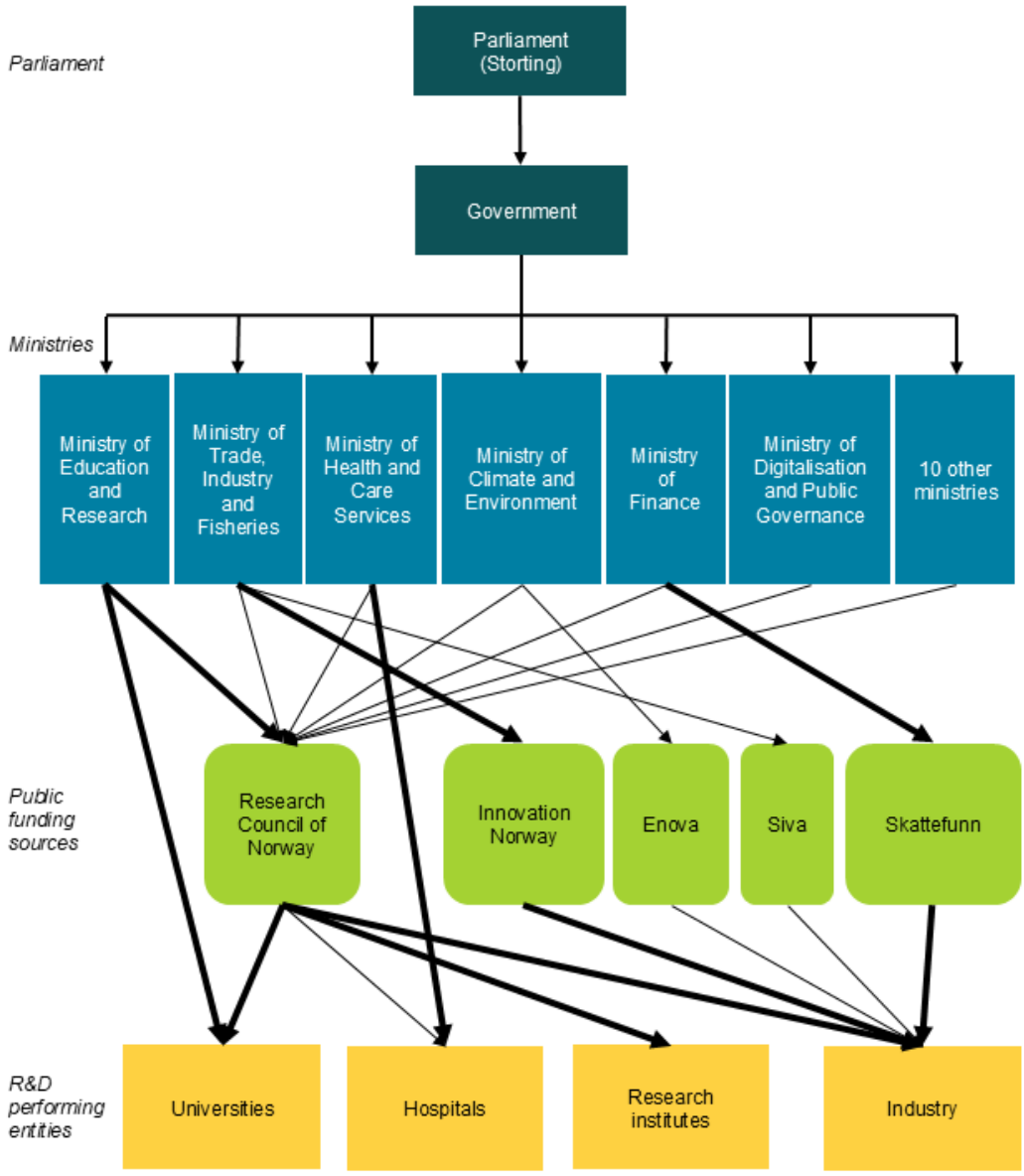
	Over NOK 94 billion was spent on research and development (R&D) in Norway in 2023. This equals a real growth of 0.3 per cent from 2022. The industrial sector's share increased 3.8 per cent, while the higher education sector saw a real decline of 4.2 per cent and the institute sector a real decline of 0.8 per cent.
	The industrial sector is the largest R&D performing sector in Norway. In 2023, the sector accounted for 50 per cent of total R&D in the country. The higher education sector accounted for 31 per cent, and the institute sector for 19 per cent.
	In 2022, approx. 97,000 people participated in R&D in Norway corresponding to approx. 53,600 R&D full-time equivalents (FTEs). Nearly three quarters of the FTEs were performed by researchers and academic staff, the rest by technicians or other supporting staff. The distribution has been stable for several years.
	Among the 69,866 researchers/academic staff who participated in R&D in Norway in 2023, there were 27,284 women and 42,582 men. The gender balance varies between the sectors. In the industrial sector, the proportion of women was 22 per cent, in the institute sector it was 47 per cent and 53 per cent in the higher education sector.
	Statistics on diversity in research show that 35 per cent of researchers and academic staff at educational institutions, health trusts and in the institute sector were immigrants or descendants of immigrants in 2023. This is a significant growth from 2007, when the proportion was 19 per cent.
	In 2024,1850 doctorates completed their dissertation at Norwegian institutions. This is the second highest number ever. The proportion of women was 53 per cent, down one per cent point from its peak in 2022, and 47 per cent men. The proportion of foreign doctorates now amounts to around 44 per cent, while it was just over 10 per cent at the beginning of the 2000s.
	An analysis of the state budget shows that the public funds allocated to R&D in Norway in 2024 can be estimated to NOK 48.3 billion, 4.4 billion more than in 2023 and amounting to 0.94 per cent of GDP.
	R&D activity in Norway is geographically highly concentrated. In 2023, the four largest R&D counties, Oslo, Viken (split into Akershus, Buskerud and Østfold in 2024), Trøndelag and Vestland, accounted for more than three-quarters of the R&D expenditure.
	As of May 2024, Norway had received almost 3.3 per cent of the funds allocated through Horizon Europe. The Norwegian ambition was 2.8 per cent. Norway so far participates in 1,185 granted projects.
	The number of patent applications filed in Norway declined in 2023. There has been a substantial decline since the peak in 2017.
	Norwegian research achieves a relatively high scientific influence measured by citation frequency. With a citation index of 116 (2021–2022), Norway ranks as number 10 of the world's 40 largest R&D nations (measured in number of publications). This means that the Norwegian articles from the period were quoted 16 per cent above the world average.
	Norwegian research increasingly involves international cooperation. 57 per cent of the publications in 2023 had co-authors from institutions in other countries. The share was 40 per cent in 2011.
	In 2022, innovation investment costs for the Norwegian business sector totalled 94.6 billion NOK, a nominal increase of 27 per cent since 2020.

	Total Norwegian R&D expenditure amounted to 1.85 per cent of GDP in 2023.
	In 2023, Norwegian public R&D expenditure was 670 PPP euro per capita. This is the third highest in the OECD, behind Switzerland and Iceland.

The Norwegian system of education, research and innovation

The Norwegian research and innovation system includes a large number of institutions with different roles. It is common to distinguish between three levels: the political (coloured turquoise in Figure I), the strategic (green) and the performing level (yellow). The figure above provides a simplified picture of the organisation and division of labour in the research and innovation system.

Figure 1 Main Science, Technology and Innovation (STI) actors in Norway



The political level

It is the Norwegian Parliament and Government that adopt framework conditions and research policy goals. The Government's overall research policy goals and priorities are set out in the Long-term Plan for Research and Higher Education (Norwegian Ministry of Education and Research, 2022), which is valid for ten years but revised every four years.

Norwegian research policy is based on the principle that each ministry is responsible for research within its own areas, referred to as the “sector principle”. Accordingly, all ministries (16 in 2025) are responsible for financing both short-term and long-term research within their respective areas. Hence, public research funding and science policy involves extensive coordination. The responsibility for coordinating research policy across ministries lies with the Ministry of Education and Research.

The various ministries fund research to varying degrees. The Ministry of Education and Research accounts for approximately half of public R&D funding in Norway, and other important contributors are the Ministry of Health and Care Services and the Ministry of Trade, Industry and Fisheries. As only three ministries account for 78 per cent of the total R&D funding, many ministries provide very limited funds.

The strategic level

At the strategic level, there are several agencies that are important for Norwegian science and technology policy. The two most important players are the Research Council of Norway (RCN), which focuses on research and technological funding, and Innovation Norway, which focuses on innovation.

The RCN is an administrative agency under the Ministry of Education and Research. Norway has only one research council with responsibility for all subject areas within both basic research and innovation-oriented research. Almost 25 per cent of Norwegian public R&D spending is allocated through the RCN. Even though the Ministry of Education and Research is by far the largest contributor all ministries provide funding through the RCN. In addition to its role as funding agency, the RCN has other important roles in the Norwegian research system. Firstly, the RCN is the authorities' central research policy advisor. Secondly, the RCN is the most important body for realising the government's overall research policy. Finally, the RCN also functions as a meeting place for actors involved in the design and implementation of research policy.

Innovation Norway is another important actor in the Norwegian system of education, research and innovation. Innovation Norway is a statutory company and works to increase innovation in businesses throughout the country with the aim of strengthening competitiveness. The Ministry of Trade, Industry and Fisheries and the county municipalities are the main owners of Innovation Norway, but the organisation also receives money from other ministries and state administrators.

Also of importance for R&D funding is the tax deduction scheme for Norwegian companies called SkatteFUNN. It is aimed at encouraging innovation through tax credits for R&D activity. The scheme is administered by the RCN in collaboration with the Norwegian Tax Administration. Because it results in tax credits, the scheme is indirectly funded by the Ministry of Finance.

In addition to the RCN and Innovation Norway, there are several other players. Enova is a state enterprise owned by the Ministry of Climate and Environment whose purpose is to aid Norway in meeting its climate goals and to support the transition to a low-emission society. Siva is a governmental enterprise facilitating a national infrastructure for innovation consisting of incubators, business gardens, catapult centres, innovation enterprises, innovation centres and industrial real estate.

Internationalisation is increasingly important for all parts of the Norwegian R&D system. Most importantly, Norway contributes significant funding to and participates in the European Framework Programme for Research and Innovation, allowing Norwegian entities to apply for R&D funding there on equal footing with actors from European Union member states. Strategic decisions regarding R&D funding made by the European Union are therefore of major importance to the Norwegian R&D system.

Finally, it is important to mention that, relative to many other countries, there are few private foundations that provide significant R&D funding in Norway (Oslo Economics, 2023).

The performing level

At the performing level, the Norwegian research system has traditionally been divided into three sectors: the higher education sector (HE-sector), the institute sector and the industrial sector.

The HE-sector consists of public and private universities and university colleges. There is a variety of institutions in the higher education sector, including universities, state university colleges and private higher education institutions. Also, university hospitals usually are included in this sector. The last 20 years the higher education sector has undergone profound changes as the number of universities has increased from four to eleven and the number of colleges has decreased. The four older universities are the University of Oslo, the University of Bergen, NTNU (Norwegian University of Science and Technology) and the University of Tromsø – the Arctic University of Norway. In terms of R&D expenditure, the four older universities accounted for 54 per cent of the higher education sector's total in 2023. The higher education sector performs about one third of Norwegian R&D activity.

The Norwegian institute sector is rather heterogenous in terms of institute size, profile and legal status. The sector includes both public sector oriented and industry-oriented institutes, of which the latter group plays an important role in carrying out contract research for Norwegian and foreign companies. Compared with other countries, a relatively high share of Norwegian R&D (about a fifth) is performed by research institutes.

The industrial sector consists of R&D performing private enterprises and other units producing products or services for sale on the open market. Even though the industrial sector accounts for about half the R&D expenditure in Norway, the proportion of research performed in this sector is low compared with other countries. Given the resource-based structure of the economy, there are relatively few large R&D-intensive companies in Norway.

Norwegian R&D performing sectors

In Norway, national R&D statistics uses three basic sector designations:

The *industrial sector*: Companies and enterprises aimed at commercial production of goods and services for sale at an economically significant price.

The *institute sector*: Private non-profit (PNP) research institutes mainly serving industry (the business enterprise sector in the OECD classification); research institutes and other R&D-performing institutes (other than higher education) mainly controlled by and funded by the government (government sector in the OECD classification); and health trusts not conducting education and PNP hospitals.

The *higher education sector*: Units providing higher education; universities, specialised university institutions, state university colleges and university hospitals.

To highlight the R&D activities in health trusts, these are presented separately where appropriate and possible (data from 2007).

In chapter 2 it is OECD's international sector classification that is used. Figure II illustrates the differences between these classifications.

Figure 2 A comparison of the Norwegian and OECD classifications of R&D performing sectors. Box with rounded corners shows health trusts.

Norwegian classification		OECD classification
Higher education sector	Universities, specialised university institutions, state university colleges.	Higher education sector
	University hospitals	
Institute sector	Health trust not conducting education and private, non-profit hospitals	Government sector
	Research institutes and other R&D-performing institutes, mainly controlled by and funded by the government	
	Private non-profit research institutes mainly serving industry	Business enterprise sector
Industrial sector	All companies/enterprises with 50 or more employees and a selection of companies/enterprises with 10 or more employees.	

Sometimes health trusts are identified as a separate category. More often hospitals are distributed between either the higher education sector (university hospitals) or the institute sector (other hospitals and private or non-profit hospitals that have an operating agreement with the regional health authorities).

Most of the basic research takes place in the higher education sector, the institute sector conducts most applied research, while development work predominates in the industrial sector.

The Norwegian higher education system

The Norwegian higher education system is similar to the European system agreed upon in the “Bologna process” to which Norway is a signatory. The system has three “cycles”, the first of which is a bachelor’s degree that takes three years. The second cycle is a master’s degree that takes two years, and the third cycle is a doctoral degree that typically takes four years to complete (Direktoratet for høyere utdanning og kompetanse, 2025).

The education level in Norway is higher than the OECD average. In 2023 49 per cent of the adult Norwegian population (25–64 years of age) had earned a higher education degree, 1. 4 per cent a PhD.

Chapter 1: R&D expenditure in Norway

Norwegian R&D expenditure increased by 0.3 per cent in 2023

In 2023, Norway spent over NOK 94 billion on R&D. This corresponds to an increase of NOK 5.5 billion from 2022, or an increase of 0.3 per cent when adjusted for inflation (Table 1a). The industrial sector's R&D expenditure increased by 3.8 per cent (inflation-adjusted), whereas the higher education sector saw a real decline of 4.2 per cent and the institute sector a real decline of 0.8 per cent.

Table 1a R&D expenditure (current prices) in Norway by sector of performance. Share of total R&D (per cent) and real growth (per cent). 2021-2023. NOK billion and per cent.

Sector	2021	2022	2023	Share of total R&D 2023	Real growth 2022–2023	Average annual real growth 2013–2023
Industrial sector[1]	38,3	42,8	47,0	50	3,8	4,2
Higher education sector	26,9	29,1	29,6	31	-4,2	3,0
Institute sector	16,4	17,0	17,8	19	-0,8	0,6
Total	**81,6**	**88,9**	**94,5**	**100**	**0,3**	**3,1**
of this health trusts	5,3	5,8	6,0	6	-1,6	2,3

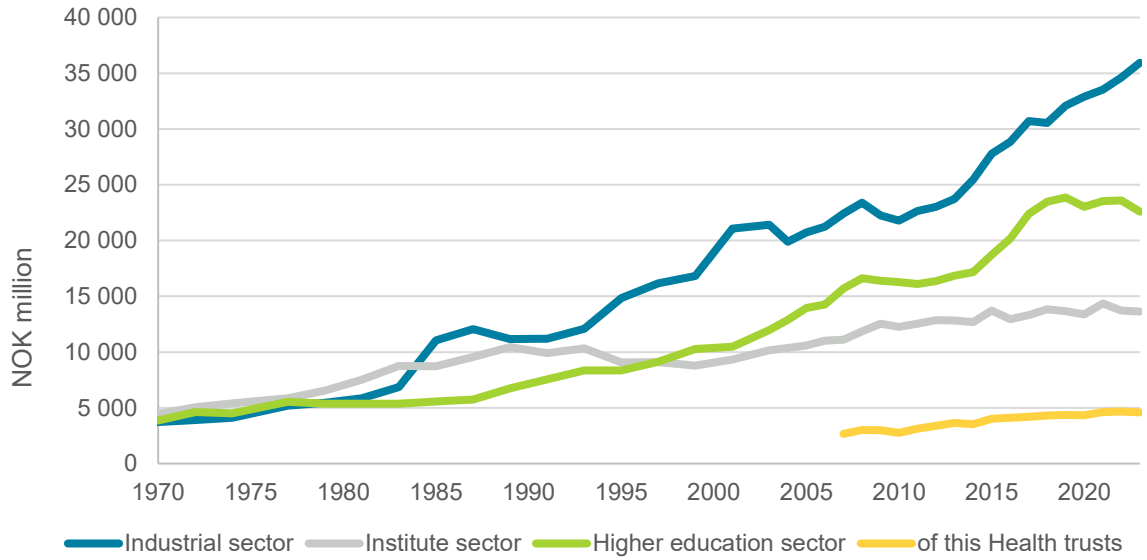
Source: Statistics Norway

As can be seen in Figure 1a, an upward trend in Norwegian R&D expenditure has been evident for a long time. The increase from 2022 to 2023 was weak by comparison, and weaker than the average annual growth over the 10-year period 2013–2023 which was 3.1 per cent.

The industrial sector is the largest R&D performing sector in Norway. In 2023, 50 per cent of Norwegian R&D expenditure took place in this sector. This includes only expenditure on R&D performed by the sector itself, not purchased R&D. Since 2000 the share of total R&D performed in the industrial sector has varied between 53 in 2001 and 43 per cent in 2009. The industrial sector's share has trended upwards since the financial crisis in 2009. The share of R&D expenditure in the institute sector has varied between 25 and 19 per cent during the same period, but with a downward trend. R&D expenditure in the higher education sector increased from 26 per cent in 2001 to 31 per cent in 2023. This share has remained relatively stable for the last 10 years.

[1] The business sector includes businesses with 10 or more employees.

