



The Research Council of Norway

Highlights from 2003



Research leads to breakthroughs in knowledge

The results of research are long-term by nature and are often unpredictable. Research is not always founded on expectations of concrete results, but on the basis that it is essential to enable us to understand, participate in and contribute to knowledge generation at international level. This is particularly important for Norway, given that Norwegian research activity comprises only a small proportion of the world's overall research efforts. In order for Norwegian researchers to be able to utilise the knowledge gained internationally, however, Norway must maintain a research standard that is high enough to make us interesting as partners for research groups working at the cutting edge of the global knowledge front. It is therefore gratifying to note that the quality of Norwegian research has shown positive developments in the past few years.

Research leads to breakthroughs in knowledge that enable us to better understand social phenomena and the natural environment of which we are a part. Biotechnology and information technology are good examples of this. This report provides various examples of breakthroughs or new products from the Research Council's 2003 project portfolio. Each of these projects is based on research carried out by trade and industry, research institutes, universities or colleges. The Research Council is committed to ensuring that there is a constructive framework underlying the efforts of all participants in the research establishment, and works actively to promote high-quality research.

In this light, we are pleased indeed that the Research Council's budget grew by no less than 18 per cent in 2003; at the same time, however, it is unfortunate that the growth in the budgets

of Norwegian universities and colleges was only minor, and that funding for industrial research remains far too inadequate.

In 2003, the organisation of the Research Council was restructured, resulting in the establishment of a new Executive Board and three division Boards. The Council now has three research divisions and greater attention is being focused on specific user groups. This transformation made 2003 a very exciting and challenging year. Our next goal is to enhance the cohesiveness, accessibility and efficiency of the Research Council. It is our hope that this process will help to foster better-quality research and more widespread application of the results of research activity.



PHOTO: JON SOLBERG

Geir Stene-Larsen

Geir Stene-Larsen
Chairman of the Executive Board of
the Research Council of Norway

Improved funding for research

It is a stated political objective that Norwegian investment in research and development (R&D) shall meet the average level of the member states of the OECD (Organisation for Economic Cooperation and Development) in terms of percentage GDP.

In 2003, the Research Council's allocations from government ministries and the Fund for Research and Innovation came to NOK 4.1 billion. Total funding for Norwegian research in the national budget rose by NOK 750 million in 2003. Most of this increase went to the Research Council, whose budget increased by 18 per cent compared to 2002.

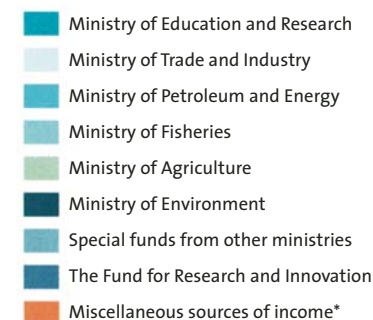
The fact remains, however, that this amount is less than the budget proposal submitted by the Research Council in 2003.

The Fund for Research and Innovation

The Fund for Research and Innovation was set up in 1999 as a supplement to ordinary funding via the national research budget. After the adoption of the revised budget for 2003, the Fund's capital expanded to NOK 31.8 billion. The yield for 2003 amounted to NOK 793 million, of which two-thirds (NOK 528.8 million) were allocated to the Research Council.

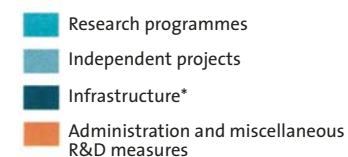
Some NOK 155 million of this sum was used to finance the Centres of Excellence, which in turn triggered the allocation of approximately twice as much funding from the centre's host institutions and partners. Fund revenues were also used to finance the large-scale FUGE (Functional Genomics in Norway) programme, long-term basic research in general, as well as research in the stipulated priority areas of information and communications technology, medicine and public health, marine science, and research in the interface between energy and environmental issues.

Total income 2003:
Allocations from government ministries (general and special funds) and other income (MNOK):



Total: NOK 4 060 million
* including administration, but excluding special contracts for ministries and independent advisory bodies funded through the Research Council.

Expenditures 2003:
Research Council's programmes and administration (MNOK)



Total: NOK 4 060 million
* basic research, strategic programmes, scientific equipment

Quality in Norwegian research

Raising the quality of Norwegian research is one of the Research Council's most important long-term goals. The establishment of the Centres of Excellence is one of several measures adopted to achieve this aim. In 2003, the Outstanding Young Investigators (YFF) scheme was also launched.

