2001
annual report

SINTEF

SINTEF's vision is technology for a better society.

We sell research-based knowledge and related services to Norwegian and international clients.

SINTEF contributes to the value-adding processes of our customers and a sustainable social development.

President Roar Arntzen outside the new building of The Norwegian Microtechnology Centre in Oslo. This is the largest single scientific commitment in the history of the SINTEF Group.

it pays to do a little research ...

Our politicians have set themselves the goal of raising the level of research funding in Norway to the average level in OECD countries by 2005. There is good reason to believe that we will not achieve this goal. The reasons are beginning to emerge; research is losing out when it is held up against other good causes such as education, health and care of the elderly.

The crux of the problem seems to be that research is regarded by politicians as a cost like any other cost. Funding for research is treated as a question of what we can afford. We are a rich country, say some people, so surely we ought to be able to do as much research as anyone else? Certainly, say others, but the budget has to be balanced, and these people do not think that we can afford it after all.

The point of industrially oriented research is to lay the foundations for the creation of value and thus for profitability. Funding for industrially oriented research is an investment from which we should expect a financial return. International studies have demonstrated that research is one of the most profitable activities in which a nation and its industry can invest. There is always the possibility of betting on the wrong research, but when one wins the results can be wonderful.

This spring, SINTEF will launch a media campaign in which we will try to present this message as clearly as possible. We will present fields as diverse as the development of multiphase technology for oil and gas transport, the problem of feedstuffs for cod aquaculture, hydrogen as the energy carrier of the future and the fantastic potential of microtechnology in virtually every area of society.

What we want to do here is to show that research is a means of creating value, and that systematic knowledge development is the way to go if we wish to create and develop a competitive edge.

Of course it pays to do a little research!

Roar Arntzen, President

The SINTEF Group is the largest independent research organisation in Scandinavia. We live by finding intelligent, profitable solutions for our clients; solutions based on research and development in technology, the natural sciences, medicine and the social sciences. At the turn of the year the SINTEF Group had 1,929 employees, who produced a turnover of NOK 1.7 billion. Contracts for industry and the public sector generate more than 90% of our income, while 7% came in the form of basic grants from the Research Council of Norway.

this is the SINTEF Group

partners in cooperation

SINTEF collaborates closely with the Norwegian University of Science and Technology (NTNU) and the University of Oslo. Personnel from NTNU work on SINTEF projects, while SINTEF staff teach at NTNU. The SINTEF-NTNU community involves the widespread joint use of laboratories and equipment. We are in the course of developing a similar programme of cooperation with the Faculty of Mathematics and Natural Sciences at the University of Oslo..

history

SINTEF was established in 1950 by the Norwegian Institute of Technology (NTH), which now forms part of NTNU. Two intentions were involved: SINTEF - the Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology – was to encourage technological and other types of industrially oriented research at the Institute. SINTEF was also to meet the need for research and development in the public and private sectors. It was established on NTH's campus in Trondheim, closely integrated with NTH's own scientific milieux. The SINTEF of today also includes the former Centre for Industrial Research (SI), which was set up in Oslo in 1949. SI was established by the Royal Norwegian Council for Scientific and Industrial Research (NTNF) as part of its long-term strategy for revitalising Norwegian industry after the Second World War. The two institutes merged in 1993, primarily in order to strengthen their overall international competitiveness.

SINTEF enjoyed its most rapid phase of growth in the 70s. This was due to the growing demand for technology in the young Norwegian petroleum industry. Together with NTH, we played a central role in building up a national expertise base for petroleum exploitation in the North Sea. Important national laboratories such as the Ocean Laboratory and the Multiphase Laboratory saw the light of day during this period.

SINTEF built up contract research units in most of the scientific disciplines taught at NTH. Our multidisciplinary profile means that the SINTEF of today is a unique institution. During the past few years, growth has been most rapid in the social sciences.

The SINTEF Group was founded in the mid-80s. As part of a comprehensive reorganisation of Norway's research institute sector, the Ship Research Institute of Norway, the Norwegian Research Institute of Electricity Supply and the Continental Shelf Institute were drawn under the SINTEF umbrella. These three institutes, all located in Trondheim, were turned into limited companies with SINTEF as the principal shareholder. A fourth research company, SINTEF Fisheries and Aquaculture, was founded in 1999.

new millennium – new challenges

Since the mid-90s, the SINTEF Group has undergone a wide-ranging process of reorganisation; a process triggered by changes in the structure of industry. Mergers and buyouts by overseas interests have led to internal restructuring and the downsizing of central research organisations in a large number of industrial companies. This changed the character of the market for contract research and thus the need for SINTEF's expertise. The market for top-level scientific competence has shrunk, while companies have become more concerned with solving major problem complexes.

We strengthened our market position by restructuring our activities from a large number of small scientific groups into 12 large market-oriented institutes. The number of administrative staff was sharply reduced, and by the end of the century SINTEF had become a "slim" and efficient organisation, whose scientific staff made up almost 70% of the total number of employees.

The reorganisation process made us more productive, but we have had problems in creating room for adequate new recruitment of staff. We recognise that an organisation that experiences a long period of stagnation is in danger of losing its creativity and its ability to recruit and keep competent staff. In our development plan for 2000 - 2003, therefore, we have set ourselves the important goal of profitable growth.

multidisciplinary knowledge packs

As a goal for the future, we have set ourselves the task of selling large "knowledge packs" based on multidisciplinary problem-solving. If we are to be attractive in the market, we must be able to customise the expertise demanded by our clients. For this reason, we place great emphasis on being solution-oriented in the way we generate knowledge.

The needs of companies, industries and society in general for integrated solutions make multidisciplinary cooperation essential. As Norway's largest centre of contract research, we have a unique ability to put together multidisciplinary teams, and this we are doing to an increasing extent. Collaboration with expert groups at NTNU and the University of Oslo is part of this strategy.

business areas

At the start of 2002, we had identified three market-defined areas of operation that intersect our institute structure, and we have earmarked these as distinct business areas. These are areas which appear to have greater market potential than individual institutes would be capable of handling alone. At the same time, we have laid emphasis on selecting areas in which the SINTEF Group enjoys competitive advantages and which also offer significant potential for growth. This should enable us to take on even larger projects than we have been able to do until now.

Those responsible for our business areas will put together product packages both in response to external enquiries and on their own initiative. The following business areas have already been set up:

SINTEF Oil and Gas. This area focuses on both upstream and downstream activities in the petroleum sector. Relevant services include concept studies, verification, project management and consulting.

SINTEF Public Sector. This area has identified health, education, integrated transport solutions, safe society and the local government sector as its areas of activity.