Figure 1a R&D expenditure in Norway by sector of performance[2]. 1970–2023. Fixed 2015-prices. NOK million.



Source: Statistics Norway

R&D expenditure as a share of GDP was 1.85 per cent in 2023

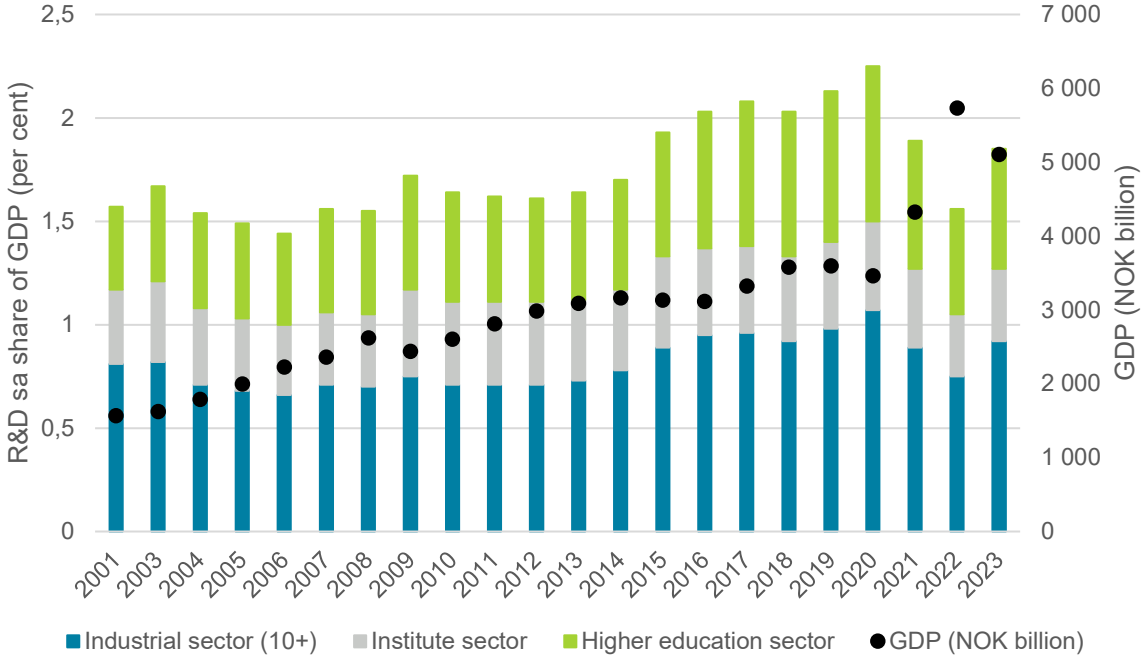
The R&D expenditure's share of gross domestic product (GDP) is a widely used indicator to measure how much a country invests in R&D. It provides a simple, overall picture of how much a country spends on R&D compared to total value creation. At the same time, the indicator is vulnerable to fluctuations in GDP. Norwegian GDP fluctuates widely, which means that the level of this indicator also fluctuates.

Successive governments have nonetheless linked R&D expenditure to GDP. In its latest Long-Term Plan for Research and Higher Education 2023–2032 (Report to the Storting 5 (2022–2023)) the Norwegian government confirms that the target for Norwegian R&D as share of GDP is 3 per cent. This is similar to the R&D share of GDP in the other Nordic countries. At present Norway is far from reaching this goal. In 2023, R&D expenditure amounted to only 1.85 per cent of GDP.

Figure 1b shows Norwegian GDP per year (right axis) as well as how much each of the R&D performing sectors contributed to the R&D's share of GDP (left axis). The R&D share of GDP reached its peak in 2020, at 2.24 per cent. However, this was due not to an increase in R&D expenditure but rather to a decrease in GDP caused by the COVID-19 pandemic. In 2021, Norwegian GDP saw a record increase, partly due to higher oil and gas prices. A similar increase in GDP also happened in 2022. The exceptionally high GDP in 2021 and 2022 is evident in the graph and explains much of the decrease in the R&D share of GDP which in 2022 reached as low as 1.56 per cent. The share increased again in 2023, not due to increased spending on R&D but rather to a decrease in GDP.

[2] Health trusts are presented together as well as as part of the higher education sector (health trust with university hospital function) and the institute sector (other health trusts and private, non-profit (PNP) hospitals).

Figure 1b Total R&D expenditure as share of GDP by sector of performance3 and development of GDP. 2001–2023. Per cent and NOK billion.



Source: Statistics Norway

# Public sources and the industrial sector contributed equally to R&D funding in 2023

In 2023, for the first time since 2007, R&D funding from the industrial sector slightly exceeded that from public sources. In 2023 the industrial sector and public sector each contributed over NOK 40 billion to R&D funding, or about 43 per cent each (Figure 1c). However, their contribution to the different performing sectors varies. Most of the funding from the industrial sector is used to fund the sector's own R&D activity. Public funding on the other hand mostly supports R&D in the higher education sector (NOK 26 billion), NOK 19 billion of which are general university funds (GUF). In addition, public sources funded R&D for over NOK 2 billion in the industrial sector and NOK 12 billion in the institute sector in 2023.

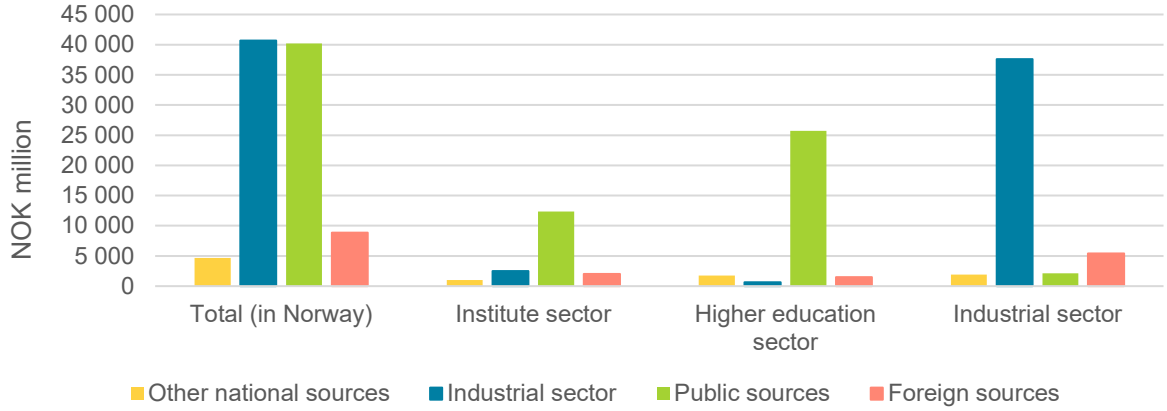
Other national sources accounted for NOK 4.7 billion, or 5 per cent of total R&D. Most of this funding is provided by SkatteFUNN, a tax incentive scheme for the industrial sector (which according to international regulations is categorised under "other national sources"). For the other sectors, own income, private donations and various funds are included in this category.

In addition, foreign sources contributed almost NOK 9 billion to R&D performed in Norway in 2023 (9 per cent). In the industrial sector[4], by far the most important international source of funding is foreign enterprises within the same company group as the Norwegian affiliate. For the other sectors, funding from the EU's framework programmes for research has become the most important source of foreign funding and alone accounted for almost 3 per cent of the funding of total Norwegian R&D in 2023.

[3] The industrial sector includes businesses with 10 or more employees.

[4] The industrial sector includes businesses with 10 or more employees.

Figure 1c Total R&D expenditure in Norway by sector of performance and source of funding[5]. 2023. NOK million.



Source: Statistics Norway

A thematic focus on health & care, energy and climate

Norwegian R&D statistics has for many years kept track of what is being researched in Norway. In the R&D survey, the research-performing units are asked how much of their R&D activity is linked to various prioritised thematic and technological areas. In recent years the areas have been linked to the government's Long-term Plan for Research and Higher Education (Ministry of Education and Research, 2018), as described in more detail in the Norwegian edition.

The politically prioritised thematic areas encompass many industries and fields of R&D, and they vary in size and where the R&D activity is carried out. The thematic areas are defined in such a way that theoretically there should be no overlap between them, but in reality it is evident that some overlap exists.

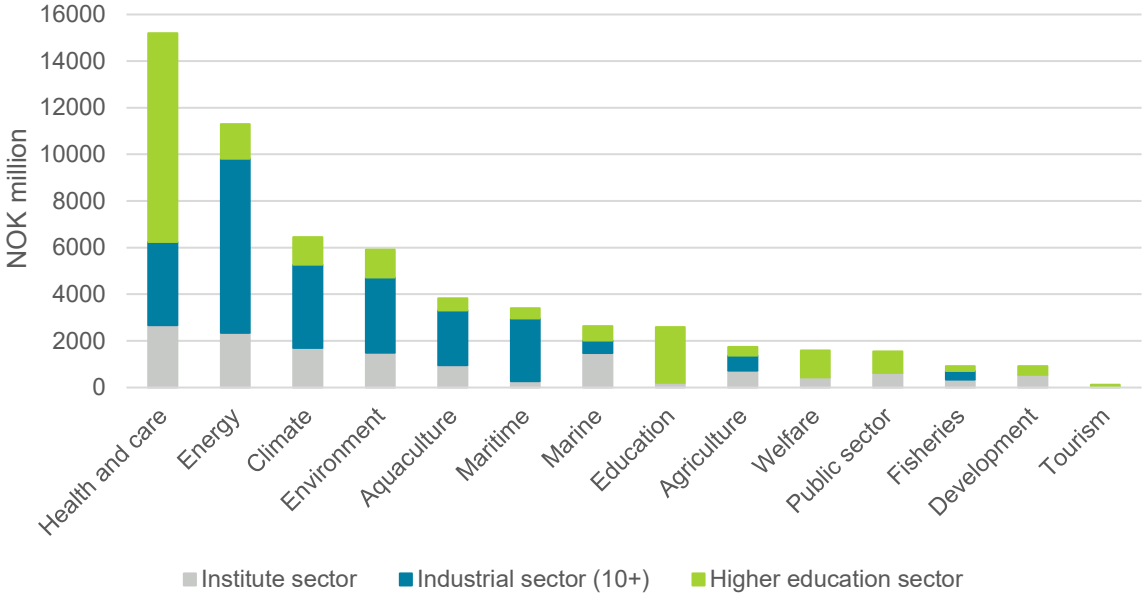
In descending order of R&D expenditure, the following thematic areas are surveyed in the R&D statistics: Health and care, energy, climate, environment, aquaculture, marine, maritime, education, agriculture, welfare, public sector, fisheries, development and tourism (Figure 1d).

Research activity within education, public sector, welfare, development and tourism is not included in the industrial sector survey. About half of the industrial sector's R&D (including only enterprises with 10 or more employees) is nevertheless aimed at one or more of the remaining thematic areas.

For all sectors combined, 66 per cent of Norwegian R&D was aimed at a thematic priority area in 2023. This amounts to NOK 58 billion (excluding enterprises with less than 10 employees).

[5] Other national sources include private gifts, foundations, own income and SkatteFUNN. Norwegian funding for research performed abroad is not included.

Figure 1d Current expenditure on R&D by thematic area and performing sector. 2023. NOK million.



Source: Statistics Norway

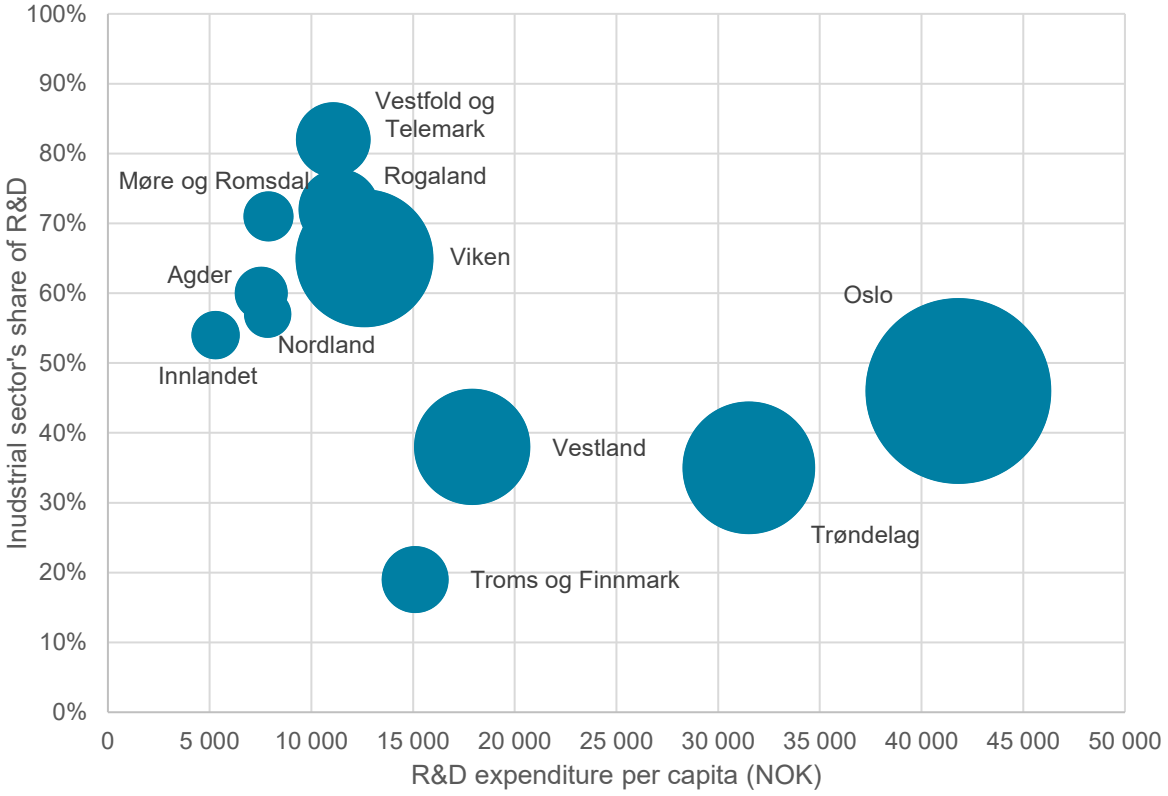
Strong regional concentration of R&D activity

In 2023, the four largest R&D counties Oslo, Viken (split into Akershus, Buskerud and Østfold in 2024), Trøndelag and Vestland accounted for more than three-quarters of the R&D expenditure. The concentration of R&D activity in these four counties has been stable for a long time, and is related to the location of universities, university colleges, institutes, R&D-intensive business and health trusts, both university hospitals and other health trusts.

Oslo was the county with the largest share of R&D activity in 2023 and accounted for 31 per cent of all R&D activity in Norway that year. The University of Oslo and Oslo University Hospital HF are major contributors to Oslo being at the top in terms of R&D activity. An R&D-intensive industrial sector, especially in service industries, also contributes a lot to Oslo's reign at the top.

Total R&D expenditure per capita was, as in the previous year, highest in Oslo. Figure 1.6b shows that in Oslo, R&D expenditure amounted to almost NOK 42 000 per person. The nearest county measured in R&D per capita is Trøndelag, where research was carried out for just about NOK 31 500 per capita. The gap down to the other counties is large. Vestland county carried out R&D worth 17 900 NOK per capita and Troms and Finnmark about NOK 15 100. The county with the lowest R&D activity per capita was Innlandet at about NOK 5 300 per capita.

Figure 1e Total R&D expenditure (circle area), R&D expenditure per capita (x-axis) and the industrial sector's share of total R&D expenditure by county (y-axis). 2023. Per cent and NOK.

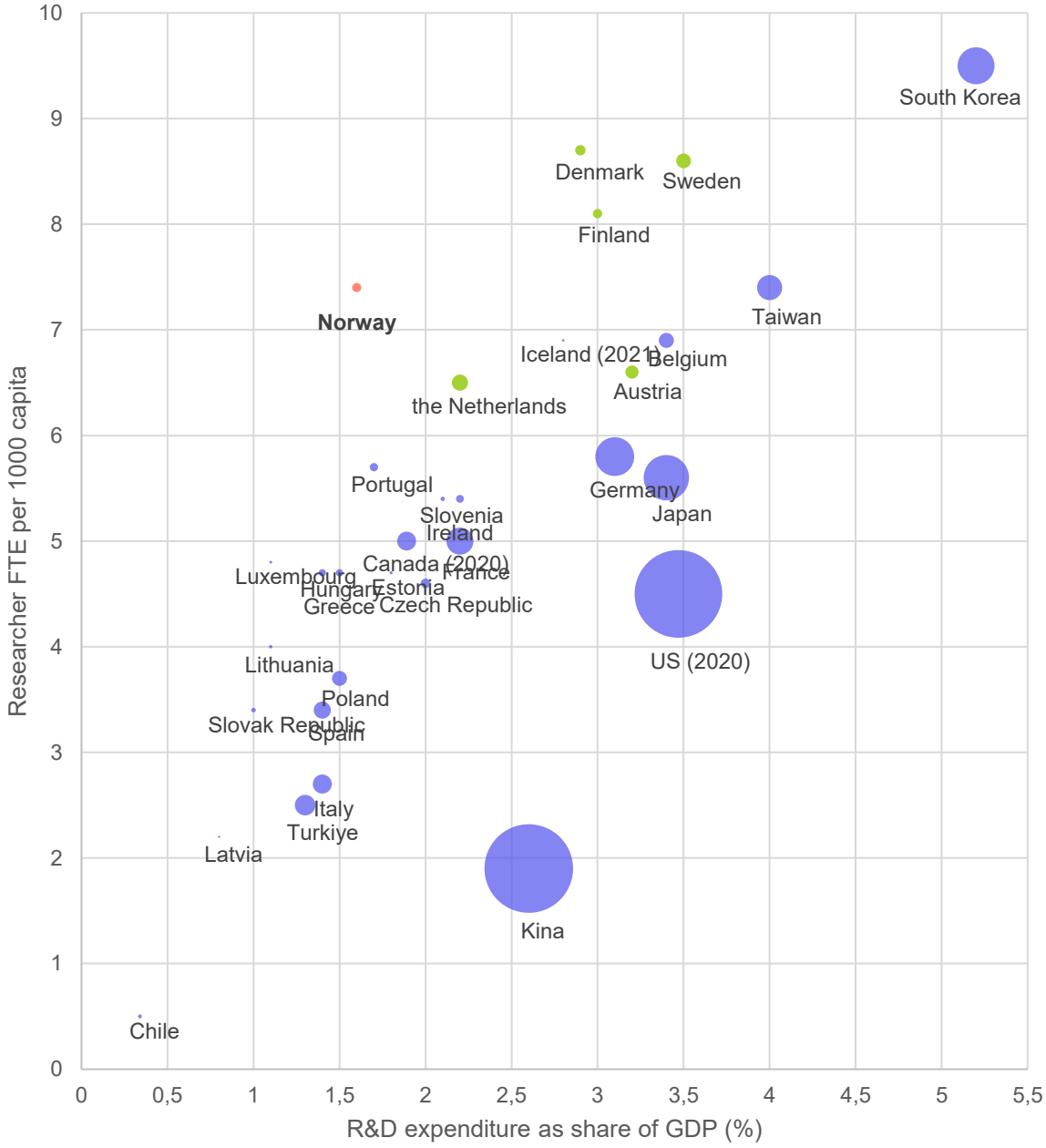


Source: Statistics Norway

Chapter 2: International trends in R&D

Figure 2a shows how Norway compared to a selection of other OECD countries with respect to purchase power parity (PPP) adjusted R&D expenditure, R&D as share of GDP and number of researchers (measured in full time equivalents (FTE)) per capita in 2022. Norway is of course a small country, population 5.6 million in 2024 (Statistics Norway), and its R&D expenditure is low in absolute terms. In 2022 Norway's gross domestic expenditure on R&D (GERD) was 0.5 per cent of OECD total when taking purchasing parity into account (OECD, 2025). At 1.56 per cent, Norway's R&D expenditure as share of GDP in 2022 was on the low side compared to other OECD countries, but has usually been closer to medium. However, Norway scores relatively high in researcher density measured in FTE per capita.

