

## STEERING AND FUNDING OF RESEARCH INSTITUTIONS

### COUNTRY REPORT: NORWAY (JULY 2002)

#### Introduction

This report on the research system of Norway draws on the Norwegian response to the project questionnaire, and on data gathered during a visit to Norwegian institutions and agencies in Oslo in November 2001. The visit was organised by the Norwegian representative on the project working party.<sup>1</sup>

The present goals of the Norwegian research system are outlined, followed by a brief overview of the system. The main body of the paper comprises a review of significant current research policies and practices.

#### Goals of the Norwegian research system

Norway has set itself the goal of reaching the average OECD level of investment in R&D by 2005. In 1999, NOK 20.3 billion were spent on R&D, amounting to 1.7% of GDP, against an OECD average of 2.18%. In 1999, financing from industry accounted for 49% of total R&D expenditure, while public financing accounted for 42% (7% from abroad, 2% other sources). Escalation in research expenditure is to be achieved through increased public investments in the National Budget, partly through the recently established Research and Innovation Fund, and also through stimulating greater private sector investment in R&D.

A key priority is to strengthen the science system through increased funding of long-term and fundamental research. In addition, priority is given to research in four thematic areas where Norway faces major challenges: marine research; information and communication technology; medicine and health care; environmental and energy research.

It is intended to strengthen the higher education and institute sectors through: rewarding quality; upgrading and renewing equipment; increasing the recruitment of researchers; intensifying efforts to achieve equality of opportunity.

Important recent government goal-setting initiatives are the *White Paper on Higher Education 2000 – 2001* (KUF, 2001b) flagging wide-ranging reforms in higher education, and the *White Paper on Research at the beginning of a new era* (KUF, 1999), dealing with priority areas.

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1. Details of the schedule of visits and meetings are given in the Annexe.

## **Overview of the Norwegian research system**

The Norwegian research system serves a geographically large country with a small but well distributed population. Research is performed in higher education institutions, the public research institutes and in industry. In 1979 R&D expenditure in each sector was approximately one third each, but by 1999, the balance had shifted markedly in favour of industry and away from the institute sector. While higher education expenditure remained relatively stable at just below 30 %, industrial R&D rose from 34 to 47%, and the institute sector fell from 36% to 25%. But by both OECD and Nordic standards, Norwegian industrial R&D percentage still remains relatively low (see further below).

R&D performing units tend to be relatively small in Norway, restricting capacity to undertake resource intensive R&D. More than 85% of industry R&D units spent less than NOK 10 million each on R&D in 1999, with small units prevalent also in the institute sector (42 institutes spent less than NOK 10 million each in 1999). Universities, by contrast, all spent more than NOK 100 million in 1999 (with two spending more than NOK 1 billion), making them the largest R&D units.

Norway has a relatively high public expenditure on R&D (42%, compared to an OECD average of 30%). In 1999, 50% of public funding for research went directly to the higher education sector, 22% went directly to the institute sector, and 24% to Research Council of Norway (RCN). Of this 24%, RCN distributed 54% to the institute sector, and 37% to higher education.

### ***Higher education sector***

Norway has four universities, each in different regions of the country (Oslo, Bergen, Trondheim, Tromsø), and six specialised university institutions. These are engaged in both teaching and research, offer first and second degree courses and doctoral programs. Together these institutions undertake 90% of the higher education research and offer most research degrees. The 26 state university colleges tend to have relatively short and vocationally oriented courses by comparison with universities. The colleges have an important regional access role in Norwegian higher education. Some colleges offer second degrees, and four grant doctorates in several fields. University colleges engage in research and development work, although to a more limited extent than the universities. Higher education institutions receive their base funding through the UFD. Competitive research funds and strategic university and college funding are available through the Research Council of Norway. The heads of all higher education institutions participate in the Norwegian Council for Higher Education, recently amalgamated across the binary divide, which plays an important consultative role with UFD for the sector.

### ***Public research institute sector***

Norway has a significant public research institute sector, comprising a considerable number of relatively small separate institutes. However, the 16 largest institutes (with over one hundred full time equivalent research staff) accounted for 60% of total R&D FTE in 1999. The large majority of the sixty institutes which receive public funding (*i.e.* those which meet the criterion of more than 50% activity in R&D) are independent of government, taking the form either of foundations or of joint-stock/ limited companies. Through the RCN they receive as separate allocations their base funding (of between 5 – 25% depending on their research category), strategic institutes funding (to strengthen the institute's knowledge base) and program and project funding. This group of institutes in 1999 accounted for 82% of the total R&D expenditure of the institute sector. Overall, institute activity declined by 1.9% between 1997 and 1999. 61% of total R&D expenditure in the institute sector came from public sources, including RCN. About one third of expenditure in Norwegian research institutes is in non-integrated research institutes classified as part of the business enterprise sector.