SINTEF BioMarine Industry. This area offers solutions that range through the whole value chain in the aquaculture, fishing and fish processing industries, i.e. everything from marine biotechnology and the development of fish-feeds to fish-capture, aquaculture and processing technology. We have also put together a number of multidisciplinary groups that are working on such topics as "CO_2-free gas power", "Hydrogen as an energy carrier" and "Mobile communications systems".

strategic alliances

SINTEF's ideal client is one who has confidence in us and who continually sends us signals indicating his needs for expertise and support. This is what brings out the best in us. For this reason, we are trying to forge strong alliances with companies, industrial sectors and public-sector bodies that are prepared to consider long-term cooperative efforts in order to achieve common goals.

In February 2002, the final elements were put in place for an alliance of this sort with the automotive component manufacturer Raufoss ASA. This company has created a separate limited company from its R & D department. SINTEF is now a shareholder in "Raufoss Technology and Industrial Management AS" (RTIM), which has about 50 employees. RTIM will perform R & D for Raufoss ASA and other industrial companies in the Raufoss region and will draw on SINTEF's resources. As far as we are concerned, this alliance will make our order book more predictable and give us better insight into industrial problems, while offering industry cost-effective access to our expertise and our specialised laboratories.

rising international activity

International contracts were responsible for 12% of our turnover in 1999. In 2000 this proportion rose to 14.5% and in 2001 it came to 13%. Our ambition is to see this proportion rise. However, we realise that international efforts demand a great deal of resources. We are therefore concentrating our overseas marketing on special areas in which we are particularly strong.

About a third of our overseas turnover is derived from EU research programmes. We give these high priority, both because we regard it as important to participate in transnational exchanges of knowledge and also because these programmes give us access to interesting networks.

The rest comes from normal contract research activities for foreign clients. During the past few years we have been extending this market in geographical terms. Since summer 2000, for example, we have won contracts worth around MNOK 40 with Iran's petroleum and energy industry.

commercial spin-offs

We are making conscious efforts to ensure that SINTEF acts as an incubator for new enterprises. One of the goals set out in our development plan is that of establishing 10 - 15 new companies a year on the basis of technology to which we ourselves hold the rights. This will give Norway much needed knowledge-based industry. By selling our shares in successful spin-off companies, we will also liquidate our investments, which will be re-invested in new knowledge development activities.

In 2001 we helped to establish ten new companies. By the beginning of 2002 we had set up an investment fund and built up "Investment Engine", an accompanying set of measures which will help potential entrepreneurs through the innovation process. We will also participate in the ownership of our spin-offs on an active basis and help our companies to develop their full potential.

technology for a better society

Mankind is facing enormous challenges with respect to its ability to provide a high quality of life for the individual. How can we produce more food for a world in which so many people are starving and where there are more mouths to feed every day? And how are we to deal with the threat of climatic change?

Norway is standing at the threshold of a future in which new industries will gradually have to take over from the petroleum industry. Our standard of living will be increasingly dependent on our national ability to produce goods and services with a high "knowledge content".

There are no simple solutions to these problems. The only thing of which we can be certain is that knowledge is alpha and omega for everyone who wishes to grasp such challenges. In all modesty, we believe that it is vital that such organisations as ours exist; companies that live by generating research-based knowledge.

Together with universities and colleges, SINTEF is part of the national infrastructure for innovation and industrial development. It is vital for Norway to maintain a national competence base that is capable of providing support for existing industry and helping new companies to emerge. A national competence base is also of importance when Norwegian companies are deciding where to locate their development departments, and when foreign companies are considering setting up shop in Norway.

SINTEF APPLIED MATHEMATICS

SINTEF Applied Mathematics develops software and utilises mathematics as a tool in a wide range of applications.

The work of the Institute ranges from improving transport planning to producing animations and visualisations of landscapes.

At SINTEF Applied Mathematics numerical methods are our most important working tool. We have several examples of how technology and mathematics can help to improve products and optimise processes.

Since 1993 we have been working closely with SINTEF Materials Technology and Hydro Automotive Structures in Raufoss, the leading manufacturer of aluminium bumper beams in the world. Our goal was to extend the life of the extrusion dies used in the huge presses that produce the bumper beams. Hot aluminium billets are extruded through these dies at pressures of up to several thousand tonnes, a process which exposes them to extremely high loads. Just ten years ago each die only lasted for about 30 or 40 extrusions before it had to be repaired; an expensive, time-consuming operation.

By systematic testing of new ideas, we arrived at an optimal design for the dies. The solution was found with the aid of numerical simulations of various design proposals. After some years of such work, we were able to reduce considerably the mechanical forces on the dies, without affecting their productivity.

The project led us to a mathematical description of the stress situation in the die. This mathematical model makes it possible to predict the effects of changes in the shape of the dies when new bumper beam designs are being developed.

The model is based on a program developed at SINTEF, that combines calculations of flow and tension. The knowledge that the model has given us is the direct reason for the dies now lasting on average three times as long as they did when we were given the job of redesigning them. This has meant a significant reduction in costs for Hydro Automotive Structures and is helping this company to maintain its position as the world's leading supplier of aluminium bumper beams.

Tore Gimse, Vice President, Research

magic figures

From left: Vice President, Research Tore Gimse and Research Director Geir Hasle.

watching over Norway's infrastructure

Snorre Ness is a Reseach Scientist at SINTEF Civil and Environmental Engineering.

SINTEF CIVIL AND ENVIRONMENTAL ENGINEERING

SINTEF Civil and Environmental Engineering contributes to the social process of wealth creation by developing and improving the national infrastructure, reducing energy consumption and improving the utilisation of natural resources. The work of the Institute ranges from traffic planning to the conservation of old buildings.

Bridges, roads, major buildings, transmission lines and oil platforms are all important parts of Norway's infrastructure. These high-value components of society's material goods need to be taken good care of. This is why SINTEF Civil and Environmental Engineering and the owners of such important structures have been putting significant resources into determining how best to maintain them. Major savings can be made by carrying out repairs properly and at the right time.

An example of our recent work is our joint study with Statnett of the concrete foundations of their transmission lines. Statnett had previously been recommended to upgrade damaged installations at an estimated cost of NOK 800 million. The company decided to carry out a study together with SINTEF, and we drew up an action plan that described which measures would offer the highest cost-benefit ratio and when it would be most sensible to implement them. This saved Statnett nearly the whole amount involved. We have also been working on developing methods of using carbon composite materials to strengthen bridges without disrupting traffic.