Figure 2a R&D expenditure in PPP dollars fixed 2015-prices (circle area), as share of GDP (per cent) and the number of researcher full-time equivalents (FTEs) per 1,000 inhabitants. OECD area and selected countries (Barometer countries in green). 2022 or last available year.



Source: OECD – MSTI (FTE per 1000 capita and R&D expenditure), Eurostat (R&D as share of GDP)

For comparison the Nordic countries Denmark, Finland and Sweden, in addition to Austria and the Netherlands, are of particular interest. Collectively these countries are referred to as the “Barometer countries” because they resemble Norway in many ways. Like Norway, the Barometer countries are relatively small but have a high number of researcher FTEs per capita. With the exception of the Netherlands, all of them have a higher share of R&D to GDP than the OECD average. In years past Norway has in this respect been more similar to the Netherlands, but had in 2022 a significantly lower share of R&D to GDP even compared with the Netherlands.

The share of R&D activity in the Norwegian business enterprise[6] sector is relatively low

For the OECD countries as a whole, the business enterprise sector accounts for almost three-quarters of R&D activity (73.8 per cent) in 2022. The share is highest in Taiwan with 92 per cent, while it is 79 per cent in the US and almost 78 per cent in China. Among the countries that invest most in R&D, it is the business enterprise sector that accounts for most of the R&D activity.

Among the Barometer countries, Sweden has the highest share of R&D in the business enterprise sector with 74 per cent and Denmark the lowest with 62 per cent. In Norway, the business enterprise sector accounts for an even lower share with 55 per cent of R&D expenditure in 2022. This is nonetheless a slight increase from 52 per cent in 2018.

The higher education sector in Norway is large

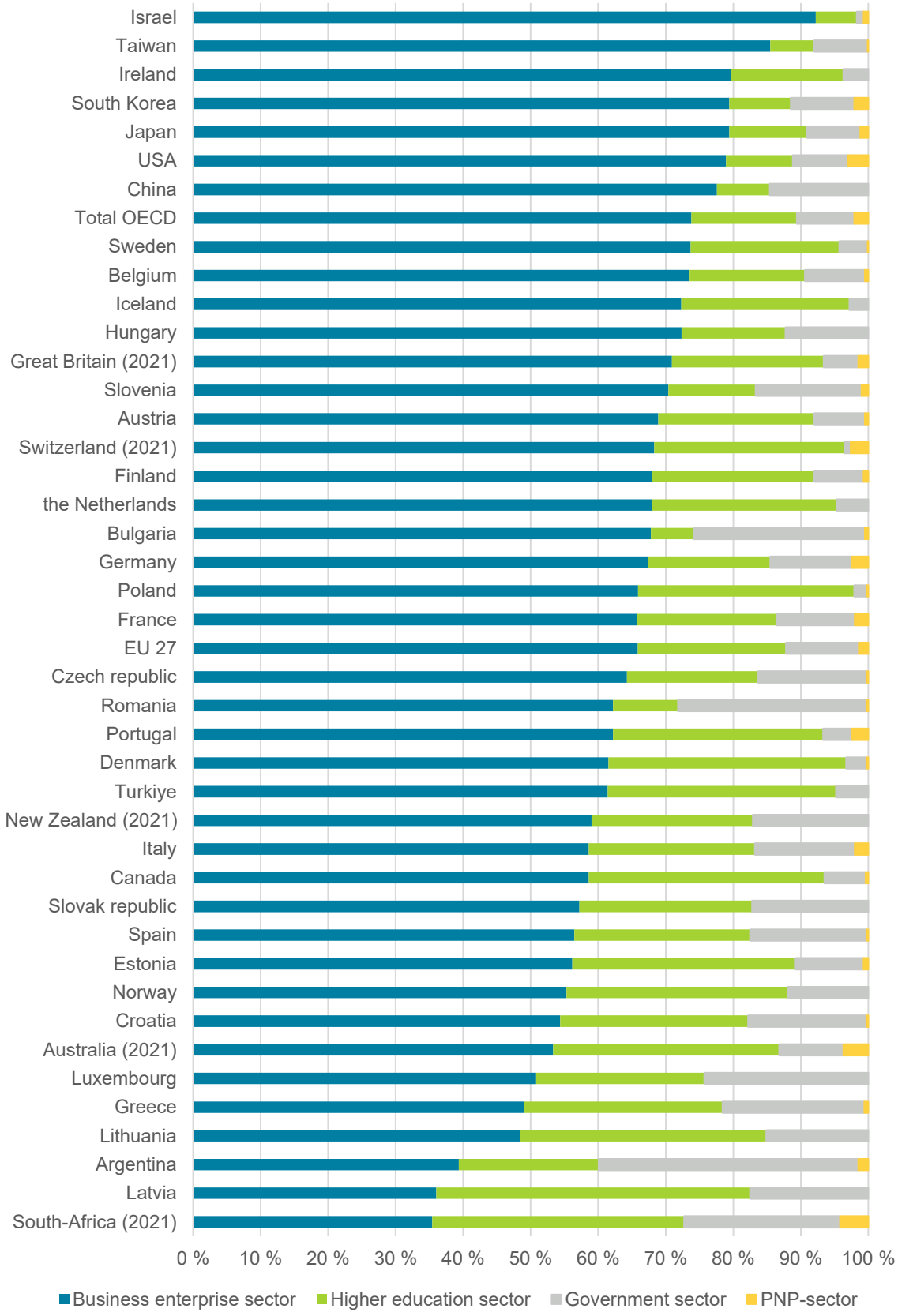
The higher education sector is the second largest R&D-performing sector in most countries. In the OECD as a whole, it accounts for 15.6 per cent of R&D expenditure. In Norway, the proportion is close to 33 per cent (2022). Other countries with a large share of R&D in this sector are Denmark (35 per cent), Canada (34 per cent), Australia (close to 34 per cent), Lithuania (36 per cent), South Africa (37 per cent) and Latvia (46 per cent).

The government sector accounts for almost 9 per cent of the R&D activity in the OECD countries in total. The share is somewhat higher in Norway at 12 per cent, which is higher than in any of the Barometer countries. This sector includes the publicly oriented part of the institute sector, as well as health trusts without a university hospital function. Differences in how countries organize their research systems affect the level of R&D activity in the different sectors and make it challenging to compare.

The private non-profit (PNP) sector is the smallest R&D-performing sector in all countries. On average, it accounts for 2 per cent of R&D expenditure in the OECD countries. It is only in South Africa, Australia, the USA and Switzerland that the proportion is 3-4 per cent. Like many other countries, Norway does not report figures for R&D in the PNP sector.

[6] Data in this chapter is derived from OECD and Eurostat and uses their sector designations and definitions.

Figure 2b R&D expenditure by sector of performance. 2022 or last available year. Per cent.



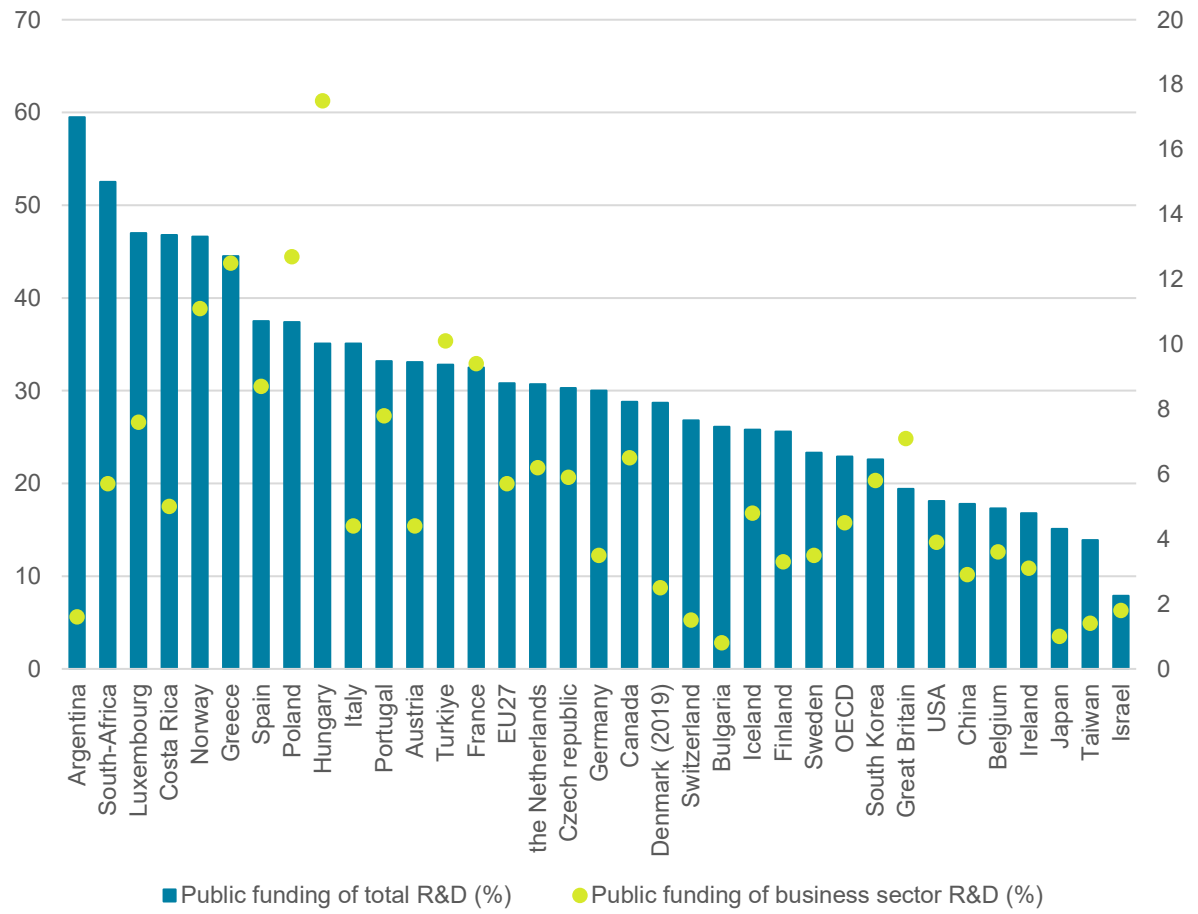
Source: OECD- MSTI

High share of public funding in Norway

In 2022, the business enterprise sector funded 65 per cent of total R&D activity in the OECD, up one per cent from the year before. Most of this funds R&D performed in the same sector, but not all. The same year, public sources funded 23 per cent of total R&D in the OECD. As can be seen in Figure 2c, the share of public funding varies greatly between countries, from less than 8 per cent in Israel to more than 50 per cent in Argentina. In Norway, the share of public funding was 47 per cent, the fifth highest among all the countries shown in the figure[7]. Norway also has a higher share of public funding of total R&D than all the Barometer countries, with Austria closest at 33 per cent.

Figure 2c also shows the share of public funding for R&D performed in the business enterprise sector. As is evident from the figure there is no clear correlation between the share of public funding of total R&D and the share of public funding of R&D in the business enterprise sector. In the OECD, the share of public funding of R&D in the business enterprise sector was 4.5 per cent, whereas in Norway the share was more than double that at 11.1 per cent. Of the countries presented in the figure, Norway had the fourth highest share, after Hungary, Poland and Greece.

Figure 2c Public funding of total R&D and of R&D performed in the business enterprise sector (selected countries). 2021/2022. Per cent.



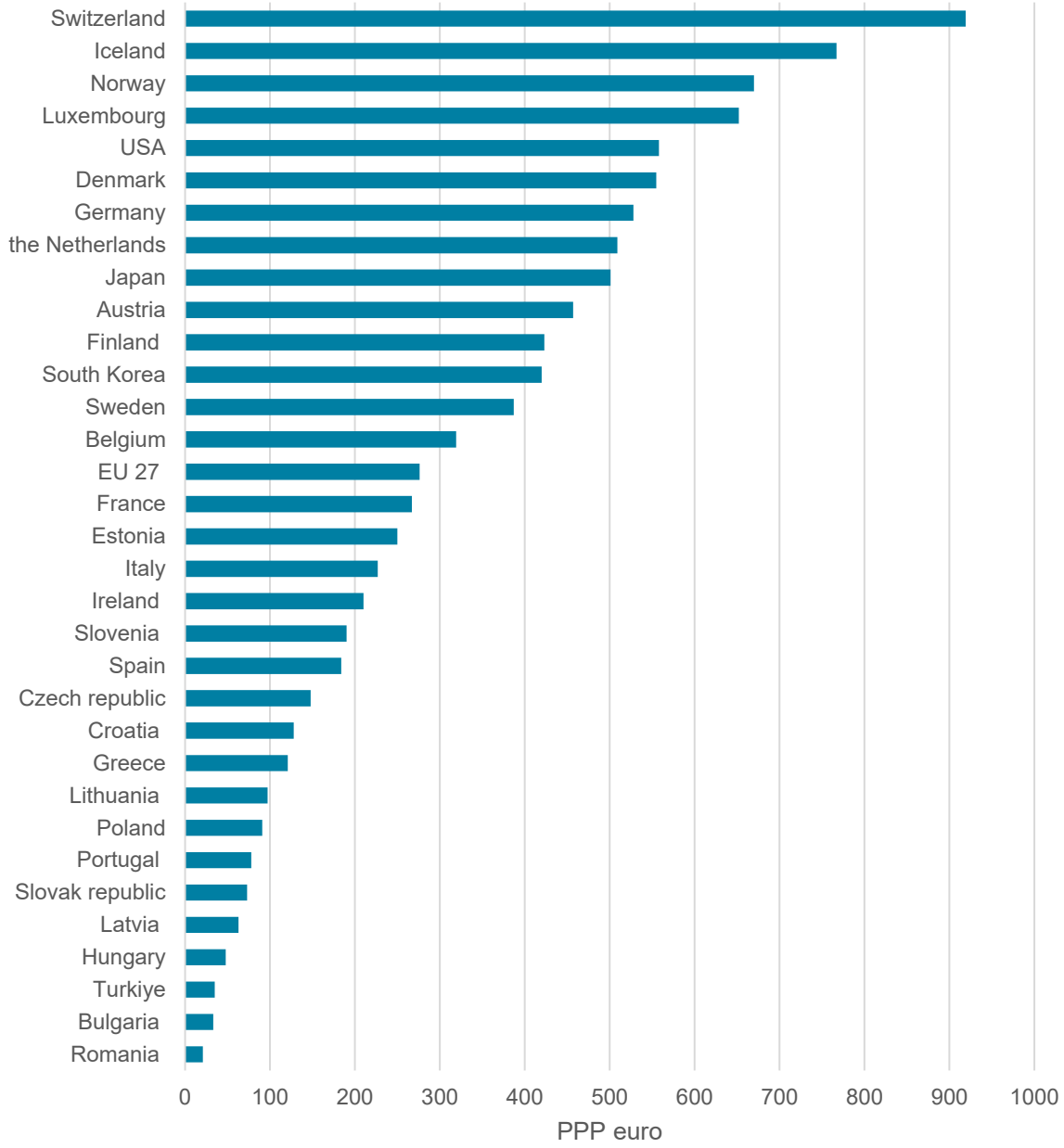
Source: OECD- MSTI

[7] The difference between this number and the one given in chapter 1 is due to the fact that they categorize own funds differently. In national R&D statistics it belongs to "Other national sources", while own funding in international R&D is categorized in the same sector as the R&D performer. Also, the numbers are for different years.

Norway third in government allocations for R&D per capita

Figure 2d below shows government allocation for R&D per capita, adjusted for purchasing power (PPP). In this comparison Norway ranks third after only Switzerland and Iceland. By this metric also Luxembourg, the US and the Barometer countries rank high. At the other end of the scale are several Eastern European countries. While the EU countries on average allocated 275 PPP euro per inhabitant, Norwegian government allocations were more than twice as high at 670 PPP euro per capita.

Figure 2d Government allocations for R&D per capita in select OECD countries. 2023 or last available year. PPP euro.