## ***Industry Research***

In Norway, the business enterprise sector funds less than 50% of R&D, which is considerably lower than the 62% average for this sector among OECD countries as a whole, including in the other Nordic countries, with which Norway compares itself. The biggest R&D industrial performers are in manufacturing and mining, and in the service industries. Of total industry R&D, 2 % was on basic research, 22% on applied, and 76% on developmental work. Considerable variation exists in R&D performance within industries, with only some 16% of firms engaging in R&D activities in 1999. R&D is undertaken disproportionately by the larger firms – 59% of all intramural industrial R&D being in firms with at least 200 employees, and only 18% in firms with fewer than 50 employees in 1999. However, in those cases where smaller firms were engaged in R&D, they showed a higher R&D intensity than in the larger firms with regard to the R&D spent per employee. Norwegian industry has a dominance of small and middle-sized enterprises, relatively few of which are regularly engaged in R&D.

## ***Parliament and Government***

The *Storting*, or Parliament is the body where research policy decisions and directions are ultimately taken. The three *standing committees of parliament* which deal most directly with R&D policy issues are: Education and Research; Business and Industry; Energy and the Environment. These committees review ministry budgets as part of the annual budget debate, and on an ad hoc basis review reports to parliament on research matters.

Norway operates what it describes as a ‘sectoral approach’ to research, meaning that each ministry is responsible for promoting and funding research activities within its own area. The Ministry of Education and Research (UFD) is the ministry charged with co-ordinating Norway’s research policy across the government. The Research Minister chairs the *Government’s Research Board*, which includes ministers with the largest research budgets and meets three to four times a year, associated with the budget cycle – more frequently when significant matters need clarification. Research is said to be high on the current agenda. Meetings of the *Inter-Ministerial Research Forum for Government Officials*, convened by UFD, tend to be more ad hoc and technical in focus, but its permanent sub-group meets regularly, for example every six weeks for the one responsible for the Research Council Norway. UFD is the dominant ministry with regard to research: its research budget is virtually 50% of the total government budget for research; it provides base funding for institutions in the higher education sector, has policy responsibility for the RCN and funds part of its budget. Ministry research budgets for 2001 are:

Education, Research and Church Affairs	(NOK 4 802 million)
Trade and Industry	(NOK 1 908 million)
Health and Social Affairs	(NOK 648 million)
Defence	(NOK 487 million)
Fisheries	(NOK 471 million)
Environment	(NOK 381 million)
Agriculture	(NOK 379 million)
Foreign Affairs	(NOK 371 million)
Petroleum and energy	(NOK 282 million)
Transport and Communications	(NOK 162 million)
Culture	(NOK 63 million)
Finance	(NOK 59 million)
Children and family	(NOK 37 million)
Justice	(NOK 18 million)

Each ministry contributes to the budget of the Research Council of Norway (RCN).<sup>2</sup>

Prior to government level decisions on areas of research policy, advice is sought in different ways, including from: national review commissions (*e.g.* Hervik and Mjoes Commissions, both discussed below); the Research Council Norway (*e.g.* in relation to priority areas); external commissioned evaluations (*e.g.* the recent review of the Research Council Norway, see below). Research reports may stimulate policy action (*e.g.* NIFU study of recruitment, discussed below). Widespread consultation, evaluation and a search for consensus can be seen as hallmarks of the process of Norwegian policy making – it is a country with a relatively small population, and within particular communities of activity, people tend to be known to each other.

### ***Research Council of Norway***

RCN was created in 1993 from the consolidation of five pre-existing research councils. Among research councils internationally, it is unusual in the scope of its responsibilities, dealing with all fields of research, and with all types of research from basic to applied; providing core funding to the public institute sector, and strategic and project funding to both the higher education and the institute sector. In addition, it has an important advisory role to government on research matters. RCN's structure includes six thematically designated divisions which fund different fields of research activity: bio-production and processing; industry and energy; culture and society; medicine and health; environment and development; science and technology. The Executive Board appoints a Research Board for each research division, which in turn appoint Program, Peer Review and Expert Committees relevant to their fields of concern.

RCN manages nearly one third of public sector research funding (NOK 3 billion in 2001). Most RCN funds are distributed through competitive means, using peer review of applications. Funding is allocated to: research programs; independent projects; infrastructure; grants and fellowships. RCN negotiates its budget annually with each of its funding ministries, which generally allocate funds for designated purposes. Ministry of Trade and Industry is the largest contributor. The RCN thus plays a dominant role in public research funding in Norway. A major external review of the Research Council, commissioned by government, was completed in December 2001. In May 2002, the Government announced its decision to

2. In 2002, a number of ministries were reorganised, so that now: Social Affairs and Health was split into two separate departments; Church Affairs was moved to Culture, hence, ministries of: Education and Research, and Culture and Church Affairs.

maintain the model of a single research council, and it will present the overall principles for ‘the new research council’ to Parliament in October 2002 in connection with the Government’s budget proposal for 2003. Aspects of the review are discussed in more detail in later sections.

## **Review of policies and practices**

In this section, seven areas of research policy and practice are addressed:

- Increasing the overall funding available to research.
- Putting available research funds to best use.
- Directing research effort to priority areas.
- Improving the research performing capability of institutions.
- Evaluation structures and processes for institutions.
- Making the best provision for future supply of quality researchers.
- Strengthening the international links of Norwegian research.