Another aspect of our work on concrete concerns the use of various types of industrial and household recycling and waste products. The idea is that waste should be treated as a valuable resource instead of an environmental problem. One example of this approach is glass waste, of which Norsk Glassgjenvinning AS collects 50,000 tonnes a year. We have found a method of adding such glass to concrete for use in floors and facades. This has become a popular product with building owners; the beautiful glass-concrete floor of the Weidemann Museum in Steinkjer Town Hall, for example, is widely admired. We have also identified useful applications for machine sand, which is the finest fraction of the crushed materials produced in stone quarries and which used to be treated as a waste product. Machine sand helps concrete to flow and fill casting moulds by itself, eliminating the need for a vibrator. This helps to cut down noise pollution and reduces the risk of physical stress injury. We are currently working on the problem of making it possible for all construction concrete to be self-compacting, and are seeking out other types of fine-grained waste products that can be utilised in the concrete of the future.

Bjørn Svensvik, Vice President, Research

SINTEF ELECTRONICS AND CYBERNETICS

SINTEF Electronics and Cybernetics identifies new solutions in microtechnology and develops measurement and control systems. Our work ranges from technical analyses to the development of complete systems that must be capable of operating in any environment, from the human body to outer space.

Information of importance for your health and safety should be available quickly. At SINTEF Electronics and Cybernetics we are working on microtechnology and advanced measurement systems that will bring you information of this sort much more rapidly than you are used to. The rapid demonstration and identification of bacteria and viruses can be vital. Today, a great deal of time is lost in sending samples to central laboratories. In collaboration with the Norwegian company Norchip Ltd, SINTEF Electronics and Cybernetics is developing a chip the size of a credit card that will contain an entire microbiology laboratory. Biological material is deposited in tiny reaction chambers that have already been charged with special chemicals that can emit light. Within half an hour, detection of light from the reaction chambers will indicate whether specific micro-organisms are present. The analyses can be performed quickly in the field by relatively unskilled personnel. Diabetes patients can also benefit from microsystems. On behalf of another Norwegian company, Lifecare Ltd, we are currently developing a capsule that is no larger than a little fingernail. This will be inserted under the skin and will keep users and/or their health-care centre informed about their blood sugar concentration.

Our measurement systems will also soon be going into orbit. In order to prevent astronauts from breathing unpleasant, toxic or carcinogenic gases, the "indoor environment" of the International Space Station needs to be monitored. NASA recently announced a competition for equipment and techniques for monitoring air quality in spacecraft, in which a wide range of concentrations of 25 gases were to be measured simultaneously. In conjunction with the German company Kaiser-Threde GmbH we offered what was clearly the best solution, utilising analytical techniques that we had already developed for the European Space Agency (ESA). A system based on SINTEF's design will soon be tested on a space shuttle.

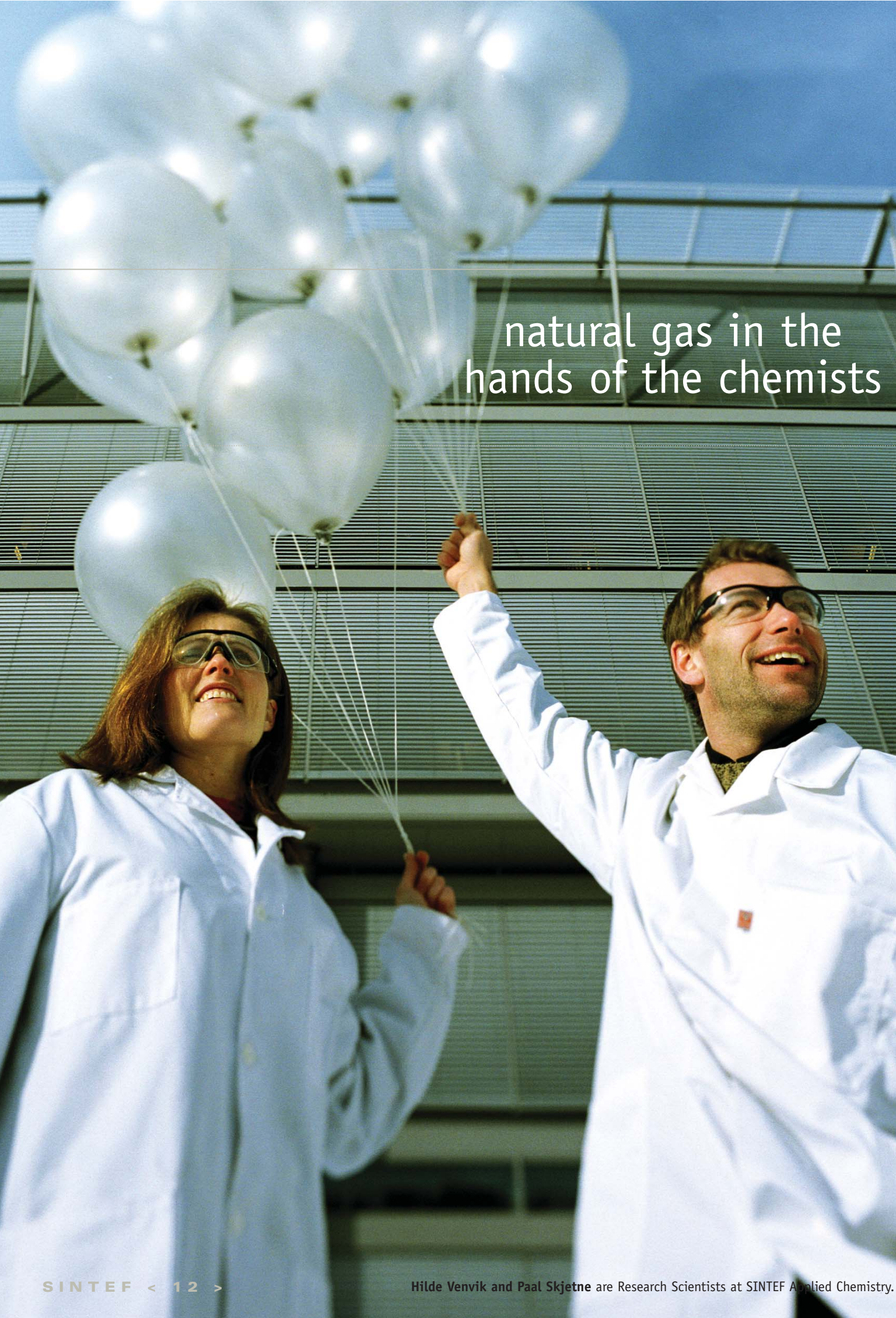
Security is also an issue when IDEX Ltd in Asker is developing a fingerprint sensor with support from SINTEF. The sensor can be made extremely compact, a feature that gives it many applications. Potential uses include providing security features for users of portable computers, mobile telephones and PDAs, etc.

