Research in Norway

NORWEGIAN MINISTRY
OF EDUCATION AND RESEARCH

research in norway

Research satisfies the unending human curiosity, opens up new avenues for economic and social activities, and improves future well-being. We need a strong and lasting commitment from government, industry and society at large if we are to reap the rewards that research can deliver.

The Norwegian government aims to strengthen its investment in research and development. Key goals for research policy will be to support ground-breaking and high quality research, to develop world-leading research capabilities, to foster innovation in industry, and to stimulate increased investments in research and development in businesses.

Research is international in nature, and international flows of knowledge have always been the norm in science. The Government is commited to increasing the internationalisation of Norwegian research, both for strengthening Norwegian competitiveness and for gaining access to a large international knowledge base. To further enhance the quality of Norwegian research, international cooperation must become an integral part of the average workday of more Norwegian researchers.

Norway aims to occupy a strong position internationally in terms of new technology, skills and knowledge. In several areas Norway can offer unique competence and research opportunities. Our strengths are largely related to the country's geography, economic specialisation patterns and institutional characteristics:

A challenging topography has impelled leading research within fields such as oceanography, satellite communication and polar research.

The exploitation of natural resources has had a profound impact on our innovation and research profile. Hence Norway has strong research traditions within marine and maritime research, petroleum research and energy research in general. More recently, special priority is given to research related to renewable energy, and carbon capture and storage.

I hope that this brochure will give you an impression of Norwegian research and research policy.

Torbjørn Røe Isaksen
Minister of Education and Research

investing in talents

Sufficient and qualified researchers are a prerequisite for attaining a leading position on the international research arena. In Norway, 33 percent of the population aged 15 to 64 have a tertiary education, and there are ten researchers per thousand total employment, which is considerably above the EU average.

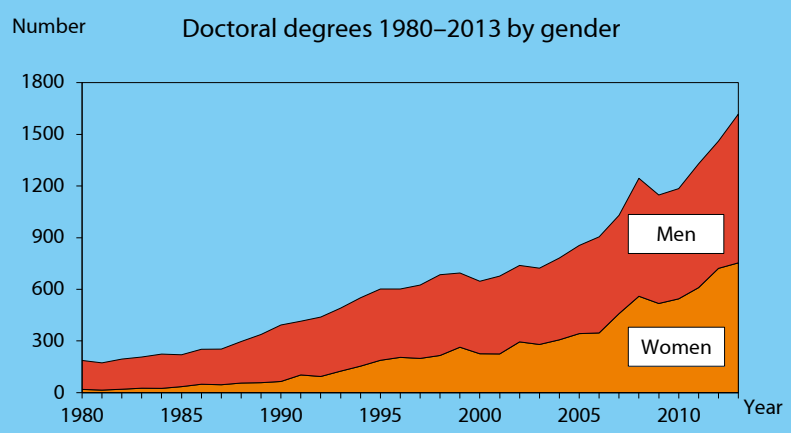
Mobility of researchers across borders is of paramount importance for developing and maintaining word-class research. There is a need to increase mobility not only across Europe, but also between Europe and other regions of the world. Norway can offer strong research communities and favourable conditions in a number of areas, and would like to attract ambitious and qualified researchers from all parts of the world. The Government promotes internationalisation of Norwegian research institutions and enterprises, and the inward and outward mobility of researchers is encouraged. The Government has steadily increased the number of PhD-positions and there is a marked increase in PhD-positions filled by foreign candidates. In Norway, most PhD-candidates are employed by their institutions. They enjoy job security and social security benefits, as well as internationally competitive wages.

The Government gives high priority to international research cooperation. Since 1994 Norway participates with full rights and obligations in the EU Framework Programmes. Bilateral agreements are also important to facilitate international research cooperation. As of 2013, the Norwegian government has entered into agreements on cooperation in science and technology with Japan, the United States, France, India, China and South Africa.