### ***Increasing the overall funding available to research***

Within the context of Norway’s goal of increasing its R&D to OECD levels (measured as % GDP) by 2005, increasing the overall funding available to research is important. Achieving this goal, however, is complicated by the fact that GDP growth in Norway is very strongly influenced by increasing oil and gas prices, and estimates of the absolute sum required by 2005 for increased R&D diverge considerably (from NOK 5 billion (1999 White Paper) to NOK 12 billion (current RCN estimate).) Four policy areas are relevant: the development of a significant new fund dedicated to support research; shifting the balance within higher education institutional funding to foster increased research activity; encouraging greater R&D within enterprises; increasing the allocation from ministries for research activity.

### ***Research and Innovation Fund***

In 1999 Norway introduced a new element into national research funding in the form of a government endowed fund, whose annual yield supports national research priorities. The government’s intent in establishing the Research and Innovation Fund (mooted in the 1999 Research White Paper) was to provide stable and long-term public financing of research, particularly for multidisciplinary research which cuts across sectors. The Fund’s yield is intended to supplement rather than to replace existing research funding arrangements.

The Fund’s capital, which is being built up by the sale of state shares, currently stands at NOK 13 billion, providing at present an annual yield of NOK 525 million. The intent is to increase the capital to NOK 15 billion by 2005. The capital is placed with the Central Bank of Norway (*Norges Bank*) and interest is equivalent to the interest on government bonds at the time the capital is placed. The yield for each year is posted as income in the national budget, so that while an endowment exists, its income is treated as part of the normal annual budget cycle. The yield becomes part of the annual funding of the

Ministry of Education and Research, and decisions on how the yield is to be used are taken internally within that ministry, following national priorities.

In its first two years (2000 and 2001), the whole yield was allocated to the Research Council of Norway to support basic research in general and basic research within the four national thematic priorities. In 2002, one third (NOK 175 million) was channeled directly to higher education institutions (earmarked for scientific equipment and recruitment posts), and two thirds (NOK 350 million) to the RCN (to establish a Centre of Excellence scheme, the Functional genomics (FUGE) scheme, and the balance to continue support for national research priorities). Funding to the FUGE project (NOK 100 million p.a.) was earmarked by parliament.

Thus this is a substantial new addition to the overall Norwegian research budget, and, given good management, should provide an important, dependable and perpetual source of research funding. When seen from outside Norway, however, a hovering question is whether this model of an endowment fund, integrally tied to the fabric of the annual government budgetary cycle, provides sufficient independence to ensure the long term allocation of the Fund's yield for research, were political priorities to change. Were there independent trustees, and publicly accessible guidelines for how the funds are to be distributed, more confidence may be felt that over the longer term, fund monies will indeed continue to be used for dedicated research. Perhaps present arrangements are sufficiently robust within the Norwegian context, and anxieties unnecessary. Maybe alternative arrangements would not have been politically feasible.

#### *Research component within general university funding*

Until recently, increases of the base funding for higher education institutions received via UFD (accounting for some 70% of the institution's R&D expenditure), was related primarily to student numbers. Two particular difficulties have emerged for research. First, although the 1990s saw an increase in the total number of students in higher education, the increase was mainly in private institutions and university colleges. At universities, student numbers dropped by some 7% between 1996 and 1999 (although differentially by field of study), so that overall base funding has dropped in line with teaching needs, but with no reference to research needs. Secondly, an expectation has arisen within universities that monies should be spent for those areas which have effectively generated the income for the university; but the greater numbers of students are in the humanities and social sciences, areas where the direct costs of research are generally relatively modest (data bases, libraries etc notwithstanding).

A new funding model, said to be widely supported within the higher education community, has been developed and is being introduced during 2002 marking a significant departure from the above pattern. The new model has a specific component for research, and is discussed further below.

#### *Increasing enterprise based research*

Although Norway has a higher than average **public** contribution to research, it is the level of **private** contribution which needs to be significantly augmented if the target of the escalation plan is to be achieved by 2005. The Hervik Commission, established by the Ministry of Trade and Industry in co-operation with the Ministries of Finance and the then Education, Research and Church Affairs, was asked to consider policy measures that could stimulate an increase in private investment in R&D. Its report proposed additional public funding for certain types of R&D projects, with the majority arguing this should be given as a tax credit, and the minority as direct financial support.

In July 2001 the Stoltenberg Government launched the FUNN arrangement of direct financial support for industry-based R&D projects. It was a user-led program whereby firms were partially funded through the

RCN (using funding from the Ministry of Trade and Industry) to buy research from universities and institutes for accredited firm-based research activities. This program was designed to be administratively simple, have a short response time, and to encourage collaboration between small and medium-sized firms and R&D institutions, particularly in regional areas. In the view of one large public research institute, the program was successful in its aim of increasing enterprise support for research, although it favoured established businesses able to plan research activities over an extended timeline. The FUNN program, however, has been short-lived as Parliament, during the debate on the revised budget of 2001 following a change of government, requested a proposal for general tax deductions for industrial R&D investment – an indirect scheme in line with the majority of the Hervik Commission.