Ernst H. Kristiansen, Vice President, Research

a race at microscopic level

Maaike M. Visser Taklo and Andreas Werner are Research Scientists at SINTEF Electronics and Cybernetics.

natural gas in the hands of the chemists



Hilde Venvik and Paal Skjetne are Research Scientists at SINTEF Applied Chemistry.

SINTEF APPLIED CHEMISTRY

SINTEF Applied Chemistry is Norway's largest interdisciplinary contract research institute in the fields of chemistry, biotechnology and environmental technology. Our clients come from a wide range of industries, ranging from pharmaceuticals to the petroleum sector, and we develop new tools, products, processes and environmental technology solutions on their behalf.

Norway exports large quantities of natural gas, but we are also experiencing a much sharper focus on its use in this country too. Natural gas is first and foremost an important energy resource, but it is also a raw material for high-value products such as proteins and chemicals.

New technological developments are essential to widen the use of natural gas. For many years, SINTEF Applied Chemistry has been active in core areas of research and development in natural gas utilisation.

In 2001 we have been building up natural gas activities that are of particular relevance to energy and the environment. SINTEF Applied Chemistry is collaborating with NTNU in a Strategic Institute Programme on the development of small-scale hydrogen production from propane, in a reactor that will be small enough to be installed in a car.

Our technology in the field of combinatorial chemistry, in which we are capable of carrying out a large number tests simultaneously, using parallel technologies for the synthesis, characterisation and screening of new functional materials, is internationally recognised and has resulted in major research contracts. In conjunction with our work for Norwegian industry in the field of synthesis gas production and the development of new types of reactors, this has propelled us into a leading position in the development of technology for small- and large-scale hydrogen production.

One important challenge in dealing with hydrogen is how to store it. Research is moving in the direction of storing hydrogen within certain materials such as polymers. In this field we are collaborating with the Insitute for Energy Research and the University of Oslo, for example on the use of new types of polymers as storage materials. This forms part of the Research Council of Norway's efforts to develop a hydrogen economy.

In cooperation with NTNU and a university in the US, we are also looking at how to utilise methanol as a raw material for the production of important animal feed components for the aquaculture industry, for example. In the context of the important debate on gas power, we can provide technology that will help us to satisfy demands for CO_2-free gas-fired power stations, in which an understanding of chemistry and process technology will play an important role.

Odd Ivar Eriksen, Vice President, Research

SINTEF MATERIALS TECHNOLOGY

SINTEF Materials Technology works closely with industry in the development of advanced materials, and we seek out new, environmentally friendly products and processing methods that will increase productivity and raise quality standards. The Institute does work on materials recycling, light alloys for the automotive industry, steel, ceramics and plastics. Another important field of work is identifying the functional and application properties of materials in order to enable the most suitable materials to be selected for particular applications.

Norwegian materials technology is at a high international level. The production of light-weight materials such as aluminium and plastics is a characteristic of the sector, but materials for many special applications are also produced.

At SINTEF Materials Technology we wish to make a contribution to areas in which Norway has a strong international position, but we are also developing expertise in new fields. Our strategy is to prioritise areas of research which have the potential to enable new knowledge-based industry to be established in Norway. One such area is functional materials. In conjunction with the Institute for Energy Technology (IFE) and the Universities of Oslo and Trondheim, we are attempting to set up a national programme in this field.

Functional materials are materials that have particular chemical or physical properties that can be exploited for a wide range of purposes. For example, they have a decisive role to play in solving the world's energy and environmental problems. At SINTEF, we have been working for many years on functional ceramics, e.g. ceramic membranes that enable oxygen, CO_2 and hydrogen to be separated at high temperatures. This technology will play a significant role in the development of advanced systems for producing energy from fossil fuels without producing emissions of climate gases.

Our institute is also highly active, at both national and international levels, in the development of new production processes for silicon for use in solar panels. Our efforts cover production, refining and crystallisation, and we have developed advanced mathematical models for simulating processes, microstructure and chemical composition.

We are also studying ceramic and polymer fuel cells that will be capable of transforming hydrogen into electrical energy. For the hydrogen society to become a reality, we are dependent on new, cheap materials for the production, storage and conversion of hydrogen. We also need a better understanding of how fuel cells will function in the context of a total energy system. Our efforts in the field of hydrogen technology involve activity at four SINTEF institutes, and range from the production of hydrogen to its final use. In collaboration with our partner NTNU we can offer industry and the public sector wide-ranging and in-depth expertise in many areas of hydrogen technology.

Unni Steinsmo, Vice President, Research

materials with tailor-made properties

From left: Research Scientist Odd-Geir Lademo and Research Director Jack Ødegård.

a new, better working life

Forskningsdirektør **Tor Ulleberg.**

SINTEF INDUSTRIAL MANAGEMENT

SINTEF Industrial Management helps its clients find solutions that will improve competitiveness and the value-adding process in industry and society. Technology transfer to small companies, research on good working conditions and the development of integrated production systems are among our areas of activity. We also focus on knowledge management in companies and develop risk analysis scenarios for safety in industry, transport and the offshore sector. Other important areas of activity include the development of management skills, processes of change and performance measurement methods.

At SINTEF Industrial Management we are concerned with how Norwegian employees experience their everyday life. For this reason, knowledge of the many facets of working life is one of our areas of expertise. The ways in which Norwegians work is constantly changing; for example, we now change jobs much more often than we used to. Instead of having a steady job, many of us wish to be our own bosses, working either as freelancers, on fixed-term contracts or on projects. Flexibility offers the promise of a working life that is better adapted to the needs of both workers and their companies. At the same time, however, there are reports of higher rates of sick-leave, and that many people feel worn out or even "burnt out". How are we to understand such paradoxes? What is best for the worker and the company? Because salaried work is the foundation stone of the value creation process in our society, our research is closely involved in answering questions of this sort. Our clients include public-sector bodies such as government ministries, the Research Council of Norway and employer and employee organisations, as well as individual companies.

One of the concepts underlying our work is that of uniting working life and democracy. We know that participation in decision-making is of importance for enjoying one's work and being productive. Helping the parties involved in work to talk to each other in order to meet the challenges that face Norwegian companies is one of our most important tasks. This is why we carry out projects for both employers and employees in Norwegian industry.

One of our projects last year was an evaluation of the effects of the national family cash benefit scheme on working and family life. Our work demonstrated that child-care concerns not only working mothers but also, to a great extent, fathers who are in work. This means that more employees have responsibility for children than used to be the case. This presents working life with new challenges as to how labour requirements can be met in the future.