Large-scale programmes

The concept of quality is also fundamental to the seven large-scale programmes that were either initiated or continued in 2003: FUGE (the National Programme for Research in Functional Genomics in Norway), NORKLIMA (Climate Change and Consequences for Norway), RENERGI (Clean Energy), HAVBRUK (Aquaculture and Production of Aquatic Organisms), PETROMAKS (Programme for the Optimal Management of Petroleum Reserves) and NANOMAT (Nanotechnology and New Materials). The ICT programme VERDIKT (Core Competence and Growth) will be launched in 2004.



PHOTO: RUNE PETTER NÆSS, NTNU INFO

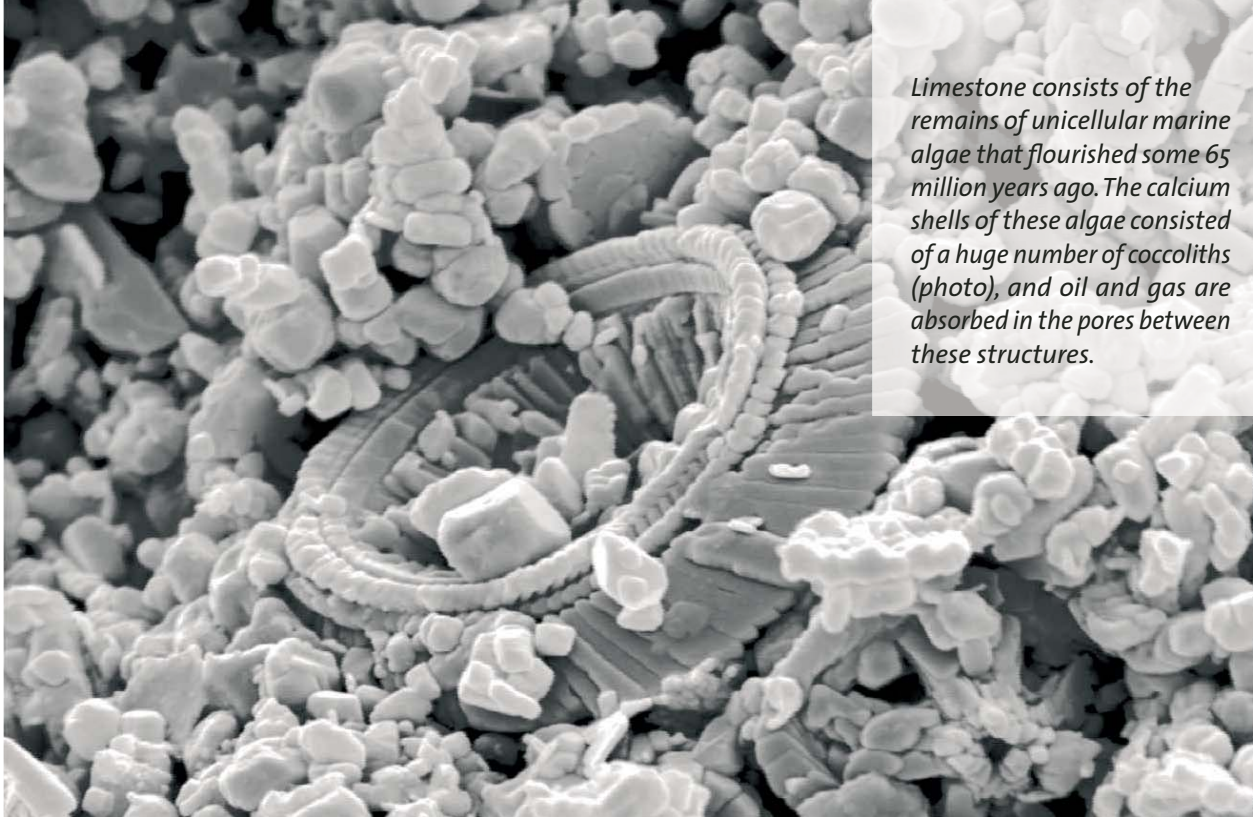


PHOTO: HIS

Limestone consists of the remains of unicellular marine algae that flourished some 65 million years ago. The calcium shells of these algae consisted of a huge number of coccoliths (photo), and oil and gas are absorbed in the pores between these structures.