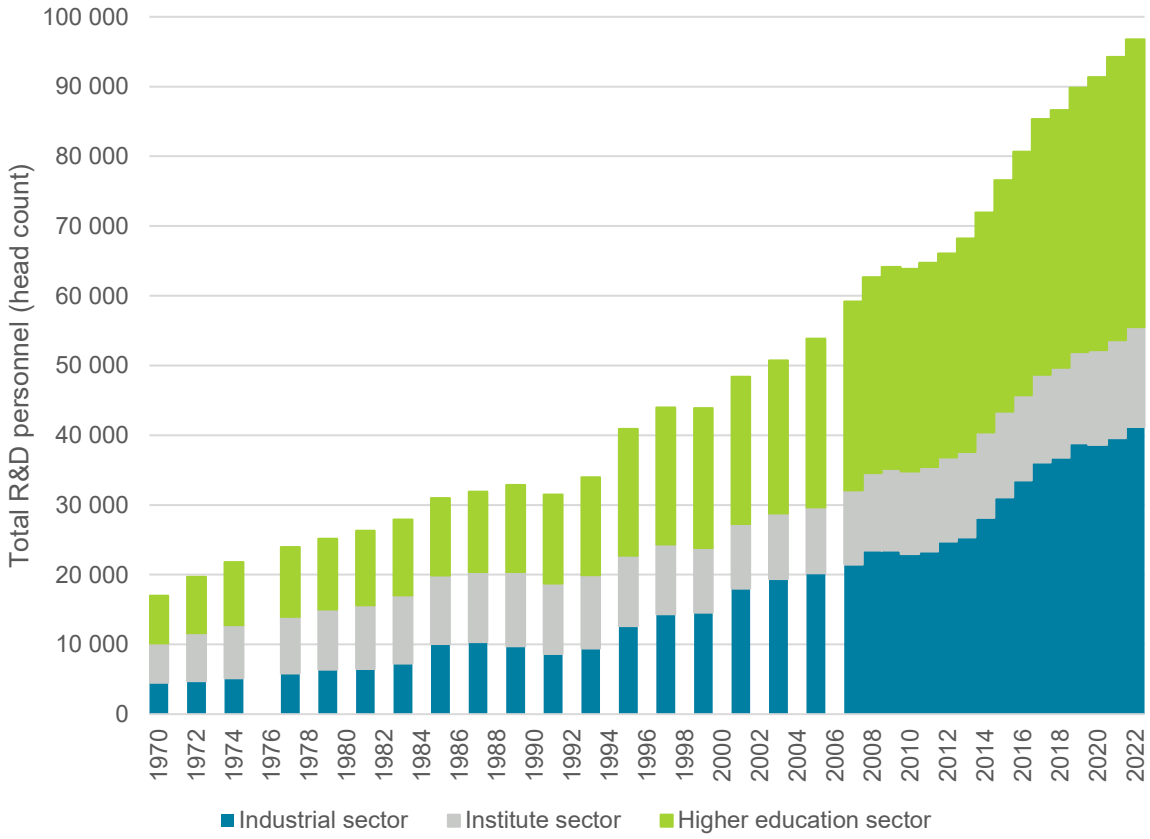
Source: Eurostat

Chapter 3: Human resources

Growth in R&D personnel and full-time equivalents

The number of people who participate in R&D in Norway has increased significantly in the period from 1970 to 2022, from 17,000 to 96,779 (Figure 3a). In 1970, the higher education sector was the largest sector with 6 800 people participating in R&D, followed by the institute sector with 5 600 and the business sector with 4 500. Over the course of 50 years, there has been a formidable growth in R&D personnel in both the business sector and the higher education sector, especially after the mid-1990s. Growth in the institute sector has been considerably lower than in the other two sectors. This is to some extent due to research policy in Norway, where investments have been greater in the higher education sector than in the institute sector.

Figure 3a Total R&D personnel by sector. 1970-2022. Head count.



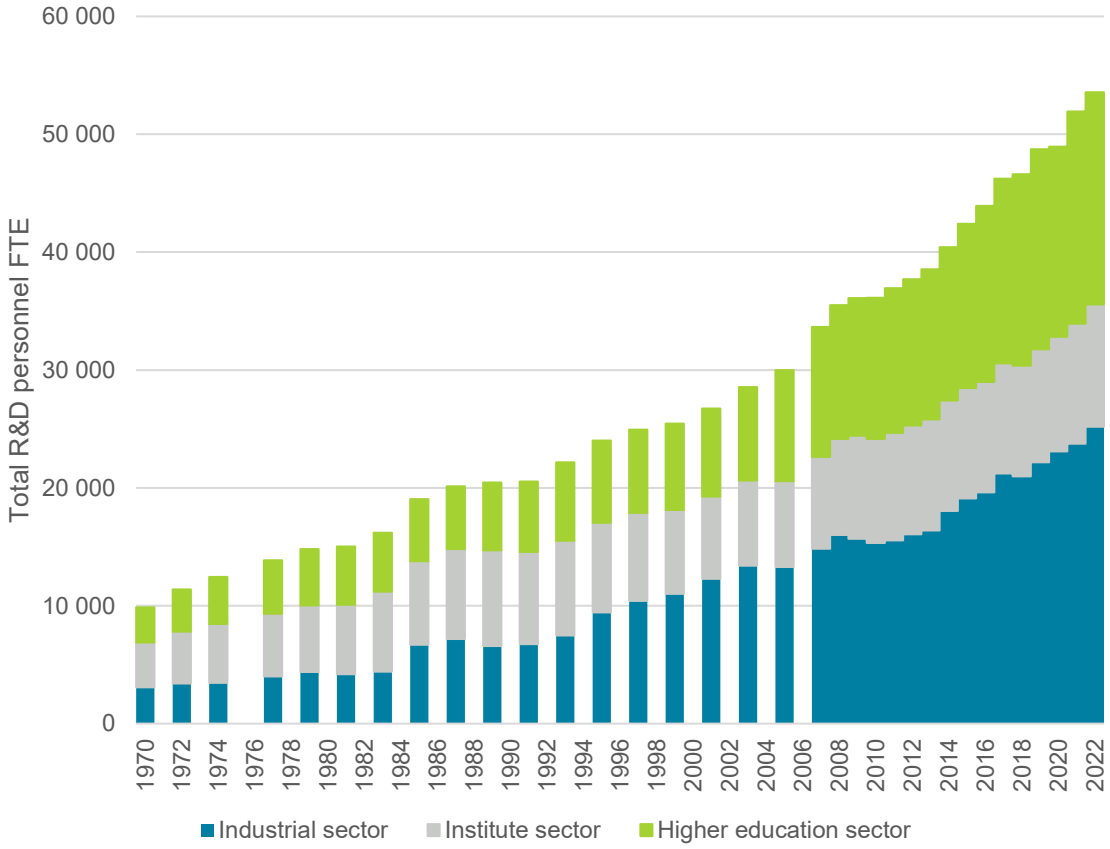
Source: Statistics Norway

The composition of the R&D personnel has also changed during these 50 years. In 1970, researchers/academic staff accounted for 60 per cent of the R&D staff in the higher education sector and significantly less than half in both the industrial and institute sectors. Since the 1980s, researchers/academic staff have been in the majority. The changed composition of research staff in Norway in the 1980s and 1990s coincided with the development of Norwegian doctoral education and increased focus on research. In 2022, 71 per cent of all R&D personnel in Norway were researchers/academic staff.

The number of R&D full-time equivalents (FTE) has also increased considerably between 1970 and 2022. In 1970, just under 10 000 R&D FTEs were performed, a number that had increased to 53 572 in 2022 (Figure 3b).

A comparison of the number of R&D personnel with FTEs performed shows that the R&D personnel spent about 55 percent of its time on R&D in 2022. The time spent on R&D was highest in the institute sector (73 per cent) and lowest in the higher education sector (44 per cent).

Figure 3b Total R&D personnel by sector. 1970-2022. Full-time equivalents (FTE).



Source: Statistics Norway

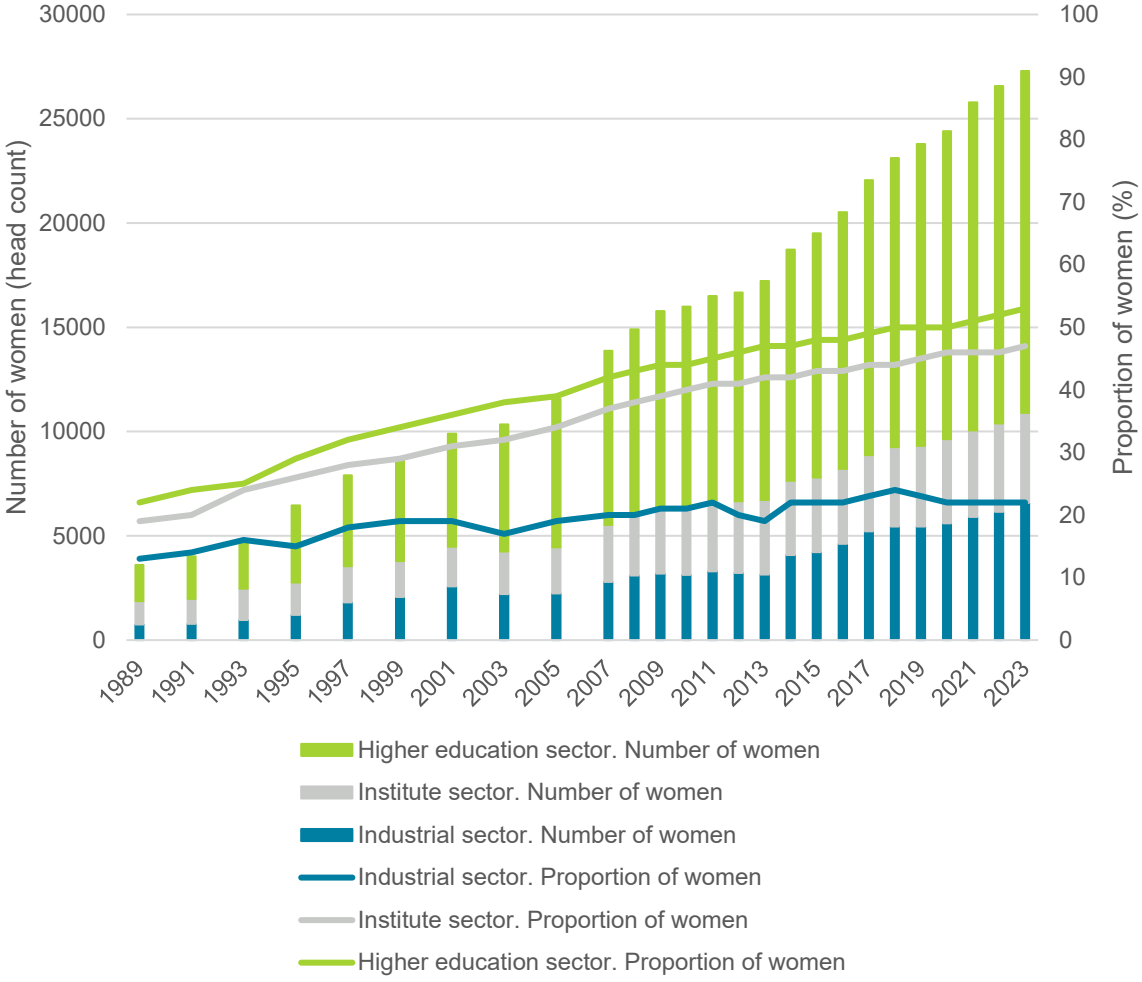
Increased diversity among R&D personnel

Gender balance in Norwegian academia has been monitored for a number of years. Figure 3c shows the proportion of women among researchers/academic staff in Norway by sector since 1989, which is the first year for which there are figures for the proportion of women in the industrial sector.

In 2023 women accounted for 27 284 of 69 866 researchers/academic staff in Norway, or 39 per cent. The higher education sector had the highest number of female researchers/academic staff of the three sectors in 2023, nearly 16 400. This is also where the proportion of women was highest, 53 per cent. The proportion has been above 40 per cent since 2007. The second highest proportion of women is found in the institute sector, at 47 per cent. In this sector, the proportion of women among researchers/academic staff has been above 40 per cent since 2010. The lowest proportion of female researchers is found in the industrial sector where women make up 22 per cent of researchers/academic staff. This proportion has remained stable for at least a decade and there seems to be a long way to go to attain gender balance in this sector.

The gender balance among researchers/academic staff varies considerably between fields of R&D with technology and medicine and health at the two extremes.

Figure 3c Number (head count) and proportion (per cent) of female researchers/academic staff by sector. 1989-2023.



Source: Statistics Norway

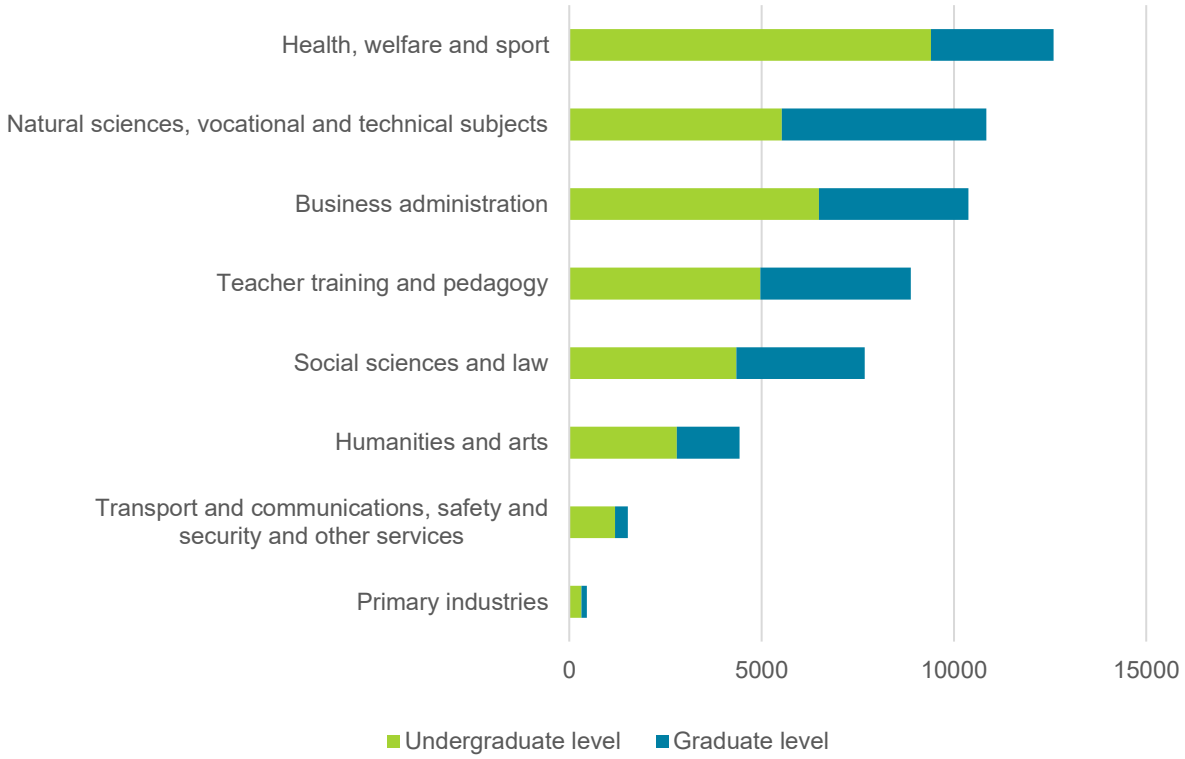
Norwegian academia is part of an international labour market and many of its researchers are recruited from abroad. The share of researchers/academic staff that are immigrants or Norwegian born descendants of immigrants[8] has increased from 19 per cent in 2007 to 35 per cent in 2023.

Most conferred degrees within health, welfare and sport

In the academic year 2022/2023, institutions within the Norwegian higher education sector conferred a total of 35 173 undergraduate degrees (bachelor's degrees or similar) and 21 741 master's degrees or similar. Most undergraduate degrees were conferred within the field of health, welfare and sport followed by business administration (Figure 3d). The largest field among graduate degrees (excluding doctoral degrees) was natural sciences, vocational and technical subjects.

[8] Norwegian born descendants of immigrant parents is a very small group and made up only 0.7 per cent of researchers/academic staff.

Figure 3d Number of degrees conferred in Norway, by field[9] and level[10]. 2022/2023.



Source: Statistics Norway

Overall gender balance in doctoral degrees, with variations in certain fields

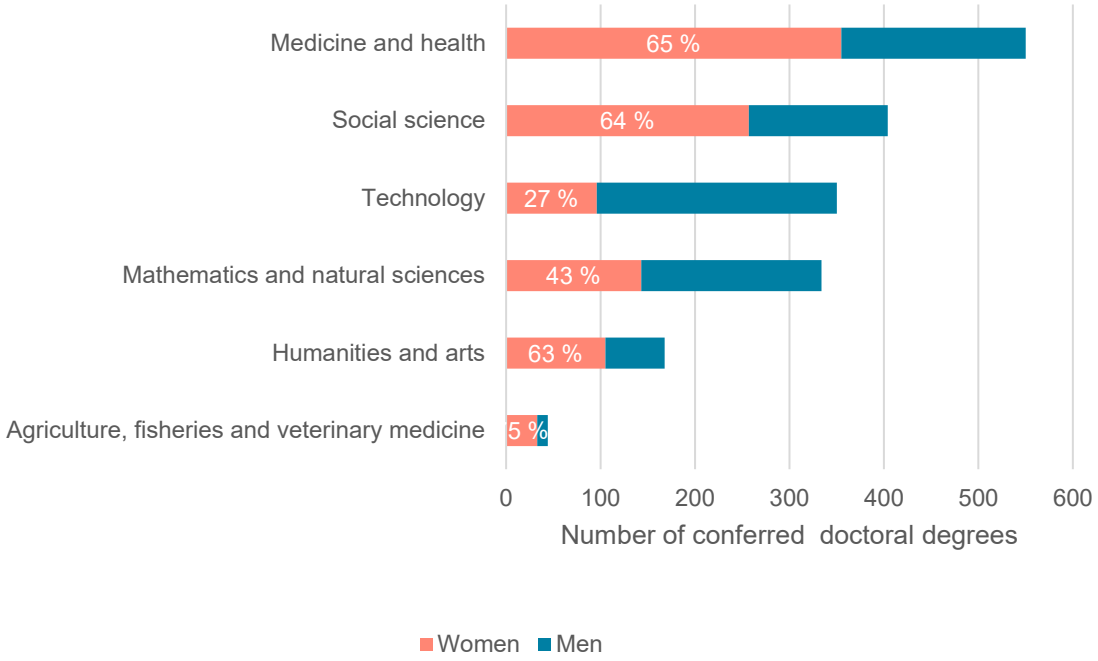
If we look at conferred doctoral degrees, medicine and health was the most common field in which to earn a PhD in 2024 (Figure 3e). 550 of the 1850 new PhDs were in this field (30 per cent).