Tor Ulleberg, Vice President, Research

SINTEF TELECOM AND INFORMATICS possesses a wide range of expertise and knowhow in informa

active in fields ranging from ICT solutions for the health sector to new satellite systems.

the hunt for digital goals

From left: Research Director Erik Kampenhøy, Research Scientist Nils Brede Moe, Research Scientist Stig Petersen, Stig Petersen, Nils Brede Moe, Nils

Information and Communication Technology (ICT) has become an essential part of modern society. The advanced use of ICT gives industry and the public sector a competitive advantage, while ICT has also become a major industry in its own right.

On behalf of the Norwegian ICT industry, we are developing new methods and techniques for producing components, systems and general-purpose software. Put in slightly simplified terms, we are system architects in the digital world. For example, we are building advanced ICT systems out of other independent subsystems and components. An important goal is to make such systems capable of dealing with the enormous quantities of information that are gathered and managed digitally. Requirements related to cost-efficient operation maintenance and further development, for example, need to be taken into account even during the planning stage.

Before we build complex ICT systems for our clients, we always analys their status and requirements. Many factors play a role in this process. We need to evaluate interactions between the organisation, processes and technology, and see how these can be put together to satisfy the client's business goals and policy. The results are methods that a company, industry or sector of society can adopt during the developme

technology. Our work is based on such disciplines as data technology, telematics, electronics and acoustics, and the Institute is

e Moe, Stig Petersen, Nils Brede Moe and Stig Petersen. All three are Research Scientists at SINTEF Telecom and Informatics.

and implementation of new systems.

One important aspect of this process is that of ensuring that these systems are reliable, which is done by building in security and robustness at several levels. For this reason, we are increasing our research efforts in this area, in collaboration with other SINTEF research groups such as Safety and Reliability, and Uninett, as well as in other research centres.

At SINTEF Telecom and Informatics we are also trying to make our expertise more accessible to end-users. For example, we are cooperating with various interests in the areas of road, rail, marine and air transport. In this sector, the challenge consists of establishing a basic set of transport information elements that will meet the essential requirements of the authorities, transport agencies, transport companies, goods and passenger terminals, drivers and transport users themselves. This will make it simpler to share information, for example about bills of lading, driving conditions and transport routes. We are also helping a transport company to introduce mobile ICT into its own operations, so that parts of the company's information system will be accessible to its drivers while they are on the road.

Aage Jostein Thunem, Vice President, Research

SINTEF UNIMED

SINTEF Unimed performs research and development projects and offers consulting services in the health sector. The Institute covers a wide range of disciplines, including research on the health service, medical technology and evaluation of methods, work environment and ergonomic technologies for disabled persons and the elderly.

At SINTEF Unimed we have identified medical technology as one of our main areas of effort - and we have several targets in our sights. For example, we wish to help to ensure that patients are offered a good range of treatments and we also want to help to create new companies capable of meeting the needs of the health sector.

We have been part of an ultrasonics development project that has been under way for several years, and we gladly confess that we are proud of the results: technology that is now in use in St. Olav's Hospital in Trondheim and in Heidelberg University Clinic – and which has also become an industrial concern in its own right.

With the aid of modern information technology we have helped to give neurosurgeons a new "window" into their patients' brains: a system that allows operating instruments to be controlled via a "map" made up of three-dimensional ultrasonic images.

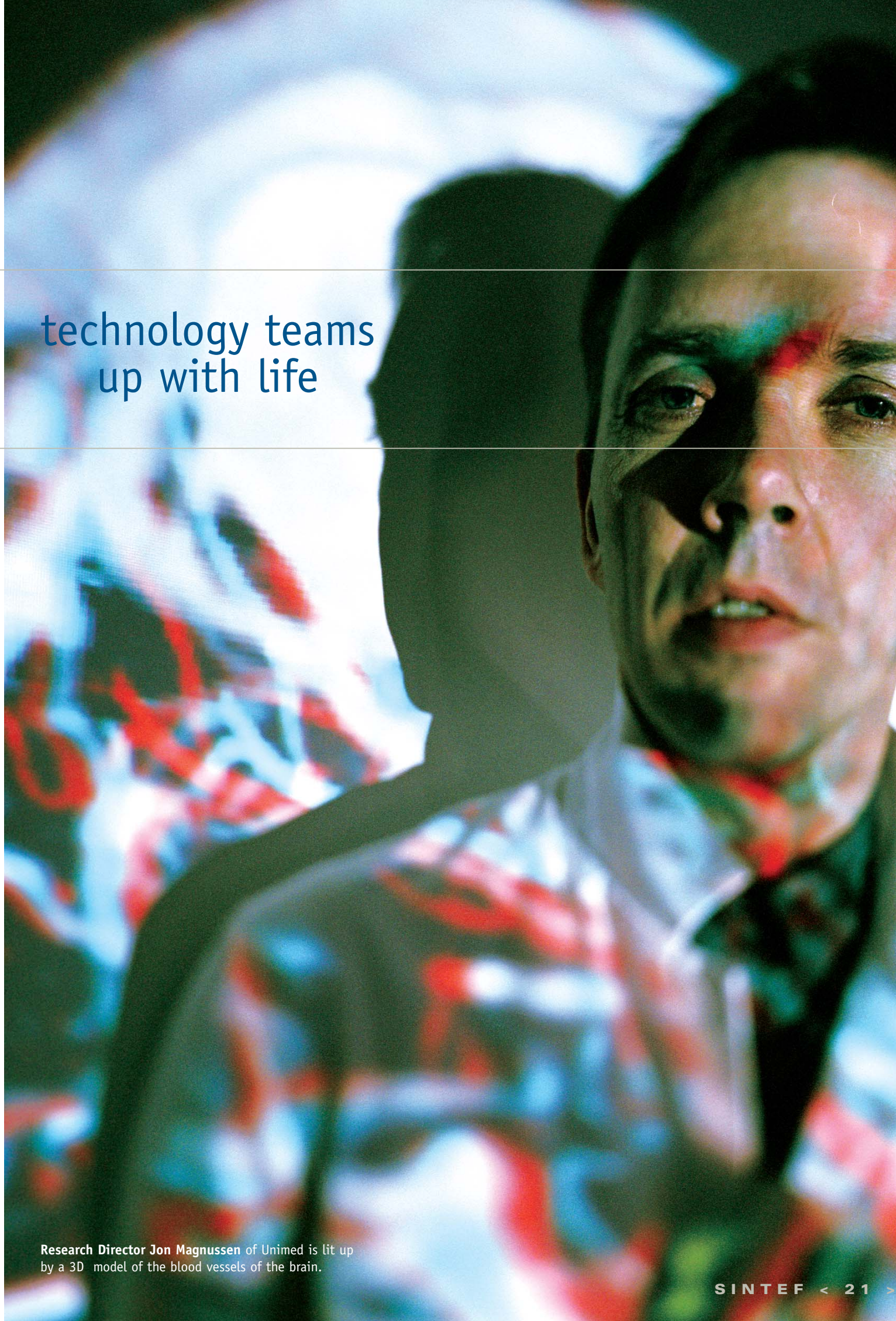
We now know that this technology improves a surgeon's chances of extracting the whole tumour from a patient with brain cancer. This is synonymous with better treatment, because research carried out in other countries has shown that patients with tumours of the brain live longer when every last bit of the tumour has been removed. We also believe that the risk of damage to healthy brain tissue is less than under open-brain operating conditions, for when the surgeon can "see" with ultrasound, he only needs to open up a narrow channel into the tumour.