Attracting foreign researchers and increasing recruitment to research demands access to high-quality research centres and advanced infrastructure. A Centres of Excellence (CoE) programme was launched in 2002. Today 21 centres from a variety of disciplines and institutions have achieved the status of CoE. Through the CoE programme, outstanding research groups receive long-term funding to engage in world-class basic research.

The CoEs receive annual grants from the Research Council of Norway averaging NOK 16 million for a maximum of ten years. In addition host institutions cover a considerable proportion of the CoEs' expenditures. The main criterion for selecting the Centres of Excellence is scientific quality, as judged by international standards. The programme has so far proved successful in pooling resources, linking national institutions, and not least developing extensive international links. The centres have attracted a great number of top qualified researchers from abroad, and some of the centres have placed themselves as central nodes in larger international networks.

A number of international scientific prizes are awarded in Norway. The Abel Prize for mathematics has been awarded annually since 2003, and the Holberg Prize for arts and humanities, social sciences, law and theology since 2004. The Kavli Prizes for astrophysics, nanoscience and neuroscience are a partnership between the Ministry of Education and Research, the Norwegian Academy of Science and Letters and the Kavli Foundation, and have been awarded every second year since 2008.



Source: NIFU: The Doctoral Degree Register
Value for 2013 estimated based on the first six months

The Norwegian Centres of Excellence

Centre for Arctic Gas Hydrate, Environment and Climate
Centre for Autonomous Marine Operations and Systems
Centre for Biodiversity Dynamics
Center for Biomedical Computing
Centre for Cancer Biomarkers
Centre for Cancer Biomedicine
Centre for Earth Evolution and Dynamics
Centre for Ecological and Evolutionary Synthesis
Centre for Environmental Radioactivity
Centre for the Study of Equality, Social Organization, and Performance
Centre for Geobiology
Centre for Immune Regulation
Centre for Intervention Science in Maternal and Child Health
Centre for the Study of the Legitimate Roles of the Judiciary in the Global Order
Norwegian Centre for Mental Disorders Research
Centre for the Study of Mind in Nature
Centre for Molecular Inflammation Research
Centre for Multilingualism in Society across the Lifespan
Centre for Neural Computation
Birkeland Centre for Space Science
Centre for Theoretical and Computational Chemistry

The Kavli Institute for Systems Neuroscience and the Centre for Neural Computation

The Kavli Institute for Systems Neuroscience coexists with the Centre for Neural Computation (CNC) at the Norwegian University of Science and Technology. The goal of the Kavli Institute is to understand the emergence of brain functions, and the fundamental mechanisms of neural computation.

The centre was established in 2002 as the Centre for the Biology of Memory as part of the Centres of Excellence (CoE) programme. In 2007 the Kavli Foundation awarded the centre status as the fourth Kavli Institute of neuroscience. In 2013, it was again awarded CoE status as the Centre for Neural Computation.

The institute and the centre are headed by professors Edvard and May-Britt Moser. Together with the other principal investigators they are both international leaders in their fields. Researchers associated with the institute have been honored with numerous awards, and have received multiple grants from the European Research Council.

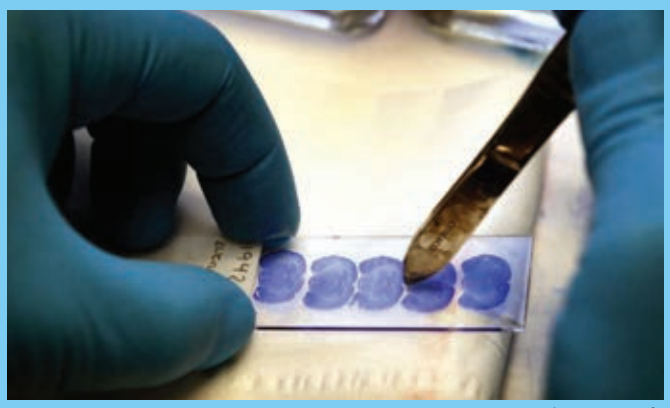


Photo: NTNU Info

energy /environment

As a major energy nation, Norway has a particular responsibility to ensure an adequate energy supply and to develop knowledge and technology for efficient and sustainable energy systems. Norway is among the world's leading nations in petroleum and hydropower competence. In addition, Norway has vigorous research communities in the field of environment and climate research.