Among the new PhDs 53 per cent were women, but the gender balance varies greatly by field. In medicine and health 65 per cent of PhDs were female whereas in technology only 27 per cent were.

[9] Fields use the NUS2000 classification (Barrabes & Østli, 2016). General subjects were not included. See also Classification of education (NUS) where you can choose to see the list of categories in English.

[10] Undergraduate degrees include degrees taking 2 to 4 years to complete, graduate degrees include those taking more than 4 years.

Figure 3e Number of conferred doctoral degrees by field and gender. 2024.



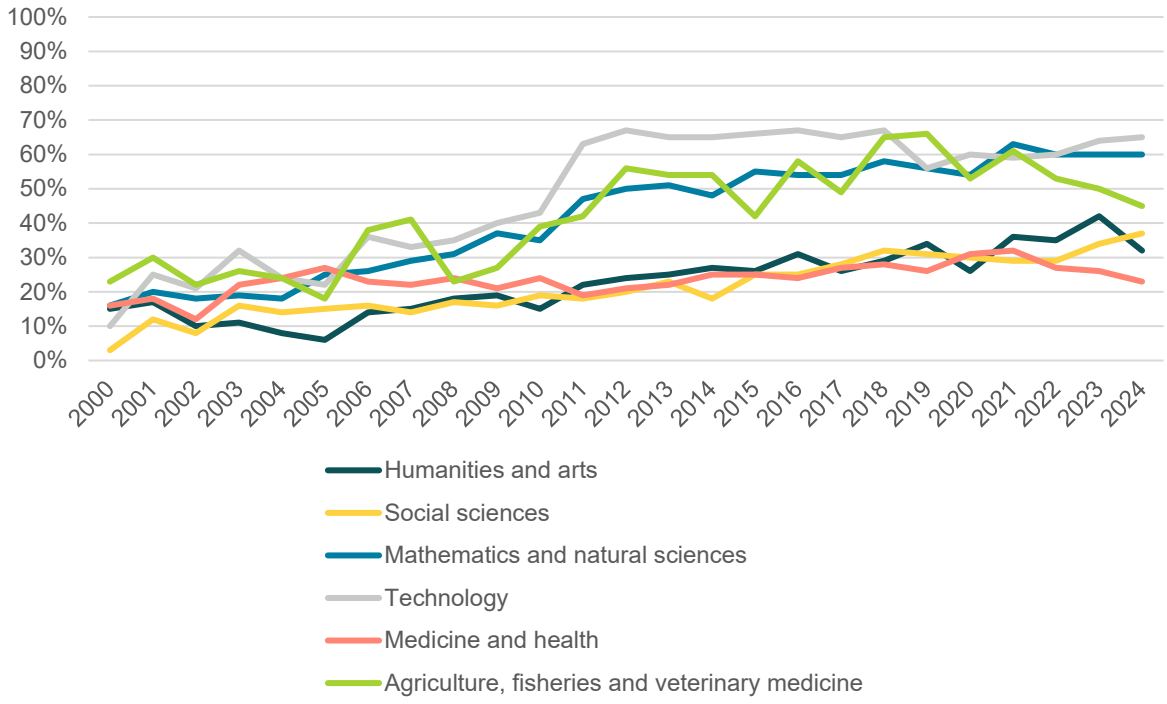
Source: Statistics Norway

A significant share of foreign nationals among PhDs in Norway

An increasing share of Norwegian doctoral students are foreign nationals and in 2023 a record 44 per cent of PhDs were earned by students with foreign citizenship. This trend is evident within all fields, but the share of foreign nationals is particularly high within technology (65 per cent) and mathematics and natural sciences (60 per cent). The same holds true in agriculture, fisheries and veterinary medicine, although this is a very small field and contributes little to the overall numbers. The lowest share of foreign nationals is found within medicine and health (23 per cent).

Most foreign nationals who earn a PhD in Norway are from Europe or Asia. Lately, a particularly high number have been from either Germany or China. In 2024 95 German citizens earned a PhD from a Norwegian institution and the same was true for about 50 citizens of each of the countries China, Iran and India. The number of Norwegian citizens earning a PhD has remained largely unchanged since 2008 at a little over 900 per year but increased in 2024 to 1072.

Figure 3f Share of doctoral degrees conferred to foreign nationals by field. 2000-2024.



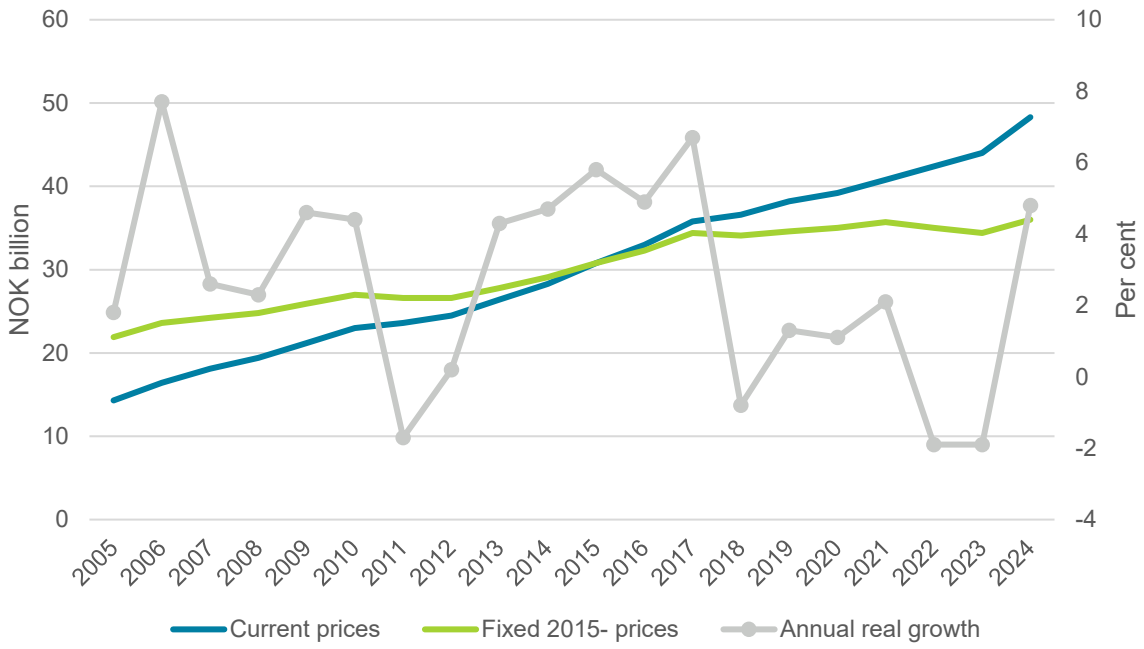
Source: Statistics Norway

Chapter 4: Public support for R&D and innovation

Government allocations for R&D in 2024 are estimated to amount to NOK 48.3 billion, or 3.89 per cent of the total expenditure in the 2024 budget (excluding loans and transfers to pension funds). It is also estimated to amount to 0.94 per cent of GDP.

Allocations rose significantly over the period 2013 to 2017, a period when annual inflation-adjusted growth was approximately 5 per cent. Since 2017 allocations have barely kept up with inflation. So, despite a large increase in 2024, nominally almost 10 per cent, in real terms allocations for 2024 are only slightly higher than in 2021.

Figure 4a Estimated government allocations for R&D over the state budget. Current and fixed 2015-prices (left axis) and annual real growth (right axis). 2005-2024. NOK billion and per cent.



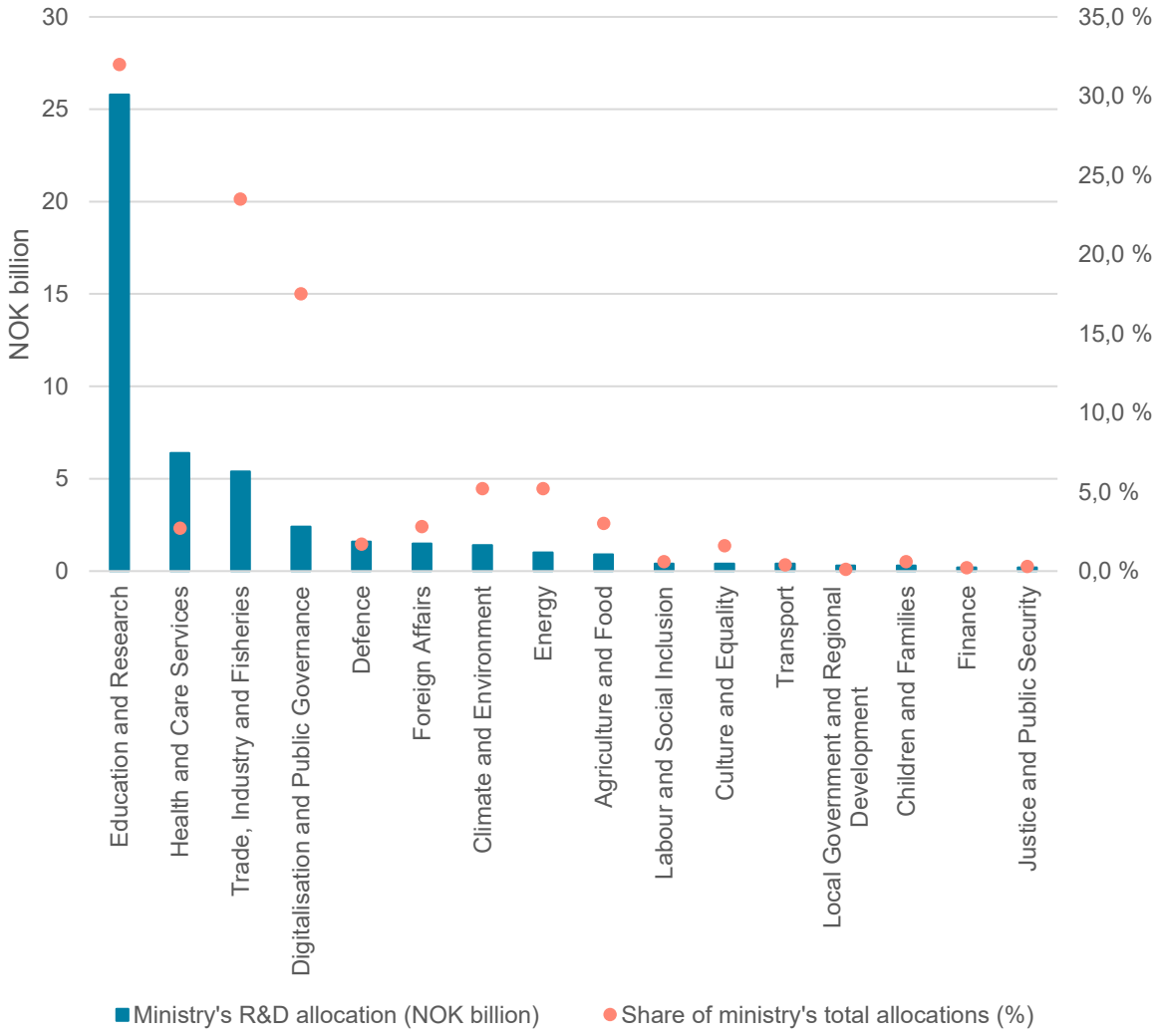
Source: Statistics Norway, state budget analysis

The Ministry of Research and Education is the biggest contributor

All ministries have allocations aimed at R&D, but the size of the allocations vary widely. Most of the central government's R&D funding is allocated through the budgets of three ministries. 53 per cent of R&D allocations in 2024, or NOK 25.8 billion, came through the budget of the Ministry of Education and Research (KD). The next largest ministries in terms of R&D allocations are the Ministry of Health and Care Services (HOD) and the Ministry of Trade, Industry and Fisheries (NFD). In total, 78 per cent of the R&D allocations came from the budgets of the three ministries mentioned.

The reason that the Ministry of Digitalisation and Public Governance uses a high share of its allocations on R&D is primarily that allocations to university buildings are channeled through this ministry.

Figure 4b Estimated government allocations over adopted state budget by ministry (left axis) and as share of ministry's total allocations (right axis). 2024. NOK billion and per cent.



Source: Statistics Norway, state budget analysis

Allocations through the Research Council of Norway decreased in 2023

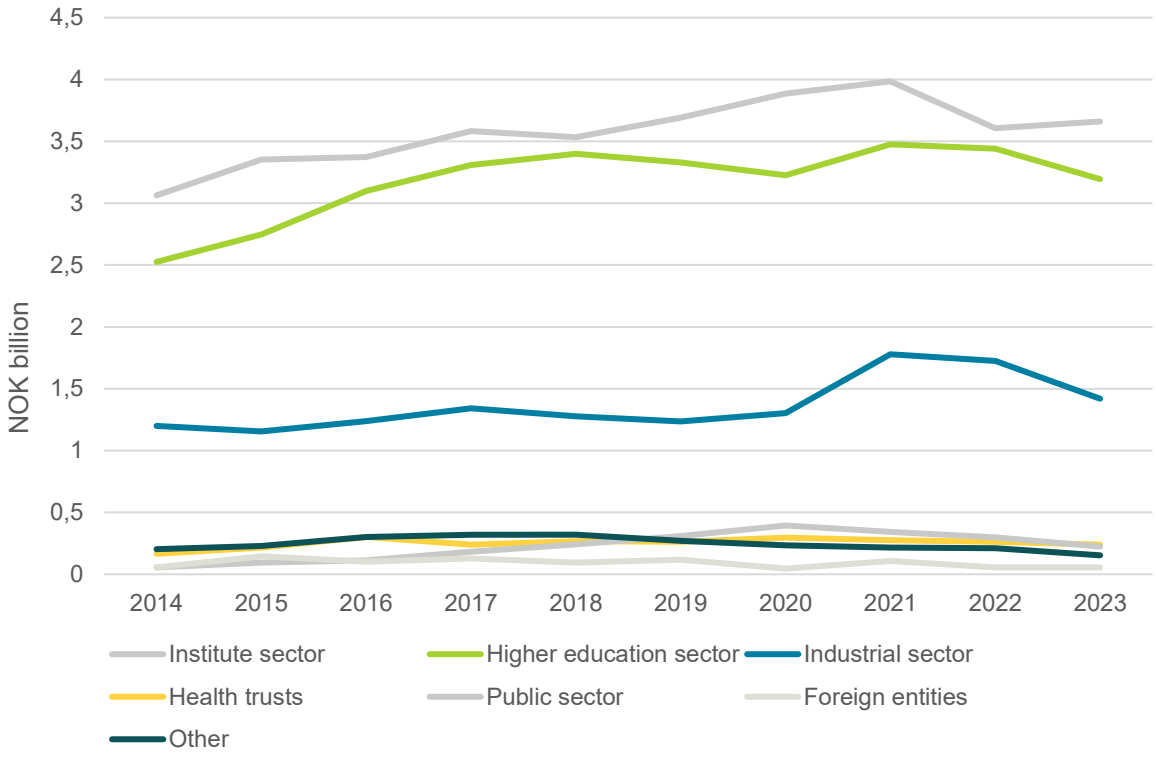
The Norwegian government provides significant parts of its allocations for R&D through the Research Council of Norway (RCN). The purpose of channeling research funds through the RCN is to ensure research quality through competitive calls and societal relevance through specific initiatives related to thematic priority areas and societal challenges.

Total allocations from the RCN varied considerably between 2021 and 2022. The increase in 2021 was a result of measures that were introduced in connection with the pandemic and largely aimed at the business sector. In 2022, on the other hand, there was a reduction in allocations. This was partly a result of measures taken by the RCN's interim board in 2022 to improve the RCN's liquidity.

In 2023, the RCN allocated NOK 11.5 billion in current prices to research projects and basic funding, corresponding to a real decrease of 1.5 per cent from 2022. The institute sector received NOK 4.7 billion (41 per cent), ahead of the higher education sector with NOK 4.1 billion (36 per cent). The third largest recipient is the industrial sector which in 2023 received NOK 1.8 billion (16 per cent).

The institute sector's share referred to above also includes the institutes' public basic funding, which is channeled through the RCN. The basic funding amounted to NOK 1.7 billion in 2023[11] and were an important contributor to the institute sector being the largest recipient of RCN funds.

Figure 4c Allocations from The Research Council of Norway by sector. 2014-2023. Includes basic funding to the institute sector. Fixed 2015-prices. NOK billion.