This system is the result of the collaborative efforts of technologists and doctors at SINTEF, NTNU and St. Olav's Hospital. Mison AS, a newly-formed company based on the groups involved in the project, has turned the system into a commercial product that was awarded a prestigious international IT prize in 2001: the "European IST Grand Prize".

SINTEF Unimed can also boast of a strong research group in the field of magnetic resonance (MR). At present, we are focusing our efforts on integrating information from ultrasonics, MR and other image-processing techniques. In this way we are making it easier for surgeons to utilise the ultrasonic information directly in the operating theatre while they are actually operating.

Tonje Hamar, Vice President, Research

technology teams up with life



Research Director Jon Magnussen of Unimed is lit up by a 3D model of the blood vessels of the brain.

hydrogen – clean energy

Mona Jacobsen Mølnvik is a Research Scientist at SINTEF Energy Research.

SINTEF ENERGY RESEARCH

SINTEF Energy Research develops good solutions related to power generation and conversion, transmission and distribution and the final use of electricity and other types of energy carriers. The work of the Institute ranges from the indoor environment and energy consumption in buildings to gas technology, combustion, bioenergy and food technology.

The problem of energy is one of the major challenges that we will face in the future. We want clean energy and we want lots of it. Hydrogen and electricity will both play important parts as energy carriers.

Norway is a leading-edge participant in the development of electricity distribution systems, and we enjoy special advantages that will enable us to play a leading role in the development of hydrogen technology.

There is no lack of challenges, and at SINTEF Energy Research we are carrying out exciting research in a number of important areas.

One major challenge is the combustion of hydrogen-rich gases, an important field with regard both to a hydrogen-based society and CO_2-free gas power.

It is obvious that generating hydrogen from biomass and/or waste will be important. Emissions are minimal and the hydrogen can be stored and used as a source of energy elsewhere.

One important step towards this goal will be the development of efficient fuel cells; we are participating in the development of good systems capable of exploiting the advantages of fuel cells.

In designing the energy systems of the future, it is important to be able to analyse how different local energy systems, such as solar power, wind power and bio-energy, and centralised systems, such as hydro-power and gas-fired utilities, should be integrated in order to create a whole that will have positive effects in terms of environmental impact, economics, energy efficiency and user-friendliness. Systems analyses of this sort are one area in which SINTEF Energy Research can point to a strong scientific tradition.

If we are to meet these goals, close cooperation with other research groups will be essential. SINTEF Applied Chemistry and SINTEF Materials Technology are both very active in research on separating hydrogen from natural gas and in fuel-cell technology, for example. Scientists at SINTEF Petroleum Research are experts on CO_2 storage in petroleum reservoirs and subsea rock formations, while MARINTEK has expertise in marine structures and logistics. These are core areas in connection with the development of purification technology for gas power, and as a foundation for the hydrogen society of the future.

Sverre Aam, President

SINTEF PETROLEUM RESEARCH

SINTEF Petroleum Research develops technologies capable of finding more oil and gas and recovering as large a proportion of our petroleum reserves as possible. The Institute's knowhow and technology support the creation of value in one of Norway's most important branches of industry.

Just as for other institutes in the petroleum sector, there was less work for us on the Norwegian continental shelf in the 90s. We therefore decided to develop our international markets - and so far, we are fairly well pleased with the results of our overseas efforts.

Towards the end of the 90s, we began systematic marketing of our services in five geographical regions, and obtained positive responses in four of them. Today, we have contracts in the Gulf of Mexico, South America and West Africa. But most important of all is the foothold we have won in Iran - one of the most oil-rich countries in the world.

In winter 2001, the Iranian state oil company NIOC asked SINTEF Petroleum Research to carry out a study of how the huge Azadegan oilfield should be developed. This onshore field contains the biggest petroleum find anywhere in the world during the past 20 years.