Despite extensive recovery of petroleum resources during the past 30 years, the petroleum industry still represents a large potential for future value creation. Research and technological innovation, combined with strict environmental regulations and other policy instruments, are needed to make the environmental impact of the exploration and production of oil and gas as small as possible.

Although petroleum is important to the Norwegian economy, the Government has a very strong focus on research on renewable energy and environment-related technologies. Since 2008, and the ambitious parliamentary agreement on Norway's climate policy, the expenditures on research, development and demonstration on renewable energy sources and energy efficiency have increased significantly.

A large part of the research has been perfomed in the Centres for Environment-Friendly Energy Research (FME). The first eight FME centres were established in 2009, with a focus on renewable energy, raising energy efficiency, energy planning, and carbon capture and storage. Three new centres were established in 2011 in the field of social science-related energy research. The centres each receive NOK 8–10 million annually for a five-year period, with the potential for a three-year extension.

Photo: Norsk Polarinstitutt, Inger Lise Næss

Svalbard – a unique research environment

The natural environment on Svalbard, unique facilities provided at a high latitude, coupled with the advanced research infrastructure established on the island, makes this a leading location for arctic and environmental research. The Norwegian government sees Svalbard as a central platform for international research collaboration. India, Germany, Great Britain, France, Italy, Japan, China, Russia, Poland and South Korea have all set up permanent research stations on the island, most of them in Ny-Ålesund. Longyearbyen accommodates advanced research infrastructure, among others the European Incoherent Scatter Scientific Association (EISCAT) and the Kjell Henriksen auroral observatory. The University Centre in Svalbard (UNIS) is located in Longyearbyen. UNIS provides university level education in arctic studies for students from all over the world. UNIS also carries out high quality research and is an important element in the Svalbard society. UNIS is the core of the Svalbard Science Centre, which also incorporates other professional and scientific institutions. Svalbard has been linked with the rest of the digital world through a fiber-optic cable since January 2004. Ny-Ålesund will be linked to this in 2014.

Norway has taken a clear initiative in order to develop and coordinate the research infrastructure on Svalbard further. In this, an important aspect will be to improve the access for scientists to infrastructure and scientific data.

research and value creation

Norway is a country with many opportunities. An open economy, a highly educated population and rich natural resources have all contributed to a society with high levels of income and well-being. With growth in line with the historical average and low unemployment, the current status of the Norwegian economy differs markedly from that of many of our trading partners.

The oil revenues put Norway in a favourable position when compared to many other countries. Nonetheless, welfare and living conditions in Norway are over time primarily determined by developments in the rest of the economy. The Government will re-inforce its commitment to industry-oriented research and innovation to support the value creation in all parts of the Norwegian economy. It is the Government's goal that Norway should be one of the most innovative countries in Europe.

Rapid technological advances in emerging technology areas such as ICT, biotechnology and genomics, material science and nanotechnology are drivers behind new waves of transformative research and technological developments in various sectors, including the environment, natural resources, the life sciences, transportation and advanced manufacturing. Norway has established strategic large scale research programmes in these fields. ICT has already a strong position in Norwegian business R&D, accounting for around 45 percent of Norwegian industry's R&D expenditures in 2011.

Norway has internationally leading competence in a number of areas, both in universities, in the research institutes and in industry. Norway has a solid institutional framework and generous public measures for supporting private R&D. Interaction between research and industry is promoted through various programmes, inter alia through a number of measures managed by the Research Council of Norway. Norway also looks abroad to foster knowledge and to promote the exchange of ideas. The Government seeks to promote cooperation between national research and innovation and foreign companies, research institutions and scientists.

Some initiatives in place are:

- An Industrial PhD programme was launched in 2008 to enhance cooperation and mobility between research and industry. The doctoral candidates have supervisors from both the degree-conferring institutions and the companies where they are employed, and the company receives a grant of 50 per cent of the rates for doctoral research fellowships for a three-year period.