In the National Budget for 2002, the Bondevik II Government plans to replace the FUNN arrangement with a tax incentive scheme for firms with less than 100 employees which provides a 20% rebate on monies invested in R&D. The mechanisms are not yet fully worked out, and it was not possible to observe its implementation. This approach has had a chequered history in some other countries. Various difficulties with implementation of the new policy have been aired, such as the fact that it relates only to businesses employing less than 100 staff, that there is no inbuilt mechanism for verifying that the projects qualify as quality research, and that the scheme will entail considerable paperwork on the part of enterprises to qualify for what will only ever amount to 20% of the costs of the research, and be paid in arrears. Criticisms in prospect of any major change of policy are relatively common, so one must wait and observe the shape of the policy as implemented. An already observed outcome of the new policy, however, has been a significant reduction in the 2002 budget allocation for the Ministry for Trade and Industry, equal to the FUNN program budget. This translated directly into an equivalent cut in the budget of the RCN which had carriage of the program. This will obviously have a significant knock-on effect on the budget of those research organisations active in this program, and there may be an extended transitional period as the new policy comes into operation and its effects are assessed.

The Norwegian developments reflect policy debates current for some time within OECD circles over the best ways of providing public support to encourage research within enterprises. Policies need to be tailored to particular needs and circumstances, and the Norwegian context is one where there is a large proportion of small and medium-sized businesses in primary industries without a history of research activity. Remoe observes that the government's challenge is to find the appropriate mix between direct and indirect measures (Remoe, 2000). One recent interesting sectoral development is a tax on all fisheries activities to produce a fund for fisheries research. There will be considerable interest in the procedures Norway is adopting to link public and enterprise sectors in national research strategies and funding mechanisms.

#### *Increasing the research funding from ministries*

With the Norwegian arrangement of sectoral funding of research, any overall increase in research funding would involve an increase in the research allocations of each of the ministries. There was no evidence that this is happening as yet on a government-wide basis, despite the declared high priority of research. Increased research spending appears to be focused on the new fund, and on various performance related changes within UFD. As indicated, the research budget of the Ministry of Trade and Industry, the largest funder of the RCN has in fact sustained a major cut in 2002 in respect of the termination of the FUNN program. It could be that individual ministries have augmented their research budgets, but there does not appear to be a co-ordinated and significant move in this direction.

### *Putting available research funds to best use*

Whatever the level of research funding, important policy questions relate to making the best use of these funds in the Norwegian context.

#### *Research Council of Norway – review and discretionary funds*

Despite the large sums of research funding which are allocated to research performers via the RCN, in practice the Council itself has relatively little discretion over their use. The RCN each year makes separate submissions to each of its funding ministries; these are discussed with the ministries in question, who will then consider RCN overall funding in the inter-ministerial research forum. The budget process is coordinated by UFD. When RCN receives ministry funding, it is generally earmarked to specific agreed uses via defined programs – the funds from UFD being those which are reportedly the freest. Given the considerable number of funding ministries, decision-making can be a complex process. The RCN apparently does not have a significant pool of discretionary funds of its own which it can, on a continuing basis, use to experiment with, for example, on new modes of funding, or with interdisciplinary activities etc. For a short while the new Research and Innovation Fund appeared to provide discretionary scope, but part of these funds are, as already indicated, to be spent for designated purposes.

It appears that the funding ministries either do not wish to or are not able for various reasons to relinquish full control over their research funds to the RCN. Admittedly ‘control’ over funds might mean simply a broadly defined designated purpose for a given sum, but it does mean that RCN ends up with a large number of funded programs which it operates, rather than more global sums with which it can develop a more strategic research funding profile. A greater ability to use funds flexibly in supporting research (as indeed has recently been achieved by the German research council) could well be part of the new proposals put to Parliament in the autumn.

#### *Performance funding*

The new performance related funding model for higher education will come into effect during 2003. The model comprises three components: core funding (60%); teaching (25%); and research (15%). Variations may be expected from year to year and between institutions in the relationship between the three components. The teaching allocation is based on credit production, graduate completion and student exchanges.

The research allocation, which will be redistributed among institutions, is based partly on performance and partly on quality and strategic considerations. The performance related research allocation will be redistributed between universities based on degree completion specified by level, and redistributed between colleges based on credit production and external co-operation. Additional measures of performance for both types of institution include the number of posts (*e.g.* professorships) and competitive funding attracted from the EU and the RCN. The quality and strategic element is still under consideration (mid 2002), but is intended to reward research of high quality and relevance and stimulate the institutions to develop research strategies that support the national objectives.