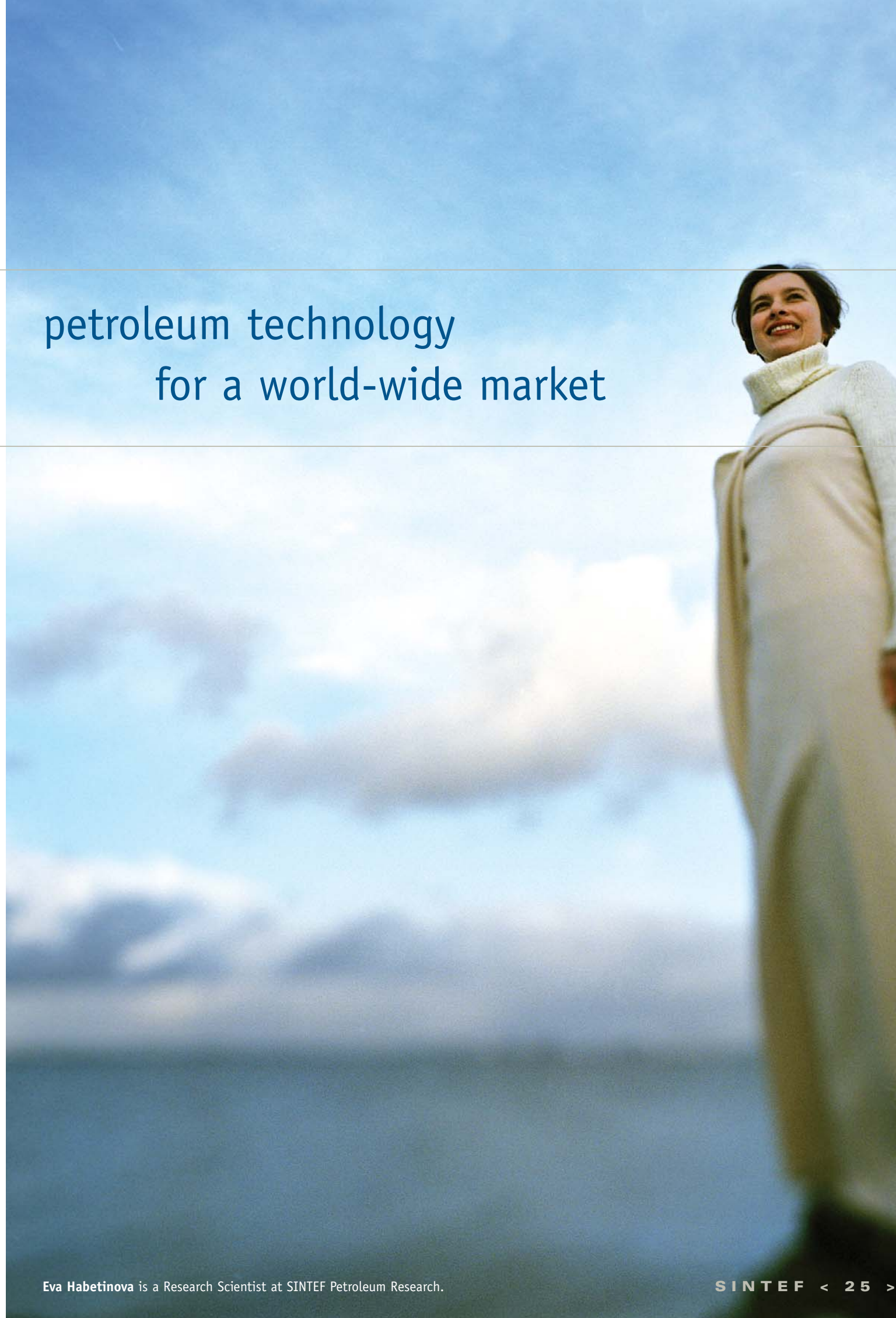
In February 2002 we won another major contract with NIOC for a similar study of seven oil fields that are already in operation. In this case we have been asked to suggest ways of increasing recovery rates. This project has a total budget of more than NOK 50 million, half of which will come to us.

The Iran projects utilise modelling and simulation software, with which we have long experience from projects on the Norwegian continental shelf. At the same time, we have taken the opportunity to gain and make use of specialised knowledge of the geology of this region, for while most of Norway's oil is found in sandstone reservoirs, Iran's reservoirs lie in fractured carbonate formations.

The other petroleum reservoirs in this part of the world are also found in such formations. We are therefore already considering the possibility of extending our overseas efforts to include other middle eastern countries. In such a perspective, we regard the knowhow we are gaining from the Iran projects as an important addition to our expertise.

David Lysne, President

petroleum technology for a world-wide market



Eva Habetinova is a Research Scientist at SINTEF Petroleum Research.

safe navigation

Rolf Baarholm is a Research Scientist at MARINTEK.

MARINTEK

MARINTEK, the Norwegian Marine Technology Research Institute, does research and development in the maritime sector for industry and the public sector. The Institute develops and verifies technological solutions for the shipping and maritime equipment industries and for offshore petroleum production.

Norway has a long coastline with a large number of fjords and narrow sounds that can be difficult to navigate in heavy winds and currents. Going aground can have serious consequences for vessels, their crews, the local population and the environment. Some Norwegian waters are so difficult that skippers need to be given special training before they leave harbour. This is why, when we develop navigation simulators at MARINTEK, we try to create as realistic an impression of real-life conditions as possible.

Coal from the Svea mine is brought through the Akselsund on the coast of Svalbard (Spitzbergen). A grounding in this area could result in a disastrous oil discharge in the highly vulnerable Arctic environment. MARINTEK has developed a simulator for this passage; the Akselsund Simulator creates a realistic impression of the motion of the vessel itself, seabed conditions and the local terrain.

An important part of the simulator software is the model of the vessel itself. MARINTEK has long experience of developing such models, both as software and in real life. The model contains complete information about the vessel and how it behaves under given conditions. The simulator also includes 3D charts of the seabed and maps of the landscape in the vicinity of the Akselsund. The terrain model, which we developed together with colleagues from SINTEF Applied Mathematics in Oslo, accepts data from the vessel model that tell it where the ship is at any given moment. This information is visualised in such a way as to give the captain a realistic view from the bridge. The interface allows him to communicate with the simulator, control propeller revolutions and rudder angle, and obtain feedback from instruments on a screen. This simulator has aroused a great deal of interest and will now be further developed for sale.

Much of our work on the Akselsund Simulator is based on cooperation with NTNU. We wish to encourage more groups to collaborate on software development. When we integrate software for hydrodynamic calculations with cybernetics and structural strength methods, we will end up with extremely advanced programs for vessel control and monitoring. Using the simulator, the University and industry can link up to MARINTEK's software to carry out joint simulation studies, allowing the simulator to be developed in close contact with equipment suppliers and end-users.

Oddvar Aam

Oddvar Aam, President

SINTEF FISHERIES AND AQUACULTURE

SINTEF Fisheries and Aquaculture possesses a wide range of expertise and knowhow in exploiting renewable marine resources. The Institute helps its clients to find solutions to problems throughout the marine value chain – from the biological basis of marine production, through aquaculture and fish capture techniques to processing and distribution.

Good prospects for fish farming mean that the number of aquaculture installations is growing year by year. It is essential for the industry to ensure that the fish are kept under good conditions, that fish farms are not sources of visual pollution and that they are safe and environmentally friendly. For this reason, SINTEF Fisheries and Aquaculture is running a Strategic Institute Programme which, among other topics, includes the development of new concepts and numerical tools for the aquaculture industry of the future.

Even though Norway has a long coastline, the lack of suitable sites is beginning to be noticeable. Norwegian companies also sell equipment to international markets where sheltered sites are not necessarily as common as they are in Norway. With knowhow derived from the offshore industry, therefore, our scientists are producing new solutions for aquaculture installations that will be capable both of withstanding heavier stresses and of satisfying demands for safer workplaces.

A leasing agreement with Denmark's North Sea Centre in Hirtshals has given SINTEF access to excellent laboratories and to personnel with long experience of developing and testing fishing and aquaculture equipment. This allows us to test out new concepts, and we can also document which equipment is best in terms of personnel safety.