Centres of Excellence

In 2003, Norway established 13 Centres of Excellence (CoEs) with Research Council funding. The CoE scheme represents a long-term, concerted effort designed to enhance the quality of Norwegian research in a wide range of disciplines.

The CoEs have rapidly become fully operational, currently employing a total of 480 full-time equivalents on an overall budget of close to NOK 500 million. They have emerged as an attractive workplace for Norwegian and international researchers alike. Approximately one third of the activity of the Centres is performed by researchers from abroad.

Kristin Clemet, Minister of Education and Research, attended the launch of the three Centres of Excellence in Trondheim.

WATER IN LIMESTONE RESERVOIRS: FRIEND OR FOE?

Utvinning av olje og gass byr på en mengde Oil and gas recovery presents a range of challenges that can only be met via research. For example, it has been shown that pumping water into a limestone reservoir in order to force out more oil or gas may weaken the limestone rock, causing the reservoir to collapse. This can create problems for installations that are resting on the seabed (the Ekofisk field sank by six or seven metres during production in the 1980s) or make it more difficult to pump out oil and gas. On the other hand, a collapse may help to force out a larger proportion of the oil in the reservoir.

Scientists at Stavanger University are studying these mechanisms in detail in order to be better able to predict how an oil or gas reservoir will react during petroleum recovery, water injection or other types of activity.

TRADE REDUCES LIKELIHOOD OF WAR

Institutt for fredsforskning (PRIO) har, The International Peace Research Institute in Oslo (PRIO) has been collaborating with the Department of Peace and Conflict Research at Uppsala University, Sweden in drawing up a new set of data on armed conflicts since the Second World War. The data have been published on the Internet (www.prio.no/cwp/armedconflict) and are already being used by researchers all over the world. In the course of its own efforts to apply this data, PRIO has documented that trade reduces the likelihood of armed conflict, both between and within states. The data also indicate that distribution of income has little bearing on the risk of an outbreak of civil war in a country, unless the differences coincide with ethnic or religious divisions.



PHOTO: TRYGVE BØLSTAD, SAM FOTO

According to PRIO, trade reduces the risk of outbreaks of armed conflict.

CAMPYLOBACTER IN CHICKENS

Campylobacter bacteria flourish in the intestinal tract of broiler chickens and are the most frequent cause of bacterial-caused stomach ailments in the Western world. The prevalence of these bacteria is rising in Norway and other Western countries. In collaboration with the Norwegian Food Research Institute and Genpoint, Prior Norge has developed a new method of directly detecting and quantifying bacteria in chicken flocks. The method cuts the time needed for analysis from two days to five hours. The method has been evaluated and is now being routinely employed to help companies to monitor and reduce the spread of infection in production plants as well as to prevent the spread of disease to humans.

Core activities in 2003

Growth in recruitment

Both the Storting (Norwegian national assembly) and the Government have stated that recruitment to Norwegian research needs strengthening, particularly in subjects in which the average researcher age is so high that there will be an urgent need for replacements within a few years. More funding for post-doctoral fellowships is an important recruitment measure that also helps to enhance quality, promotes the internationalisation and renewal of Norwegian research, and makes it possible to retain good researchers within the research community until they find more permanent positions.

In 2003 the Research Council increased the number of post-doctoral positions available by 35 per cent and financed 1368 doctoral degree fellowships.

International cooperation

The Research Council encourages, guides and provides financial support to Norwegian researchers who wish to cooperate actively with international research groups. The 2003 report "Research mobility to Norway" concluded that high quality is the most significant factor in attracting overseas research staff to Norway, for example to the Centres of Excellence.

Norway is an active participant in the EU's 6th Framework Programme, which has a financial framework of NOK 130 billion. Norwegian researchers have reaped substantial benefits from the funding distributed via the Programme. In 2003, as much as 8 per cent of research proposals included a Norwegian partner, and Norwegian

groups participated in 11 per cent of all funded projects. Areas of greatest success include aviation and space technology, food safety and global climate change, as well as the ERA-NET, in which Norway is a member of 11 projects.

SkatteFUNN

SkatteFUNN is a tax deduction scheme for companies that perform research and development (R&D) and pay taxes in Norway. The scheme has become increasingly popular, and some 4770 applications were received in 2003. SkatteFUNN (www.skattefunn.no) is thus Norway's largest-scale policy instrument for financing industrial R&D.