Higher education institutions have been supportive of the introduction of this new funding scheme. It promises to be relatively complex to administer, although designed to reward institutional achievements including in research. Given the re-distributive character of the research component, the impact of changed allocations to institutions within the sector will be important to watch. Norway has been able to benefit from the experience of other countries which have moved earlier in this direction, but it is too soon to analyse its impact especially in terms of research quality.

### *Competitive grants*

Allocating competitive grants based on peer assessment of research applications is a longstanding procedure at the RCN. Thus, funding is allocated to those proposals judged to be of the best quality by the relevant research community.

RCN has the carriage of developing the new Centres of Excellence program, initiated by the Ministry in the 1999 Research White Paper. The Centres are funded from the new Research and Innovation Fund, with a yearly overall budget of NOK 140 million from 2003 onwards. Following a two stage competitive process and based on international evaluation, in June 2002 a decision was taken to negotiate contracts for 13 centres, each of which is expected to be funded for ten years. These thirteen are distributed through each of the four universities, the agricultural university and two public research institutes. Research themes include: civil war, medieval Europe, theoretical linguistics, communications systems, mathematics for applications, geohazards, geological processes, petroleum, aquaculture, biology of memory, molecular biology and neuroscience, climate, ships and ocean structures. Thus the centres include, but go beyond, the national thematic priorities.

In common with many other countries, Norway has chosen the path of developing centres of excellence as a focus for quality research. As with performance funding, it has come to this policy able to benefit from the experience of many others. Given the strong egalitarian tradition which has been a hallmark of Nordic countries, developing an orientation towards excellence takes time and careful negotiation. However, in many respects, Norway has not had to create material losers in its bid to develop centres. They are being funded with new money, not through a process of reallocating an existing pool.

As frequently happens, policies at one level have mirrors at other levels. The University of Oslo took the opportunity of the call for submissions of centres of excellence to encourage proposals from each of its departments and faculties. It had an in-house quality review of proposals, and a selection only were forwarded to the RCN. The University of Oslo, through its research committee, decided to support with university funds those proposals not making it through RCN's second round. Thus a centres of excellence policy on a smaller scale has been established internally inside one of the research performing institutions as a direct consequence of the initiation of the process at the national level.

### *Co-operation between research performers*

Synergies in research through co-operation between research performers does not seem to be a major explicit theme of Norwegian policy, although in practice there is frequently much co-operation on the ground, particularly in regional areas. As a country, Norway has a long history of localism and, now, a highly developed regional structure. Higher education institutions are well spread to service regional populations. For example, the four present universities are in: Bergen, Oslo, Tromsø, Trondheim; and two of the largest and most diversified of the colleges are at Stavanger and Kristiansand. The national network of colleges is well distributed across the country. There is a well established pattern of co-operation amongst universities including dividing responsibilities for areas of study and expertise. How this co-operation will weather the move into the more competitive funding approach, however, time will tell.

The links between higher education institutions and the institute sector are complex and often close. For example, SINTEF, the largest institute in Norway is in fact a foundation established 50 years ago by the Norwegian University of Science and Technology in Trondheim, with its main base very close to the university, and with a complex pattern of interlinkages including joint appointments. The food alliance, Matalliansen, between the Agricultural University of Norway and the Norwegian food research institute is another example.

A particular area of success for the RCN, according to its staff, has been the building of networks among institutes working in similar fields – this has been achieved through regular contacts organised by different divisions between the institutions for which they have responsibility (*e.g.* the environment institutes). The FUGE, discussed below, is a recent example of extensive national level research collaboration co-ordination by the RCN.

### ***Directing research effort to priority areas***

Several policies support the national research priorities of increasing basic research and favouring the four thematic fields. While this is a general orientation, the major policy instrument is the Research and Innovation Fund and its programs.

### ***Dedicated funds and programs***

Directing research effort to priority areas has been achieved mainly by establishing new dedicated programs, with funding only for these areas predominantly using funds from the Research and Innovation Fund. It is an approach which uses new money to encourage research in priority areas. Norway has not yet had to or has not yet decided to tackle the difficult area of redirecting existing funds or parts thereof. That may come if further prioritization is deemed desirable, or economic conditions become tighter. It appears that for the present no contingency plans are seen to be required. It is important to note that at present some 70% of higher education R&D expenditure comes from their basic funding which is not directly governed by official R&D priorities.

The present process of priority setting is by no means the first such attempt. During the 1980s, a ‘main priority areas’ process found that the need for comprises, from both outside and inside government, led to a proliferation of ‘areas’. This experience possibly gave resolve to the government to keep the number of priority areas small when in the late 90s it asked the RCN to provide a priority research list. RCN’s process included consultation with the research community, and the resultant list reflects well the particular situation and needs of Norway, without appearing to be unduly swayed by international fashion. Present priority areas, as indicated earlier, are a mixture of thematic areas and styles of research (*viz.* long-term basic research). Thematic priorities are justified: fisheries and aquaculture are major Norwegian industries; information and technology is a growing industry used by all sectors of society; strong public interest exists in medical research; utilising the abundant energy resources in Norway (oil, gas, hydro) entails environmental responsibilities.