- Centres for Research-Based Innovation (SFI) have been established to enhance the innovative capability of the business sector by forging alliances between research-intensive enterprises and prominent research groups in long-term research projects. The programme was introduced in 2006, and 21 SFI centres have now been established. The centres are co-funded by corporate partners, host institutions and the Research Council of Norway. Corporate partners participate actively in centre governance and research. The primary criteria for selection are scientific quality and the potential for innovation and value creation.

- Norwegian Centres of Expertise (NCE) is a programme aimed at specialised business clusters in order to promote internationally competitive businesses and industrial centres. The programme was launched in 2006, and 12 clusters have been given NCE status. The programme supports long-term development processes in the clusters based on collaboration between industry, research institutions and the public sector.

- An R&D tax incentive has been in place since 2002. All enterprises that are subject to taxation in Norway are eligible for a tax deduction for expenses in projects that qualify as R&D. The programme, called *Skattefunn,* is built around a generous rate of tax subsidy combined with a defined ceiling for eligible R&D expenditure. The tax credit that exceeds the amount the business is liable to pay in tax is paid in cash. An evaluation of the programme found that *Skattefunn* contributes to increased private investment in R&D and that the additionality is high. *Skattefunn* is the largest R&D support programme for businesses, with estimated tax expenditures of NOK 1.5 billion in 2013.

- The main programme for competitive R&D grants to businesses, BIA, is operated by The Research Council of Norway. Grants from this programme are allotted on the basis of potential for value creation and R&D project quality, without restrictions on the research topic or the industrial sector.

MabCent – Centre for Marine Bioactives and Drug Discovery

MabCent is one of the Norwegian Centres for Research-Based Innovation, and is hosted by the University of Tromsø – the Arctic University of Norway. The centre covers the pipeline from biology of marine resources and species, through screening and research on bioactive compounds, to commercialisation of drugs and biotechnological and nutraceutical products.

The marine arctic environment offers unique prospects for finding novel bioactive compounds that can be used in medicines or for other purposes. The conditions in the arctic waters, with a combination of low temperatures and varying levels of light, salt and nutrients, constitute a rare marine environment. The organisms living under these conditions often have far better chemical defence systems than humans, which may help in combating viruses, bacteria and parasites and discover cures yet unknown to man. MabCent also aims for commercialisation of its research, and has several corporate partners in the international pharmaceutical industry.

norwegian research policy – the research system

Research is a crucial part of our society and culture, and much of our future value creation and well-being depend on the fruits of the scientific endeavour. The realisation of the knowledge society is an important objective for the Government.

In order to attain the highly diverse set of goals that research is expected to fulfil, research policy is designed with the overarching aims of achieving high quality research, a well-functioning research system, a high degree of internationalisation in research, and effective use of research resources and results. In addition five strategic objectives have been formulated for national research policy, as shown in the figure above.

National R&D strategies have been developed for the technology areas of biotechnology, nanotechnology and ICT. A range of sectorial research and innovation strategies have been initiated the last ten years, formulated by committees appointed by the Government and with representatives from businesses, research institutions and public administration. Sectors where such strategies have been drawn up so far are oil and gas, alternative energy, climate research, maritime, oceans, construction and health and care. About 30 percent of all public R&D funding in Norway is channelled through the Research Council of Norway, which receives funding from all the ministries. The Research Council identifies strategic research areas, allocates research funds and evaluates research within all fields and disciplines. The Council is the principal research policy adviser to the ministries, and acts as a meeting-place and network builder for Norwegian research.

Higher education institutions

About 30 per cent of all R&D in Norway is carried out in higher education institutions. The higher education institutions have considerable autonomy in managing and organising their activities. Two thirds of the R&D expenditures in the sector are funded over the ordinary budgets of the institutions (which have a performance-based component). Of external sources of funding, the Research Council of Norway is the most important, funding around 18 per cent of the R&D in the sector. Other sources of funding are government ministries, businesses, private non-profit organisations and funds from abroad (mainly the European Commission). There has been a substantial increase in research expenditure in the higher education sector during the last ten years.