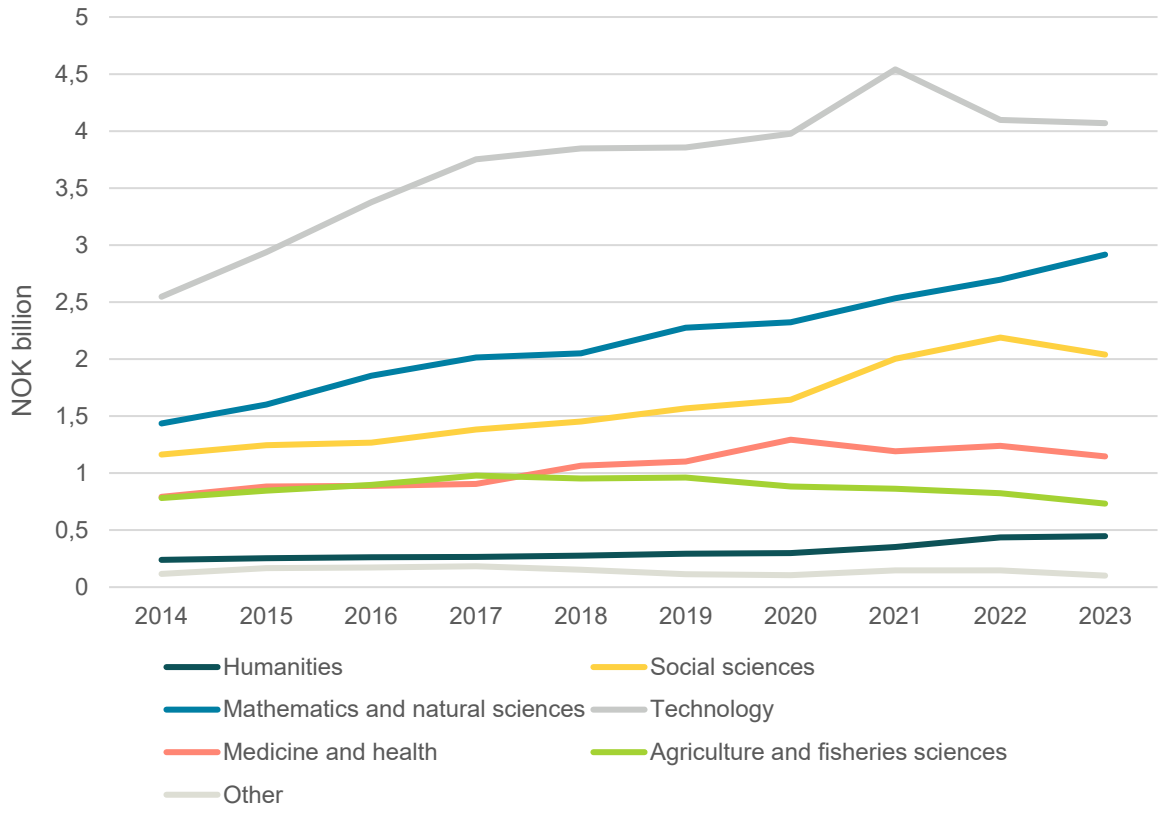
Source: RCN

Technology receives the most funding from the RCN

In 2023, as in the preceding years, the largest field for allocations (including basic funding) from the RCN was technology. Projects in this field received NOK 4 billion (current prices). Over the last decade all fields with the exception of agriculture and veterinary medicine have seen real increases in RCN allocations and the field mathematics and natural sciences has increased the most, 54 per cent since 2014.

[11] Includes funding through the Retur-EU scheme which is a performance-based basic funding for institutes that participate in EU projects (Funding for increased participation in EU projects (RETUR-EU)).

Figure 4d Allocations from the RCN by field. 2014-2023. Current prices. NOK billion.



Source: RCN

R&D and innovation also benefit from other public funding sources

As mentioned in chapter 1, tax deductions from SkatteFUNN are an important source of funding for R&D in the industrial sector. In 2023, SkatteFUNN granted deductions for NOK 4.6 billion.

Tax deduction through SkatteFUNN

SkatteFUNN is a tax deduction scheme that aims to stimulate increased R&D efforts among Norwegian companies. The scheme is rights-based, meaning that all companies that want to develop or improve goods, services or production processes through research and development, can apply for a tax deduction that amounts to 19 per cent of their R&D costs. The scheme was established in 2002 and is today the largest single measure among the business-oriented funding instruments, measured in public costs. R&D projects must be approved by the RCN to be eligible.

Another significant source of funding for the industrial sector is Innovation Norway which in 2023 supported R&D for NOK 2.2 billion. SIVA is small in comparison at NOK 93 million.

Returns from Horizon Europe have exceeded target

Ever since the EEA agreement entered into force in 1994, Norway has been an associated country with full rights to participate in the EU framework programmes.

The return rate shows the proportion of announced funds that go to Norwegian actors and is also a measure of how competitive the Norwegian research communities have been. The government's ambition is for Norwegian actors to recover 2.8 per cent of the announced funding under Horizon Europe.

The table below shows the development of the Norwegian return and return rate per year for the last half of Horizon 2020 and the start of Horizon Europe.

Table 4a Norwegian return from EUs framework programmes Horizon 2020 and Horizon Europe. 2016-2023. Per year[12]. Mill euro and per cent.

	2016	2017	2018	2019	2020	2021	2022	2023
Million euro	179	168	239	302	391	197	483	432
Return rate	**2,06 %**	**1,96 %**	**2,53 %**	**2,87 %**	**3,45 %**	**3,23 %**	**3,01 %**	**4,35 %**

The overall return rate from Horizon Europe to Norwegian researchers was, by May 2024, 3.3 per cent, and 1185 projects with Norwegian participants have received funding. Of the euro 1.2 billion received by Norwegian researchers so far, 72 per cent has come from pillar II Global Challenges and European Industrial Competitiveness, 21 per cent from pillar I Excellent Science, and 6 per cent from pillar III Innovative Europe. In pillar II, Norwegian success has been greatest within cluster 5 (climate, energy and mobility) and in cluster 1 (health).

32 per cent of funding from Horizon Europe has gone to the institute sector, 29 per cent to the higher education sector and 19 per cent to the industrial sector. An additional 12 per cent has been received by the Coalition for Epidemic Preparedness Innovations (CEPI) which is headquartered in Norway. These funds are redistributed to research groups world-wide.

[12] For H2020 the year refers to the year when the contract was signed, and for HE it refers to the year of the call deadline. 2021 hence contains projects belonging to both framework programmes.

Chapter 5: Intellectual Property Rights

Intellectual property rights (IPR) are typically used as an indicator for research and innovation activities. Economic actors use both patents, trademarks and industrial designs to protect their “intangible” investments.

Aggregated patent data provides information on various aspects of new technology with potential for industrial use, including what is being invented, by whom, when and where. Trademarks protect unique and recognisable signs associated with a company, product, or service. Whereas patent data is used to a greater extent in R&D-intensive industries, particularly in manufacturing, trademarks are a more relevant indicator for innovation in the growing service sector. The third type of property right is industrial design, which protects characteristics related to a product's design. This type of protection is more valuable where design can create a competitive advantage.

The IPR system is becoming increasingly international and in particular more integrated at the European level. A unitary patent system was launched on June 2023 by the European Patent Office (EPO) and a common registration system for trademarks and designs in EU countries is available through the European Union Intellectual Property Office (EUIPO).

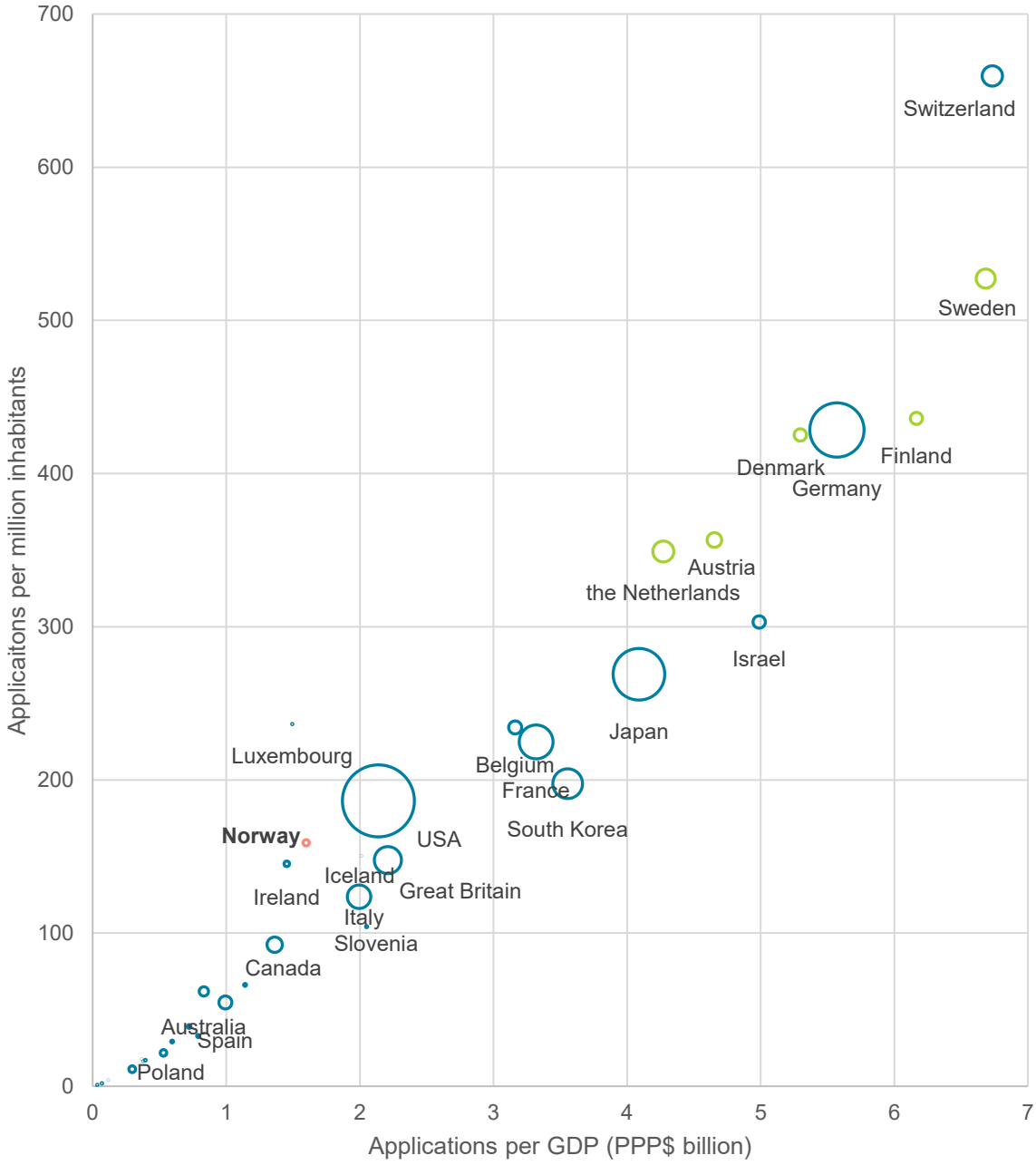
The harmonisation work in Europe affects where and how players apply for IPR over time. For trademarks and designs this work is relatively new, and enterprises to a large extent still use the national systems to protect their rights. For patents, on the other hand, indicators based on EPO patents are considered an industry standard. This is partly due to the size of the market (potentially 39 member states), but also to the high quality of the examination of patent applications. Since 2008, Norwegian actors have been able to use the EPO in the same way as other European countries.

Low patent intensity in Norway

In the last ten years Norwegian actors have sent approximately 600 patent applications to the EPO per year, either directly or via so called international applications (Patent Cooperation Treaty (PCT)). This amounts to about 0.3 per cent of total applications received by the EPO.

A more useful indicator may be patent intensity, which takes into account the size of each country in terms of population and economy. Figure 5a shows patent production among OECD countries from 2011 to 2020 using two standard measures: (i) patent applications per million inhabitants of working age (16-67 years) and (ii) patent applications per purchasing power adjusted GDP. This figure uses priority date (the date of the very first application), unlike EPO. It also bases country of origin on the inventor's country rather than the applicant's country, because companies that patent a lot can disproportionately affect a country's ranking.

Figure 5a Patent intensity in OECD countries: average number of priority applications per capita and GDP. Barometer countries in green. 2011-2020.[13]



Source: Patent data from EPO-Patstat 2024. The GDP figures and the population figures for the age group 16-67 years are also from the OECD.

In the period 2011–2020 patent production in Norway averaged 159 priority applications per year per million inhabitants of working age, up from 150 for the period 2001–2010. This corresponds to 1.6 applications per billion PPP$ in GDP, a significant decrease from the average of 2.03 at the beginning

[13] The data is based on the original application date (priority). Country affiliation is calculated based on the inventor's country. The GDP figures refer to annual production, measured in current prices and in purchasing power parity-adjusted US dollars (PPP$). The population figures are for the age group 16-67 years.

of the millennium. The decline is due to the fact that the Norwegian GDP has grown far faster than Norwegian patenting over the past decade, much due to the oil market.

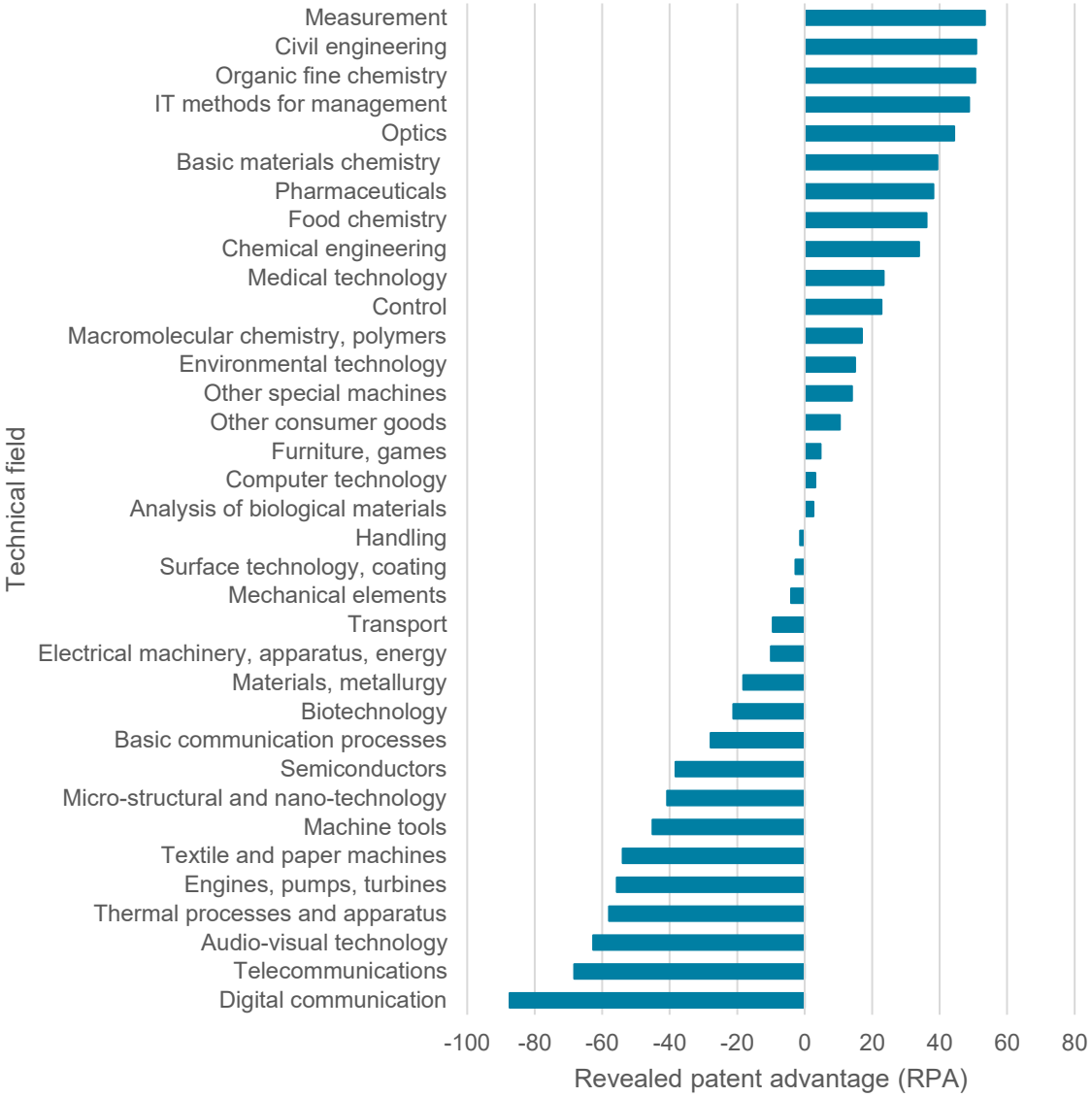
Norway ranks 15th among the 39 OECD countries based on these standard measures for patent intensity. Norwegian patenting is thus comparable to the level of patenting in the US, the UK and Ireland but still significantly lower than the Barometer countries Sweden, Finland, Denmark, Austria and the Netherlands.

The intensity of patenting also varies by technical field within each country. A high level of patenting activity within a technical field is often used as an indicator of a country's competitive advantage. For example, in the last decades Norwegian players have been active in patenting related to the oil industry in the North Sea.

In Figure 5b the technical field profile of European patents awarded to Norwegian players in the period 2014–2023 is compared with the corresponding profiles of the five Barometer countries Denmark, Finland, the Netherlands, Sweden and Austria, making use of the 35 technical fields the EPO has categorised patents into.

Technical fields with a high positive value (on top) are areas where Norwegian actors patent a lot relative to the Barometer countries. The two technology areas at the top are related to specialised engineering, where the shipbuilding industry explains much of the strength in building technology. Negative values are interpreted the other way around. Norway patents relatively little in telecom technologies, which is not surprising given that the comparison includes global leaders such as Sweden, Finland and the Netherlands.

Figure 5b Specialization index (Revealed patent advantage (RPA)[14]) for patents granted by the EPO 2014-2023, a comparison between Norway and the Barometer countries.



Source: EPO-Patstat, 2024 and NIFU based on a method developed by Fraunhofer ISI (Germany).

[14] Revealed Patent Advantage (RPA) compares Norwegian patents according to technical field in relation to patents from the five Barometer countries (Denmark, Sweden, Finland, Austria and the Netherlands) and is calculated as follows:

$$\mathrm{RPA} = 100 \cdot \tanh\left(\ln\left(\frac{\frac{\mathrm{Publ}_{ij}}{\sum_i \mathrm{Publ}_{ij}}}{\frac{\sum_j \mathrm{Publ}_{ij}}{\sum_{ij} \mathrm{Publ}_{ij}}}\right)\right)$$

The formula normalises the index value to a symmetric interval from -100 til +100 to facilitate the comparison for each technology area between countries.

Decline in IPRs sought in Norway by foreign and Norwegian actors

Since 1911 Norway has issued IPR protection in Norway through the Norwegian Industrial Property Office (NIPO). Today it is possible for Norwegian and foreign actors to apply for patent protection in Norway either directly from NIPO or to apply for a patent through the EPO and, once approved by the EPO, apply for validation in Norway through NIPO.