Thematically defined priorities always leave out some areas even though creative repackaging can frequently extend the range of researchers qualifying to seek funds under given titles. The case of FUGE (functional genomics) illustrates a successful lobby which has effectively added a fifth theme, biotechnology, to Norway’s research priorities. Responding to strong interest in functional genomics within the research establishment, in November 2000 RCN hosted a meeting which appointed a national committee to prepare a national plan for functional genomics research in Norway. By the end of January 2001 the FUGE proposal was submitted to political authorities, leading to a decision to allocate 100 million NOK from the Fund to FUGE from the RCN budget for 2002. RCN’s Executive Board appointed a board to oversee FUGE, supported by an international advisory group. The project is national in scope, operating through four regional committees, each drawing on one of the universities, in collaboration with other higher education institutions, local research institutions and relevant commercial and industrial enterprises. International links, notably within the Nordic region, are planned.

Norway has had a relatively low research profile in biotechnology, and this project aims to bring Norway’s basic research disciplines underlying functional genomics up to international standards, strengthening

equipment and human resources. The success of FUGE is an example of an interactive process of policy formulation and decision making between the research and political communities, in a situation made fluid by new funding opportunities.

### ***Improving the research performing capability of institutions***

#### *Institutional autonomy and institutional status*

The process of establishing institutional autonomy is relatively well developed in Norway within the institute sector. Over the past ten years, a considerable number of public research institutions formerly attached to ministries have become foundations, meaning that they are non-profit organisations operating under their own board, employing their own staff and able to negotiate salary and conditions of employment. For various reasons the foundation is no longer the favoured form of autonomy, and a limited company is the more likely form for such a change of status today. But the impetus to move institutes into autonomy is no longer as strong as it was during the early nineties, due to considerable loosening of the operating conditions for institutes remaining part of the civil service. Such institutes are reported now to have considerable flexibility and freedom in such matters as staff appointments and salary negotiation, so that the effective operational differences are no longer so significant.

The situation is different within the higher education sector where the question of institutional status was a major theme in the wide-ranging Mjoes Commission report of 2000 (Mjoes, 2000) which preceded the White Paper on Higher Education. The majority of the Commission favoured giving higher education institutions independent legal status, but a minority report recommending significant areas of autonomy while retaining civil service status, gained the ear of the government of the day. Now, following a change in government, a bill is anticipated more in line with the majority position, giving institutions the option to choose independent legal status, or to retain civil service status.

This signals government's wish to increase institutional flexibility and freedom of action. How institutions will respond is yet to be seen. From discussions with representatives of the Norwegian Council for Higher Education, it appears that the higher education institutions themselves are divided over the issue of what sort of status they wish for, and it was suggested that perhaps only one institution, in the short run, may opt for full autonomy. While another institution wished for more freedom regarding investments, it has already worked out an arrangement whereby entrepreneurial and commercial activities are undertaken through an associated company, so the university would opt to keep its present status. One can anticipate, then, the emergence of greater diversity in institutional structures within higher education.

The binary divide between the universities and colleges appears set to remain, although it appears permeable. Some major hoops placed in the path of institutions qualifying and wishing to move into the university sector have been removed or lessened. The White Paper in March 2001 indicated that while in the Ministry's view there was no room for further universities covering a broad range of disciplines than the existing four, and that government priority was the concentration of resources and the development of dynamic academic institutions 'of a certain size'. Also, that state colleges entitled to award doctorates should be able to apply for designation as universities. Further, the research profile of the state colleges should be developed in close co-operation with working and civic life related to the courses they provide, and state colleges should become major regional innovation actors. These developments will mean an immediate, and potentially longer term increase in the number of university level institutions, with implications for research funding. Colleges qualify for a new stream of research funding through the RCN from 2002 in the form of the new Strategic College Program (SCP) (which complements existing strategic programs for institutions and universities, SIP and SUP respectively).

### *Internal institutional processes*

In line with increased opportunity for autonomy, greater flexibility within higher education institutions is being pursued. The 2001 White Paper proposed changes to both institutional governance and management. Concerning the governing board of the institution, the Ministry recommended that the rector, who chairs the institution's board, continues to be an elected position, and that the number of external board members should be increased, along with a decrease in the number of institutional staff representatives on the board. Management processes at universities are widely regarded as being opaque and in need of greater streamlining. With regard to academic management structures within the institution, the Ministry White Paper proposed that for basic units and departments, institute heads should be appointed based on broad academic experience.

While the development of research management structures was not specifically explored for this project, it was noted that the University of Oslo has centrally designated positions responsible for research and a representative committee drawn from the faculties with responsibilities for internal university-wide research policy. Also, the University's long-term plan, 2000-2004, indicates an intention to: re-evaluate the internal allocation of resources in order to give greater disciplinary concentration and develop a stronger profile; strengthen fund-raising for research; identify and support new research areas and centres of excellence within research, and engage in joint projects with external partners; reconsider the university's disciplinary organisation, including the faculty structure, in order to increase opportunities for interdisciplinary projects, synergies within research fields, and achieve greater flexibility to strengthen or reduce certain activities (UiO, n.d.).