Since January 2002, companies have been able to deduct one fifth of their R&D expenditure from their tax bills. By mid-2004 the scheme had generated R&D projects to a value of more than NOK 20 billion for the period extending to 2006.

SMALL COUNTRIES DO WELL IN THE EU

The greater influence of the large countries in the EU is to some degree compensated for by the EU's own institutions. According to a report drawn up by the ARENA Programme, these institutions will ensure that smaller countries remain able to influence policy even after the signing of an EU Constitution. However, the future development of the EU will pose challenges to Norway, which has not taken part in the process of drawing up the constitution, and has thus missed out on a number of ongoing learning processes in Europe. The ARENA Programme (1993–2003) (www.arena.uio.no) was a multidisciplinary basic research programme on Europe, and focused primarily on how the EU affects the most important functions and institutions of the nation state.

SVALBARD TELLS US ABOUT LIFE ON MARS

In summer 2003 the Arctic Mars Analogue Svalbard Expedition (AMASE) studied interactions between water, rock and microbes in volcanoes and hot springs on Spitzbergen. The results of the studies will be used to develop strategies and instruments for demonstrating the existence of life on Mars.

The Sverrefjell volcano is the only site on Earth known to contain carbonate-based minerals similar to those found in the Mars meteorite ALH84001. Analysis of samples from the volcano indicate that such minerals have been formed from water at low temperatures. The very first life forms on Earth probably arose as a result of interactions between rocks and lukewarm water, and microbes in the Sverrefjell samples may provide us with important information about potential life forms on Mars. The project is affiliated to the CoE Physics of Geological Processes at the University of Oslo.

GREEN AND GLOSSY CHRISTMAS TREES FROM CLONED PLANTS

Oppland Skogselskap is developing Christmas tree production (spruce and alpine fir) based on artificial embryonic plants, or somatic embryos. The young plants need to be raised in a liquid medium. The main aims of this project are to mass-produce high-quality clones for forestry and Christmas-tree production, increase productivity and reduce costs, so that selected clones can be produced economically.

Scientists from the CoE "Physics of Geological Processes" (University of Oslo) and NASA climbing the Sverrefjell volcano on Spitsbergen.



PHOTO: AMASE

General goals and key figures

The Research Council's strategy for the period until 2010 sets out five general goals:

- Enhanced quality in research
- Increased research for innovation
- Expanded dialogue between research and society
- Increased internationalisation of Norwegian research
- Do more to foster talent

Objectives for the Research Council as an organisation have also been drawn up, and can be found at www.rcn.no.

Key figures for Norwegian research

- In 2002, Norway spent NOK 25.5 billion on R&D. About 15 per cent of this was channelled through the Research Council of Norway.
- The industrial sector funded 52 per cent of total R&D expenditures.
- Some 46 000 people are employed in the Norwegian R&D sector.
- The Research Council's budget for 2003 was NOK 4.3 billion, which was utilised as follows:

- NOK 1.5 billion to research institutes
- NOK 1.7 billion to institutions of higher education
- NOK 0.5 billion to trade and industry
- NOK 0.6 billion to other sectors.



PHOTO: TORE WUTTUDAL/NN/SAMFOTO

The salmon is one of several species with life cycles that alternate between freshwater and seawater, and which are liable to be attacked by the salmon louse.

COMBATING THE SALMON LOUSE

The growing aquaculture industry has contributed to the spread of the salmon louse parasite in populations of salmon, sea-trout and Arctic char. Recent breeding trials at AKVAFORSK have shown that there is a wide range of genetic variation in resistance to salmon lice, and that resistance can be improved by systematic breeding. In the long term, this will reduce the need to treat fish for salmon lice, improving fish health and reducing infestation. Other experiments at the Institute of Marine Research have shown that it should be possible to develop a vaccine against salmon lice, but it is still too early to say whether the method involved can be used for commercial vaccine production.

GREENHOUSE ON WHEELS MAKES THE GRASS GROW GREENER

The Rogaland company Mobilt Drivhus AS has developed a mobile lighting rig that can give new life to worn grass surfaces on sports grounds, reducing the need to replace them at regular intervals. The Manchester City and Swansea football clubs each bought a unit at the end of last year, and Newcastle, Arsenal, Chelsea, Manchester United, Everton, Bolton and Benfica have all shown an interest. The company joined the SkatteFUNN scheme in 2003.