Most of the R&D-performing institutions in the higher education sector in Norway are public institutions. There are 8 universities (all public), 9 specialised university institutions (3 private), 22 public university colleges, and 30 private university colleges (only a few with R&D).

The largest higher education institutions in terms of R&D are the University of Oslo, the Norwegian University of Science and Technology in Trondheim, the University of Bergen, the University of Tromsø – The Arctic University and the Norwegian University of Life Sciences at Ås. These five insitutions accounted for nearly two thirds of the R&D expenditures in the higher education sector in 2011.

Research institutes

More than 20 per cent of Norwegian R&D is carried out in the research institute sector. The sector is diverse in terms of R&D activity, research topics and the size of the institutes. Norwegian research institutes serve a wide range of clients, including public administration and the industrial sector.

The variety of customers also reflects the range of subject areas in the sector. Technology is the dominant area with around one third of the sector's total R&D. A large number of institutes specialising in social sciences provide research relevant for social development and for government policies. Natural sciences and agricultural sciences are the dominant fields of science in the environmental institutes and the primary industry institutes respectively. Around two thirds of the R&D performed in the research institute sector is publicly funded, and funding from industry makes up around 20 per cent of the total. Around 10 percent of the funding comes from abroad. A considerable part of this funding comes from the European Commission, and some institutions get a significant source of income from abroad by performing R&D for foreign companies. Norway is also home to the SINTEF Group, the largest research organisation in Scandinavia (see box).

University hospitals and health trusts

The largest field of science in Norway is medicine and health sciences, accounting for one fourth of the R&D performed in the higher education and government sectors. A large part of this R&D takes place in the health trusts: university hospitals and other health institutions. Research is one of four primary activities in Norwegian hospitals that are established by law. R&D in medicine and health sciences has increased substantially during the last ten years, and the health trusts accounted for around seven per cent of domestic R&D in 2011.

SINTEF Group

The SINTEF Group is the largest independent research organisation in Scandinavia, with approximately 2100 employees. The SINTEF foundation was established in 1950. In the 1970s SINTEF grew rapidly due to the demands for technology in the emerging Norwegian petroleum industry. Important laboratories such as the Ocean Basin Laboratory and the Multiphase Laboratory saw the light of day during this period. In the 1980s the SINTEF Group was founded. Today the SINTEF Group consists of several research institutes: SINTEF ICT, SINTEF Building and Infrastructure, MARINTEK, SINTEF Materials and Chemistry, SINTEF Energy Research, SINTEF Petroleum Research and SINTEF Technology and Society. The SINTEF Group has offices in Norway and abroad, with headquarters in Trondheim. The SINTEF Group is active on an international level, with clients in around 60 countries and international contracts making up 16 per cent of the turnover in 2010. SINTEF's employees represent 68 different countries.

The Norwegian foreign missions and Innovation Norway

Norway has around 100 foreign missions, which together with Innovation Norway promote cooperation between foreign and Norwegian enterprises and institutions involved in research and innovation. Research envoys are stationed at the Norwegian embassies in Bejing, Moscow, New Delhi and Washington D.C. and the Mission of Norway to the EU in Brussels.

Relevant links:

The Norwegian ministries www.government.no
The Research Council of Norway www.rcn.no
Innovation Norway www.innovationnorway.no

Higher Education

The Norwegian Association of Higher Education Institutions www.uhr.no
The Norwegian Centre for International Cooperation in Education (SIU) www.siu.no/english
NOKUT – the Norwegian Agency for Quality Assurance in Education www.nokut.no/en
University of Oslo www.uio.no/english
Norwegian University of Science and Technology www.ntnu.no/english
University of Bergen www.uib.no/en
University of Tromsø – The Arctic University www.uit.no/english
Norwegian University of Life Sciences www.umb.no/english
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