### *Evaluation structures and processes for institutions*

Norway has for a considerable time had a systematic process of evaluation and review of various disciplinary areas of research and of institutions which forms part of forward decision-making. A government directive, the so-called 'economic regulations' regarding the economic administration of public institutions, obliges ministries to organise evaluations of major institutions under their responsibility. Both external and internal mechanisms are in use and systematic evaluation is increasingly seen as necessary for both quality and transparency purposes. When the RCN was established as a single consolidated council in 1993, it was agreed that after an initial period of time it would be evaluated by an external team. This evaluation was put in train in due course by parliament, and the external review team delivered its report in December 2001.

The University of Oslo was to be reviewed by an external team in March 2002, and as part of that process undertook an extensive internal review during 2001 (UiO, 2001). The RCN has in place a process of regular rolling reviews (on a six-year cycle) of all institutes that it funds. The principles of performance funding and of competitive funding, outlined earlier, entails well established procedures of peer review and accountability.

### *Making the best provision for a future supply of quality researchers*

#### *New degrees*

The White Paper on Higher Education (KUF 2001) proposed that a common degree structure be introduced within higher education institutions, based on a three year bachelor's degree as the first degree providing professional qualifications and entry to higher degrees. A two year master's degree, as the next step, would provide professional qualifications and admission to doctoral studies. At master's level, two types of

courses will emerge: a more theoretically oriented degree leading on to formal research training; a more practically oriented degree which does not necessarily lead on to research. This major reorganisation has the backing of the Norwegian Council for Higher Education, and by 2002 a number of institutions are beginning to introduce the system. Alongside this, the Ministry proposed the introduction of a three term academic year to enable greater flexibility in the composition of subjects, course and degrees and better utilisation of the whole academic year.

This is not the first major restructuring of degrees within Norwegian higher education. Some fifteen years ago Norwegian universities introduced the American style PhD in parallel with the traditional Norwegian doctorate (Kyvik et al, 2001). The PhD type program, based on 3-4 years of structured study and guided research, is now much the more popular of the two. Since 1970, the number of doctoral degrees awarded by Norwegian institutions has increased from approx. 100 per year to almost 700 per year. Despite this, a recent evaluation of the PhD program identified major problems, including low completion rates, high average age for doctoral students, and the need for better integration into the rest of Norwegian higher education.<sup>3</sup>

A recent government White Paper on recruitment has proposed that 1600 new positions for PhDs be established before 2007, with the aim of 1100 candidates graduating each year.<sup>4</sup> As a carrot to improving the completion rate, institutional shares of PhD positions will be linked to PhD completions.

#### *Strengthening recruitment of quality researchers*

In 1998, NIFU argued the need for new recruits for research. Its data indicated that Norway was not producing sufficient recruits either for future higher education needs or for society in general (NIFU, 1998). The proposals for increasing the number of doctorates in the higher education white paper drew on this research.

The government's present White Paper on recruitment proposes a number of changes in research and personnel policy. The aim of strengthening recruitment is seen to require stronger scientific leadership and a stronger focus on strategic thinking, with priority being given to the working conditions of researchers, as a key to improving their capacity for quality research. In addition to the proposals listed above regarding PhDs, specific proposals include:

- Improving the conditions for and the quality of research is to have priority over increasing the number of personnel.
- Combining research and teaching responsibilities for most scientific positions at universities and colleges.
- Institutions to make full use of flexibility in employment regulations and possibilities within the appointment system.

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3. As the review of PhDs, at the time of writing (July 2002) is only available in Norwegian, the statements about it are based on information communicated from UFD.

4. As the White Paper, at the time of writing (July 2002) is only available in Norwegian, the statements about it are based on information communicated from UFD.

- Strengthening scientific leadership, including the management of personnel resources and fostering high quality scientific work in research groups.
- Institutions to develop enterprising recruitment policies to attract and keep outstanding personnel.
- Institutions to arrange more favourable working conditions for recruiting women professors.
- Institutions to expand existing international agreements to attract foreign scientific personnel.

### ***Strengthening the international links of Norwegian research***

Both universities and the public research institutes participate in the EU Framework program, but the former have more latitude due to more flexible internal funding arrangements and probably also scale.<sup>5</sup> Universities are increasing their participation in EU programs by comparison to the institute sector. Without necessarily increasing, but possibly partially reallocating, overall research funding, there may be scope to explore ways in which the public research institute sector can participate in those EU framework programs which require matched funding. A structural difficulty identified by institutes is that their base funding from the RCN (between 5 – 25%) is on average considerably lower than the base funding afforded equivalent organisations in other European countries by their governments. In this situation, the institutes find it difficult to accumulate a sufficient reserve on which they can draw for participation. This point was recently underlined in an external evaluation of STEP (the Norwegian Institute of Studies in Technology, Innovation and Economic Policy), a small institute of seventeen professional staff whose core funding from the RCN remains low and uncertain (STEP, 2001). With the margins low, generally small-sized institutes, not strongly organised into large networks as in some other OECD countries, the institutes appear competitively organised for good economic times, but with little by way of reserves for more challenging times.