Table 5a shows the total number of applications for patent protection received in Norway from 2015 to 2023. In 2023 the total number of applications was 1398. Since its peak in 2017, when 2063 applications were submitted, this is the lowest number of applications received. The decline in 2023 was due to fewer applications from Norwegian applicants whereas applications from foreign actors is relatively stable.

Table 5a Number of patent applications. 2015–2023.

Year	Total number of patent applications	National applications submitted by Norwegian applicants	National applications submitted by foreign applicants	Validated international applications	Of total applications, from Norwegian enterprises
2015	1 805	1 120	129	556	860
2016	2 062	1 195	121	746	840
2017	2 063	1 108	136	819	807
2018	1 660	1 016	101	543	825
2019	1 531	883	89	559	752
2020	1 444	834	101	509	693
2021	1 580	899	123	558	797
2022	1 410	806	88	516	699

In contrast to patent applications, which take longer and are more complex, the processes surrounding trademark protection are usually faster and easier. Therefore, the number of applications for registration of trademarks can give us more up-to-date data on innovation.

In 2023, NIPO received 15,959 applications for registration of trademarks, 10 per cent lower than in 2022 (Table 5b). This is the lowest number since 2014, a sharp decline caused by fewer applications from foreign applicants. Foreign players can apply for trademark protection in Norway either by applying directly to NIPO or by validating their trademarks through the Madrid Protocol, an international scheme that applies to 122 countries and makes it possible to apply for trademark protection in several countries at the same time. The data shows that 9,994 trademark applications came through this protocol in 2023, a 14 per cent decrease from 2022.

On the other hand, the number of Norwegian applicants was 6 per cent higher than the year before. In total, they submitted 3,309 trademark applications, accounting for 21 per cent of all trademark applications received in 2023.

Table 5b Number of trademark applications. 2015-2023.

Year	Total number of trademark applications	National applications submitted by Norwegian applicants	National applications submitted by foreign applicants	Registered in Norway via the Madrid protocol	Of total applications, from Norwegian enterprises
2015	16 630	4 097	3 007	9 526	3 710
2016	15 702	4 265	3 302	8 135	3 841
2017	17 307	4 439	3 061	9 807	4 040
2018	17 279	4 765	2 799	9 715	4 161
2019	17 287	4 168	2 844	10 275	3 643
2020	16 660	3 862	3 031	9 467	3 359
2021	18 142	3 910	3 219	11 031	3 527
2022	17 696	3 111	2 995	11 590	2 824
2023	15 959	3 309	2 656	9 994	2 873

Chapter 6: Scientific publication

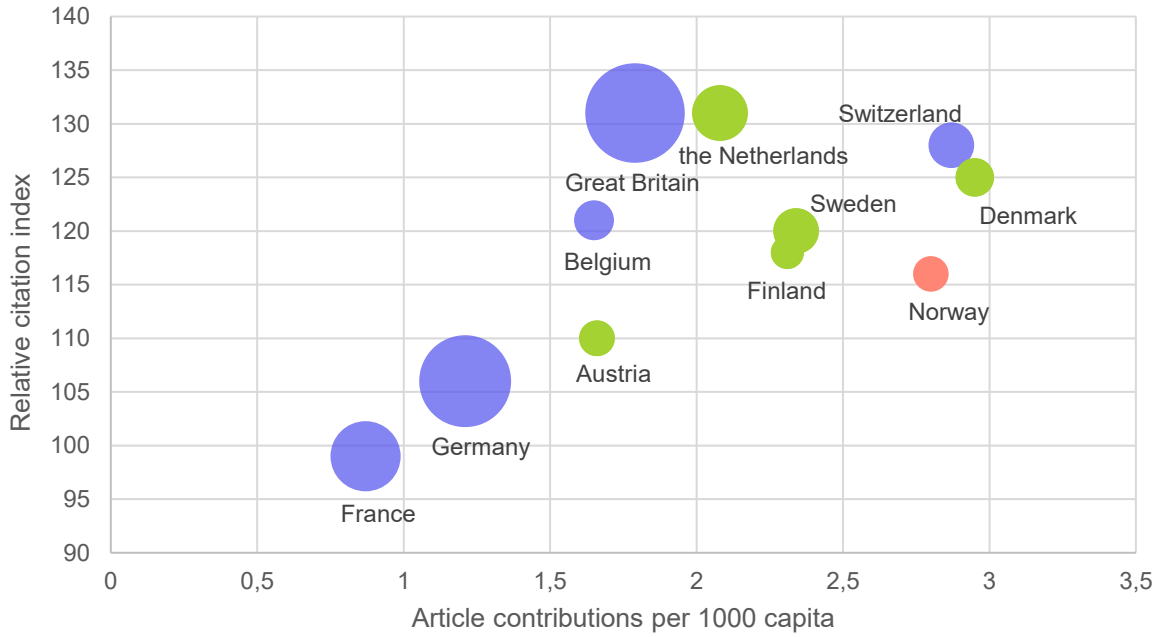
Norway ranks tenth in relative citation in a publication landscape marked by the strengthening of China's position

There are large differences between countries when it comes to article production. For a long time, the US was by far the largest research nation globally. But in 2019, China for the first time surpassed the US in publishing volume. China has further strengthened its position since then and in 2023 accounted for 25 per cent of the world's scientific production, measured as article contributions (using modified fraction counting, see the Norwegian report for explanation). The corresponding figure for the US was 14.1 per cent. Compared to 2019, the number of articles has increased by 36 per cent for China, while there has been a decrease of 9 per cent for the US.

Researchers in Norway contributed to 23,000 articles in 2023, or made 15,300 article contributions (using modified fractional counting[15]). Norway's share accounted for 0.53 per cent of global article production in 2023. This places Norway as the world's 32nd largest research nation measured by scientific publication.

If we on the other hand, consider publication volume in relation to population size, Norway is among the countries in the world with the highest publication numbers and thus research intensity (Figure 6a). At 2.80 article contributions per 1000 inhabitants, Norway ranks third after only Denmark and Switzerland. Large research nations such as the US, the UK and Germany have significantly lower publication volumes relative to their population than Norway. From 2019 to 2023, Norway has seen a 9 per cent increase in the number of article contributions. This is a stronger growth than most European countries and indeed all of the barometer countries.

Figure 6a Number of article contributions per 1000 capita (2023) and relative citation index (2021-2022) for selected Northern and Central European countries. Circle size corresponds to total number of article contributions. Barometer countries in green.



Source: NIFU. Data: Web of Science

[15] A counting method for scientific contributions, eliminating differences in contributions that depend on co-authorship practices. With this method different areas of research have a comparable average contribution. (legg inn referanse: https://www.sciencedirect.com/science/article/pii/S175115771830350X)

The figure also shows relative citation index per country, a measure of the average number of citations per publication. This shows whether or not a country's publications are cited more or less often than the world average, which is normalised to 100.

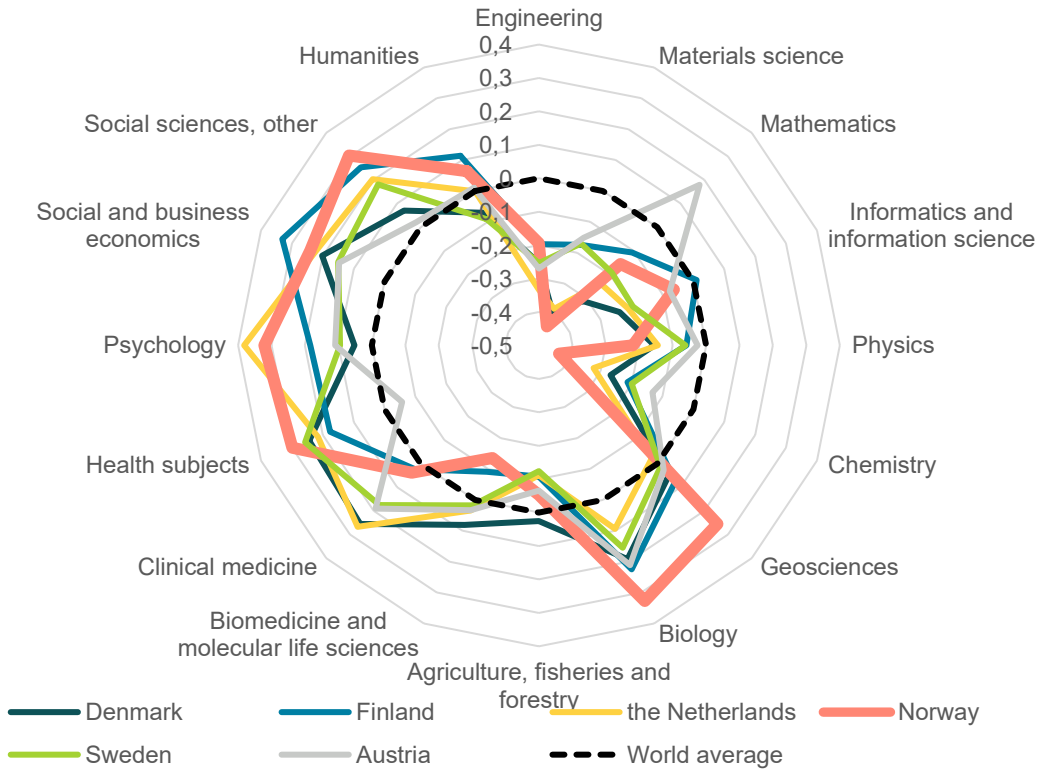
Of the world's 40 largest research nations, Norway, with a relative citation index of 116, ranks as number 10. This score means that Norwegian publications were cited 16 per cent more than the world average. The top scores belong to Singapore (147), the Netherlands (131) and the UK (131). Denmark also had a high score at 125, whereas Sweden at 120 and Finland at 118 scored comparably to Norway and Austria scored a bit lower at 100.

Strong specialisation in geosciences and biology

Another way to assess scientific impact is to look at the share of a country's publications that are among the 10 per cent most highly cited within the field it was published in. In 2022 13 per cent of Norwegian publications were among the 10 per cent most cited. This is comparable to Sweden, Finland and Austria, but lower than Denmark and the Netherlands at 14.7 and 14.4 per cent, respectively.

Each country has its own profile with regards to how much it publishes in each field, and these profiles can vary widely. Figure 6b shows Norway's publication profile compared to the Barometer countries and the world average, based on publications from 2023. The indicator used is the so-called "relative specialisation index", which is an expression of whether a country has a higher or lower proportion of publications in a particular field compared to what is the average for the whole world, normalised to 0.

Figure 6b Relative specialisation index for select countries (Barometer countries). 2023.



Source: NIFU. Data: Web of Science

Relative specialisation index (RSI)

The indicator is an expression of whether a country has a higher or lower proportion of publications in a particular field compared to the average for all countries, where RSI = 0. This means that it characterises the internal balance between the disciplines, but the index does not say anything about production in absolute terms. If the RSI > 0, it indicates a relative, positive specialisation (in the form of scientific publication) in the field in question. Note that the total score for a country will be 0. The disciplines are very different in size, which is important to be aware of when interpreting the results.

The figure shows that the Barometer countries have a specialisation profile that deviates considerably from the international average. At the same time, they are relatively similar, which is perhaps not so surprising, since the countries were originally selected because they had many similarities with Norway. Broadly speaking, the Barometer countries have a high relative activity in the social sciences, health sciences and clinical medicine. Conversely, we find a low relative activity in areas such as chemistry, materials science and engineering.

In the case of Norway, there is a strong specialisation in geosciences and biology, considerably stronger than in the other Barometer countries. A sharp increase in the geosciences' share of Norwegian articles is the most significant change in our professional profile since the beginning of the 1970s. This is partly related to Norway's emergence as an oil nation, but also to later investments in climate research, among other things. Norway also has a lot of research, measured in relative publication volume, in social sciences, psychology and health sciences (this includes public health and nursing sciences).

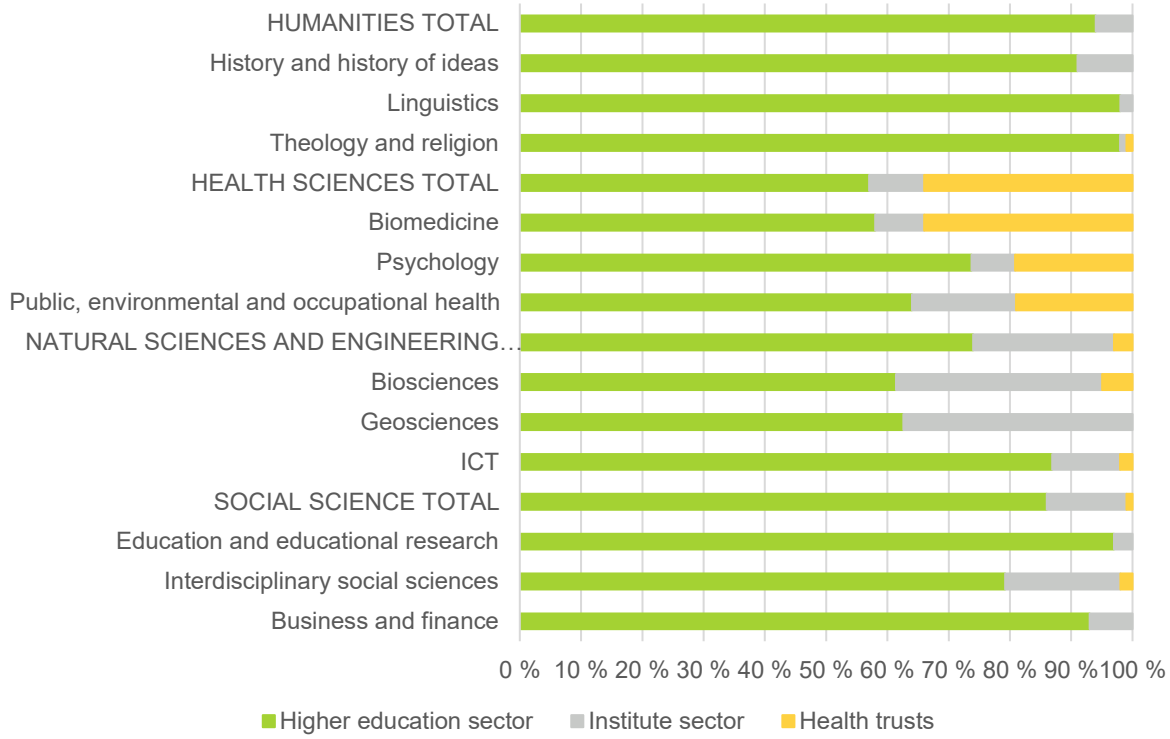
Norway has particularly few publications in chemistry and materials science, and a moderately negative specialisation in physics, engineering, mathematics, informatics and information science, as well as biomedicine and molecular life sciences. When it comes to clinical medicine, which is by far the largest field in terms of publication volume, Norway is in line with the world average. The same applies to agriculture, fisheries and forestry. Although Norway has a positive specialisation in fishery, this is offset by relatively less publication in agriculture and forestry.

In the Norwegian registry for scientific journals, series and publishers (“Kanalregisteret”), all publication channels are classified as belonging to one of four scientific areas and 73 fields. This provides a basis for calculating the volume of publications in different fields. Figure 6c shows how the different R&D performing sectors contributed to the publication in select fields in 2023. The analysis includes only scientific publications registered in the national Cristin database and therefore does not include publications from the industrial sector.

The higher education sector accounts for the largest share of Norwegian research publication in all fields

The higher education sector accounts for by far the largest share of Norwegian research publication in all fields. In humanities universities and university colleges account for as much as 94 per cent of publishing. But the sector is the largest also in the other areas. The institute sector plays a significant role in publishing outside the humanities, and particularly in natural sciences and engineering where the sector accounts for 23 per cent of publishing. Within the fields of geo- and biosciences, the institute sector accounts for more than a third of Norwegian publishing. For obvious reasons health trusts mostly contribute within health sciences, and in particular to the field of biomedicine, but also significantly to psychology and public, environmental and occupational health.

Figure 6c Scientific publication in Norway by area and largest fields. Relative share of publications (publication points[16]) by sector. 2023. Per cent.



Source: NIFU. Data: Cristin

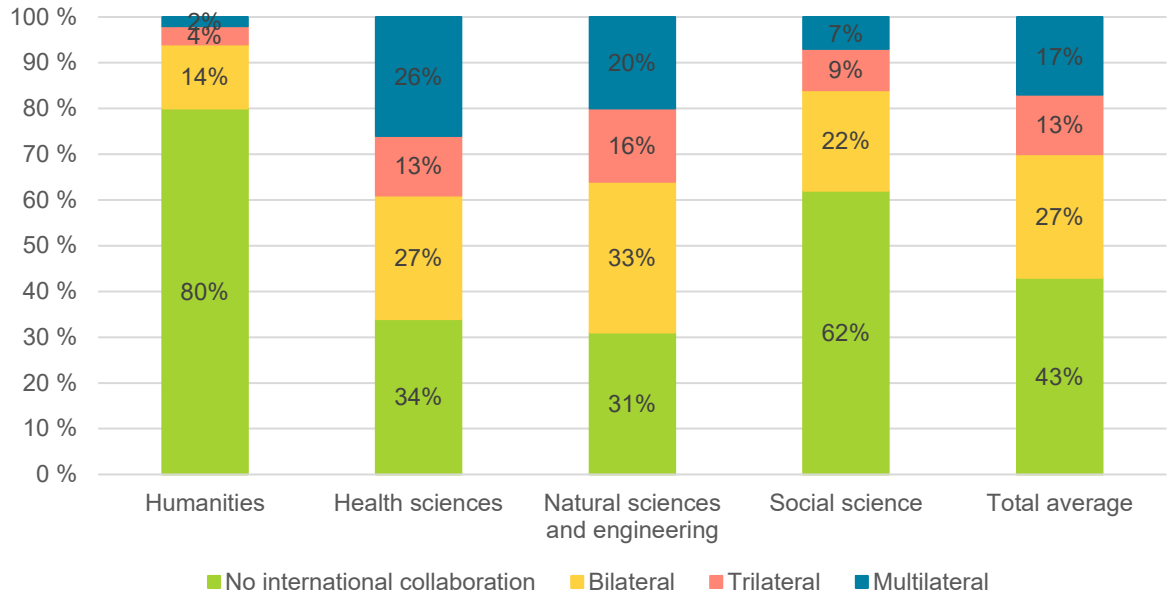
An established method for examining scientific collaboration is to study author affiliations on scientific publications. These types of studies can provide information about development, scope and patterns of collaborations. Globally the trend has been towards increasing international collaboration, and Norway is no exception. During the period 2011–2023, the proportion of publications with foreign co-authorship increased from 40 per cent to 57 per cent for (all subject areas combined).