ENDOCRINE DISRUPTIONS AND TESTICULAR CANCER

There is both epidemiological and experimental evidence that the basis for testicular cancer is established in utero, and that exposure to oestrogenic compounds is a risk factor. Research at the Department of Gynaecology and Obstetrics at the Rikshospitalet University Hospital has shown that the mycotoxin zearalenone, which is a naturally occurring oestrogen produced by fungi, can cross the placenta barrier during a period when foetal germ cells are believed to be particularly sensitive to the subsequent development of testicular cancer. This mycotoxin is found in grain, rice and some vegetables, and is produced when the plant is "distressed", for example as a result of extensive use of fertiliser. Fungi may also produce mycotoxins in crops during storage. In vitro studies in mice fetuses have shown that oestrogens may affect a growth-regulatory system in primordial germ cells that is often involved in the development of cancer. This supports the hypothesis that exposure to oestrogen mimics in the womb may be a critical factor in the later development of testicular cancer.

Major changes in the Research Council

In 2003 the Research Council of Norway underwent a series of major changes as a result of an evaluation process completed in 2001. The Executive Board and administration have put a major effort in 2003 into developing the organisation in the direction of the central aims that were formulated in connection with the evaluation: raising the quality of Norwegian research, strengthening basic and innovation-oriented research, and transforming the Research Council into an even better organisation.

In January 2003, the Research Council's new Executive Board was in position. On 1 September the Research Council launched its new organisational structure, with two administrative divisions: Administration and Communication, and three research divisions:

The primary task of the Division for Science is to support the development of basic research in all subjects and disciplines as well as the development of inter- and multidisciplinary research. The Division seeks to encourage professional renewal and advance new scientific findings, and strives to enhance the overall conditions for Norwegian research.

The Division for Strategic Priorities works to identify and evaluate national strategic research needs and enhance knowledge and research capacity in priority areas. The Division is responsible for operationalising overall research policy initiatives in cooperation with the public sector, the research community and trade and industry.

The new Large-scale Programmes initiative is based in this Division.

The Division for Innovation serves as an important partner for industry and the public sector in research, development and innovation. The Division will be a key strategic and operational player in efforts to promote innovation, and will implement policy instruments designed to stimulate innovation capacity. The Division will also work to convert research results into commercial activity.

More information about 2003 can be found in the Research Council's Annual Report (www.rcn.no > The Research Council > Annual reports).

ADOLESCENT GANGS ARE NOT AN IMMIGRANT PHENOMENON

Mediene presenterer ofte innvandrergjenThe media often present immigrant gangs, masculinity and violence as a new and foreign element in Norwegian culture. According to research carried out under the Programme on Welfare Research, however, such gangs were not introduced by immigrants, but have actually existed in Norway for a long time. People who grew up in the 1950s speak of serious street fights between gangs in which sticks, knives, bows and arrows and even firearms were used, but these clashes were rarely mentioned in the media.

A project about the meeting between the welfare society and youth gangs carried out at the Norwegian Institute for Urban and Regional Research has generated new insight into the inner life of violent gangs, and their relationships and confrontations with other gangs and society at large. Among other aspects, the project observed that processes that generate hostile images,

Violent adolescent circles are not a recent phenomenon in Norway, but also existed in the fifties, for instance.

spirals of revenge and escalation of violence are independent of ethnic background, and that the processes found in Oslo, Kristiansand, Drammen and Stavanger are similar to one another.

THE FAMILY DOCTOR REFORM HAS RESULTED IN BETTER MEDICAL COVERAGE

Two national questionnaire studies carried out in 2000 and 2003 by University of Tromsø researchers indicate that Norwegians have become more satisfied with their access to doctors and with the waiting time for appointments since the family doctor reform was introduced. The best results have been achieved in medium-sized municipalities.

With regard to the quality of consultations and treatment, the studies showed only a slight improvement in ratings. Satisfaction with the availability of emergency room services has remained unchanged.

Another result of the family doctor reform is that fewer people switch doctors. This may be due to a combination of the fact that doctors are staying for longer periods in their positions with the fact that people are more satisfied with the availability of their present doctor.

PHOTO: STEIN J. BJØRGE, AFTENPOSTEN/SCANPIX



The Research Council of Norway serves as an advisory body on questions of research policy, administers some NOK 4 billion a year for research activities and provides a meeting place and networking opportunities for participants in the research system.

The Research Council identifies priority areas of research, distributes research funding and evaluates ongoing research. The Council acts as the government's principal advisor on all issues relating to research policy.