With the growing number of take-overs of Norwegian firms by multinationals, the question has been raised as to how much research will continue to be done within Norway itself. Looking ahead ten years or even less, this is an important concern. While the same amount of economic activity may be generated on the ground in Norway, there is no guarantee that the research associated with this activity will continue to be handled by Norwegian research organisations. Multinational owners do not have an allegiance to any particular national territory, and it seems likely that research for former Norwegian-owned firms would be placed wherever the best arrangements can be found – an issue for a considerable number of countries and not only those with relatively small populations. Norway will not necessarily suffer from this aspect of globalisation, but it will only work to the country's advantage if a strong competitive research 'industry' can be maintained with opportunities for Norwegian researchers and attention to Norwegian needs.

### **Conclusion**

There is considerable change in many aspects of publicly funded research activity in Norway at the present time. A systematic approach to change with wide acceptance of evaluation as an important element in the change process is evident. Consultative processes appear to function well.

The higher education sector is strengthening, although not necessarily at the expense of the institute sector. University research capacity is expected to continue to grow with new institutions classified as universities,

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5. Norway participates through the European Economic Area (EEA) agreement.

likely to lead to intensified research activity within these institutions and increased competition within the sector as a whole. As the higher education institutions are well distributed within the country, there could be a strengthening of the regional distribution of research activity. However, there are also forces that could lead to greater concentration and there are likely to be increased international linkages and partnerships. As the reforms in degree structures and funding mechanisms in train in the higher education sector proceed, the research performance of the university sector can be expected to strengthen further through more effective use of human and material resources, and improvements in infrastructure.

By contrast, the public research institute sector faces a number of major challenges. For those institutes closest to the industrial side, the prospect of the move to tax relief as the key mechanism to encourage firms to increase research holds out the prospect of an extended period of transition with fewer contracts. Indeed, one major institute is making a determined effort to develop self-generated reserves to ensure continuity. The lack of a cushioning reserve for a number of institutes makes their continued and future participation in European framework projects more difficult than the participation of the better (if only slightly) cushioned Norwegian universities in such projects. Thus a certain amount of repositioning may be called for among the institutes. Since most of the institutes in the sector made a successful transition to independent status during the 90s, becoming noted for innovativeness, the sector should maintain its dynamism.

With research currently high on the national agenda, and the escalation plan setting such ambitious goals, it is surprising that the main vehicles for increasing research spending, the new Fund and tax relief for firms, do not centrally involve the large number of ministries with an interest in research in augmenting their research budgets as a third plank.

The outcome of the review of the RCN is of major significance to the direction of public research in Norway, particularly of basic research. The proposals for a renewed research council anticipated in the 2002 budget process will be closely watched.

Targets to be achieved are demanding and will require continuing structural change, review of processes and results, together with attention to ways to increase flexibility in use of resources.

## **ACRONYMS**

FUGE	Functional genomics
FUNN	Scheme of direct financial support for industrial R&D operated through RCN
KUF	Ministry of Education, Research and Church Affairs (to 2001)
NIFU	Norwegian Institute for Studies in Research and Higher Education
NOK	Norwegian kroner
RCN	Research Council of Norway
STEP	Norwegian Institute of Studies in Technology, Innovation and Economic Policy
UFD	Ministry of Education and Research

### **Visit schedule – November 28-30, 2001**

#### **Ministry for Education and Research**

Karen Nossum Bie, Deputy Director General, Dept of Research  
Geir Arnulf, Deputy Director General, Dept of Research  
Morten Storseth, Higher Executive Officer, Dept of Research  
Vidar Horsfjord, Assistant Director General, Dept of Higher Education.

#### **Ministry of Trade and Industry**

Kristin Hauge – Assistant Director General

#### **Research Council of Norway (RCN)**

Kirsten Voje, Acting Director, Strategy  
Dag Kavlie, Special Advisor, Science and Technology  
Nina Gornitzka, Special Advisor, Environment and Development  
Jan-Arne Eilertsen, Senior Advisor, Culture and Society

#### **Norwegian Council for Higher Education**

Jarle Ronhovd, Assistant Director General, Norwegian Council for Higher Education  
Geir Strom, Senior Advisor, University of Bergen  
Per Dahl, Rector, Stavanger University College

**STEP Group (Norwegian Institute of Studies in Technology, Innovation and Economic Policy)**

Svend Otto Remoe, Director  
Per Koch  
Johan Hauknes

**Norwegian Institute for Studies in Research and Higher Education (NIFU)**

Randi Sogren  
Jens-Christian Smeby  
Stig Slipersaeter  
Kirsten Wille Maus

**University of Oslo**

Kari Lindbekk, Dept of Academic Affairs and Research Administration  
Kristin Dobinson  
Steinar Johannessen

**SINTEF (The Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology)**

Dag Slotfeldt-Ellingsen, Executive Vice President

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