There are, however, marked differences between scientific fields. In 2023 69 per cent of all Norwegian publications within the natural sciences and engineering involved international collaboration whereas the share was only 20 per cent within the humanities. The other fields fall somewhere between those extremes, but share the trend towards increasing international collaboration over time.

Another difference between fields is the type of collaborations that are common, from small bilaterial collaborations between one Norwegian and one foreign researcher, to large multilateral projects involving numerous researchers from many countries. Figure 6d shows how Norwegian publications differed with respect to types of collaboration in each field. Within the humanities and social science most publications don't involve any kind of international collaboration whereas within both the natural sciences and engineering and the health sciences about two thirds of all publications are results of international collaborations, half of which involve more than one international collaborator. In total, most collaborations involve researchers from the US, UK and Sweden, but this also varies by field.

[16] Publication points is a weighted indicator that takes into account author shares, type of publication, international co-authorship and the level of the journal/publication channel.

Figure 6d Norwegian publications by type of international collaboration. 2023. Per cent.



Source: NIFU. Data: Cristin

Chapter 7: Innovation in Norway and Europe

Innovation in the Norwegian industrial sector

Statistics Norway conducts the Norwegian Innovation Survey (Innovation in the business enterprise sector – SSB) every two years. The most recent survey was conducted in 2023 and covers the period 2020-2022.

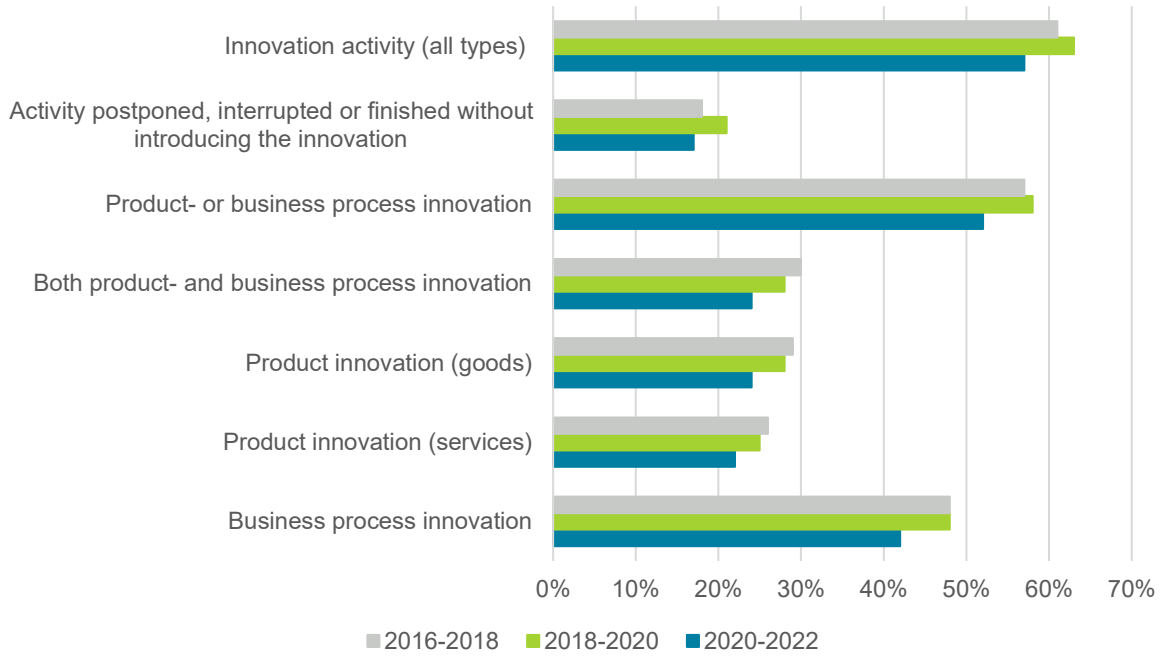
The survey on innovation in the industrial sector measures two main types of innovation: in products, goods or services, and in business processes. In addition, the survey collects information on the structure of the enterprises' innovation activities and on the perceived framework conditions for innovation.

The main criterion for something to be considered an innovation in the survey is that it is new to the enterprise or intended to significantly improve or change its characteristics. An innovation must have been put into use in the enterprise or introduced into the enterprise's market. It is not a requirement that an innovation must be new as such or new to the market. Nor does it have to be developed by the company itself.

After several years of unforeseen economic events such as the COVID-19 pandemic, both in Norway and in the global economy, the share of Norwegian enterprises that introduced innovations or carried out innovation activity decreased somewhat in the last survey compared to the two previous surveys.

For the period 2020–2022, the share of enterprises with innovation activity was 57 per cent. This is a reduction of 6 percentage points, from 63 per cent, compared to the period 2018–2020. The share of enterprises with product innovations or innovation in business processes has decreased by the same amount, from 58 to 52 per cent. In more detail, 24 per cent of the enterprises had product innovation in goods, 22 per cent had product innovation in services, while 42 per cent of the enterprises had innovation in business processes.

Figure 7a Innovation activity by type. 2016–2018, 2018–2020 and 2020–2022. Per cent of enterprises.



Source: Statistics Norway

Marked increase in innovation investments in 2022

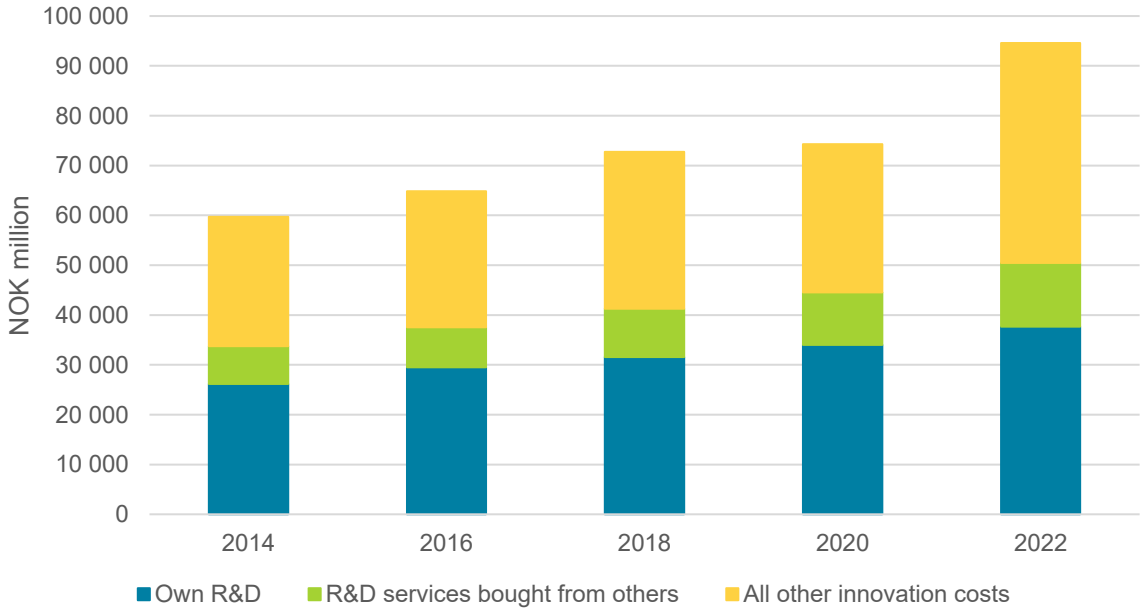
In 2022, the total innovation investments (innovation costs) for the Norwegian industrial sector were estimated at about NOK 94.6 billion. This is a marked increase of 27 per cent since the previous survey, which provided figures from the first "pandemic year" of 2020.

Almost NOK 38 billion was spent on the sector's own research and development work whereas it invested nearly NOK 13 billion in the purchase of R&D services from others. The category all other innovation costs amounted to NOK 44 billion, of which just over NOK 20 billion was personnel costs for innovation with. a total of more than NOK 21 billion in operating equipment and capital goods for use in the innovation activities.

This increase may seem dramatic, but a breakdown shows an increase in the vast majority of industries. At the same time, there are large variations, from very high increases to marked reductions, but this is not unexpected. Seen as a whole, the 2022 figures are close to, albeit above, the trend from all surveys after 2012, with the 2020 survey as the deviation.

Perhaps relevant, may be that the authorities dramatically increased their support to the business sector during the pandemic years. One hypothesis is that parts of the industrial sector found new opportunities during the pandemic and invested to meet these. Other parts of the business sector may have been protected from negative economic effects in the short term, while at the same time being prevented from participating in some of their normal activities. This may also have contributed to increased innovation investments in order to "fill the time" and thus be better equipped when returning to a normal situation. In addition, many of the industries that were hardest and most directly negatively affected by the pandemic were not among the most innovation-intensive in terms of investments.

Figure 7b Total innovation investments by cost type. 2014-2022. NOK million.

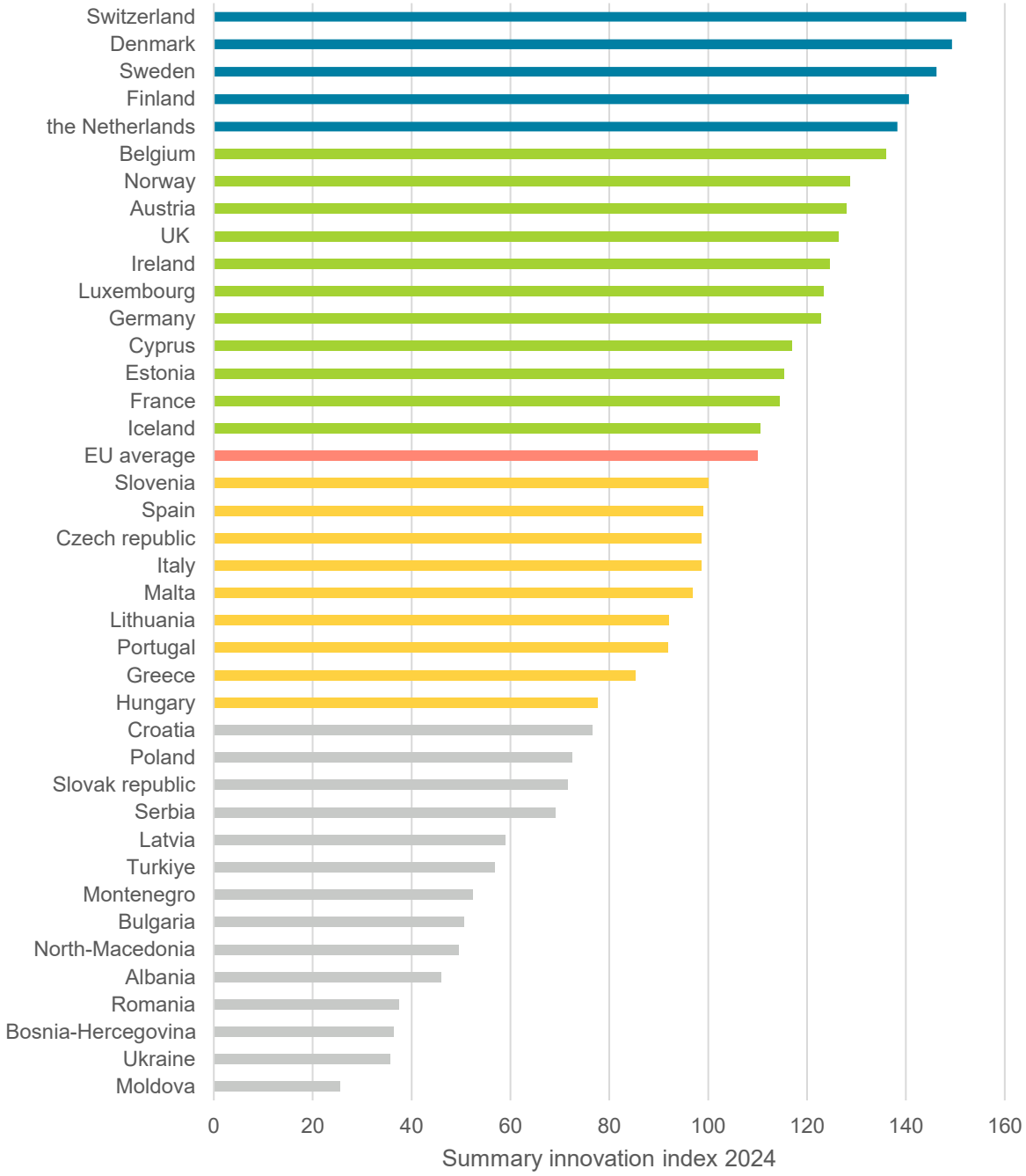


Source: Statistics Norway

Norway in the group of strong innovators

Every year, the European Commission publishes an overview of key indicators related to innovation capacity in the so-called European Innovation Scoreboard (EIS) (European Commission: Directorate-General for Research and Innovation, 2024). The purpose is for individual countries to be able to assess relative strengths and weaknesses in their national innovation systems.

Figure 7c European Innovation Scoreboard (EIS) country ranking by summary innovation index. 2024.



Source: European Innovation Score Board 2024

In 2024, the report covers EU member states as well as 12 other European countries, of which Norway is one. A ranking based on the EIS aggregate index of all EU countries, Norway and several

other non-EU countries is presented in Figure 7c and shows Norway ranked as number 7. This places Norway in the group of strong innovators, the second highest group. As recently as 2016 Norway ranked below the EU average and then in the group of so-called moderate innovators. So seen over time, Norway has improved noticeably in this ranking. The improvement is particularly due to a positive development in the indicators for international scientific co-publication and risk capital expenditure.

Norway's strengths and weaknesses

As in 2022 and 2023, it is still linkages, innovators, attractive research systems and human resources that are highlighted as Norway's comparative advantages. Within linkages, it is the indicators for innovative small and medium-sized enterprises (SMEs) collaborating with others, and especially public-private co-publications, that pull the dimension score up in relation to the EU. The attractive research systems dimension has increased somewhat over the past year due partly to an improvement in the indicator for international scientific co-publications. The human resources dimension has also had a slight positive development over the past year. This was particularly driven by the indicator for lifelong learning. Norway also scores significantly higher than the EU average in the dimension for innovators, even though it remains unchanged since 2023. In particular, Norway's share of SMEs introducing product innovations contributes to the high score, relative to the EU.

Looking at the relative weaknesses, we still find the lowest scores in sales impacts, intellectual assets and firm investments. Much of this can be related to the Norwegian industry structure. For the indicators related to sales impacts, Norway scored zero in 2024 on exports of medium- and high-tech goods and far below the EU average also on sales of new-to-market and new-to-firm innovations. Within intellectual assets, Norway scores much lower than the EU average, especially when it comes to design applications. For firm investments, the lowest score is on R&D expenditure in the business sector. This indicator also fell by 12 percentage points in 2024.

Figure 7d Norway's score on the European Innovation Scoreboard compared to EU. Dimension and summary index and dimensions. EU average = 100. 2024.

Source: European Innovation Score Board 2024

R&D and innovation statistics

Contributors to science and technology indicators for Norway

Norwegian R&D statistics are based on the guidelines of the 7th edition of the OECD Frascati Manual from 2015. Innovation studies were first introduced in the 1990s, and the range of innovation indicators has been considerably extended following the revision of the Oslo Manual in 2018.

This report draws on measurements and indicators with a long history and time series. Statistics on resources devoted to research and experimental development (R&D) in Norway, in terms of expenditure, full-time equivalents and personnel, have been compiled since 1963.

The production of STI statistics has been distributed across different parts of Norway's statistical system. The official statistical agency, Statistics Norway, is a key pillar. The agency produces R&D and innovation statistics, conducts evaluations and research, and provides access to data (Research and innovation – SSB).

NIFU is another major actor in S&T studies. NIFU has produced R&D statistics for the government and higher education sector since the 1960s and is also involved in evaluations and research projects covering education, innovation and research studies. Statistics Norway and NIFU have collaborated in reporting R&D statistics to Eurostat and the OECD.

Sikt – Norwegian Agency for Shared Services in Education and Research – is a public administrative body under the Ministry of Education and Research. Sikt offers access to administrative data on research and the higher education sector, students, publications and research results from Cristin (Current Research Information System in Norway) / the Norwegian Research Information Repository (NVA).

The Norwegian Directorate for Higher Education and Skills (HK-dir.) was established in 2021 and is subordinate to the Ministry of Education and Research. The Directorate has an overall, national responsibility for administrative tasks within higher education, higher vocational education and competence policy and gives advice to the ministry, implements the policy and coordinates the tools.

Data sources

Much of the data presented in this report comes from Statistics Norway and is available on their website. Below are links to some key data tables where you will find the latest figures.

- Table 13869: Total R&D expenditure, by source of funding and sector of performance.
- Table 13513: Funding of R&D expenditure in the higher education sector, by field of R&D and type of cost (NOK million).
- Table 13516: Funding of R&D expenditure in the institute sector. Current expenditure, by field of R&D and type of institute.
- Table 13870: Basic research, applied research and experimental development, by sector.
- Table 13509: R&D expenditure, by sector of performance and type of cost.
- Table 13520: R&D personnel (head count), by sex and sector of performance.
- Table 13511: R&D full-time equivalents (FTE), by sector of performance.
- Table 13711: Thematic and technology areas of R&D. Current costs, by sector and research area (NOK million) 2017 – 2023.

Exchange rates

- 2022 Year average 1 US dollar = 9,6 Norwegian kroner

- 2023 Year average 1 US dollar = 10,6 Norwegian kroner
- 2024 Year average 1 US dollar = 10,7 Norwegian kroner
- 2022 Year average 1 Euro = 10,1 Norwegian kroner
- 2023 Year average 1 Euro = 11,4 Norwegian kroner
- 2024 Year average 1 Euro = 11,6 Norwegian kroner

Source: Norges Bank

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