The economic potential of the aquaculture sector attracts new participants with offers of products and equipment. Such people are often looking for new technology capable of providing higher efficiency and a greater degree of automation, and in these aspects we can offer technological solutions, numerical tools and product testing services. The appearance of fish farms is also beginning to be important. Plastic containers and temporary food storage sites shame the local environment and are sources of visual pollution. For this reason, we have engaged design experts who can take environmental factors, the use of colour and form, and location into account in designing the fish farms of tomorrow.

The institute programme, which will continue for five years, includes such factors as ethics and the quality of life of the fish. Moving the systems out to less sheltered waters will give us access to clean water, offer the fish good living conditions and hinder outbreaks of disease. At the same time, making sure that the fish are not unduly stressed by changes in volume and movements of the sea-cages caused by waves and currents will be a challenge.

Karl A. Almås, President

harvesting from the sea

José Rainuzzo is a Research Scientist at SINTEF Fisheries and Aquaculture.

helping at the birth of knowledge-based companies

SINVENT

SINTEF's development company Sinvent AS is responsible for the SINTEF Group's innovation activities. It is also the parent company of a group within which the SINTEF Group has gathered all its purely commercial companies.

Standards of living in the Norway of the future will depend to an ever-increasing extent on the ability of the country to create new knowledge-based companies. The SINTEF Group has responded to this challenge by setting up its own "greenhouse" for product ideas; in SINTEF's subsidiary Sinvent we are the gardeners.

The greenhouse provides financial support from the SINTEF Group's recently established investment fund. It also offers a range of support services that aim to guide potential entrepreneurs from the SINTEF Group through each phase of the innovation process - from the birth of an idea until the newly established company is capable of standing on its own feet. The most important people involved are the scientists who have come across product ideas that they have faith in during their research. The greenhouse has set aside funds and personnel to help such people in various ways: there is funding for projects to evaluate ideas - i.e. to find out whether they can be patented, to check out their market potential, etc. – and to develop them further, e.g. by producing prototypes.

We are talking here about technology to which the SINTEF Group owns the rights. The Group goes in as an active owner in start-up companies that are based on technology of this sort. When the company has become viable and has grown in value, the Group will sell out its interest in it.

Selling shares in successful start-ups is a way of ensuring that the SINTEF Group itself will continue to grow. Spinoff companies often become customers of their parent institutes, which is another way of bringing in revenue to the SINTEF Group. Furthermore, the prospect of becoming an entrepreneur may have a positive effect on the recruitment of potential researchers. Start-up companies are thus also important to the SINTEF Group itself.

In Sinvent, we have day-to-day responsibility for the innovation process promoted by the SINTEF Group's investment fund. We follow up innovative projects, offer the fund's board advice about which projects to invest in, and help start-up companies to develop successfully.

Spin-offs from the SINTEF Group have tended to come in waves. The first of them appeared in the mid-eighties, while the next one did not come until ten years later. In Sinvent, we wish to play a part in ensuring that the spinoff process will not only become continuous but also gain in strength.

Nils Spidsøe, President

this is Sinvent

The SINTEF Group has organised its purely commercial activities as a series of subsidiaries of SINTEF's development company Sinvent AS. Together with Sinvent itself, the following companies were members of the Sinvent concern in 2001:

Bedriftsuniversitetet AS (Oslo)
offers company-oriented further and higher education at university level.

MOLAB AS (Mo i Rana)
is a "laboratory partner" for industry. The company sells quality verification services in the fields of chemical analysis, materials technology and environmental monitoring.

Norwegian Fire Research Laboratory (Trondheim)
is the national centre of expertise in research, technology and testing in fire technology.

Runit AS (Trondheim, Oslo and Raufoss)
offers operational solutions and consulting services in financial and project management, IT, purchasing and competence development. Runit's activities were sold to the Norwegian Post Office's IT concern ErgoGroup at the turn of the year.

VerkstedPartner AS (Trondheim)
is an advanced engineering company which has grown out of the research milieu at SINTEF/NTNU.

shareowner on behalf of SINTEF

Sinvent AS also manages the SINTEF Group's ownership interests in various other start-up companies. Sinvent is an active part-owner of 25 companies in addition to those that make up the Sinvent concern.

multidisciplinary knowledge packs

In the course of the past year we have selected three areas of special effort that cut across our institute structure and have marked them out as distinct busines areas: Oil and Gas, Public Sector and BioMarine Industry.

We believe that this will enable us to take on even bigger projects than we have been able to accept until now. At the beginning of 2002, the business areas SINTEF Oil and Gas and SINTEF Public Sector were already operational.

SINTEF Public Sector

Norway's public sector is currently in a state of flux and is putting tens of billions of kroner into "extraordinary measures" for long-term improvements. The aim is for the public sector to offer qualitatively better services while reduceing their unit cost. This gives SINTEF the opportunity to offer our collected expertise and capacity "across the board" in addition to what we already provide this sector. From this perspective the public sector is to some extent a major new market for SINTEF, with the potential for large long-term projects. We believe that SINTEF is in a unique position and has special resources for putting together knowhow, meeting the requirements and developing the integrated solutions that this sector needs. This is our most important reason for defining the public sector as a separate business area. Our vision is to help to create, among other things, the best health, local government and educational services in Europe.

Our neutral role puts us in a natural position to help meet the needs of employers, the authorities and suppliers of goods and servicces.

All of the products and services that we offer are rooted in SINTEF's existing research groups. The range of subjects and breadth of expertise we can offer make us attractive both as a partner and as a supplier of large long-term projects.

We work up concrete knowledge packs and ideas for integrated solutions.

The areas which have been identified so far are health, schools, integrated transport solutions, safe society and local authorities. We have already worked up ten or so concepts which we are currently offering potential clients.

SINTEF Oil and Gas

Ten years ago, oil and gas research was responsible for 40% of the SINTEF Group's turnover. Today, the equivalent figure is only 20%. Not only has the amount of research we do fallen - we have also lost our market share. Traditional R & D contracts have become fewer in number, although the need to develop new solutions based on technological expertise is just as great. This is the background for the establishment of the business area SINTEF Oil and Gas.

We believe that investigations and studies can offer SINTEF a new way into this market, and that in turn this will lead to more research contracts.

SINTEF Oil and Gas is not intended to be a large organisational unit that carries out projects using its own staff. We intend, rather, to sell the multidisciplinary strength of SINTEF and look for projects that will involve several institutes. The projects that will be created here will be staffed by key personnel from our institutes, in agreement with their managements. We hope in this way to become a mechanism for growth at institute level.

SINTEF Oil and Gas will sell product packages that will profile the types of service that SINTEF is capable of offering. To date, we have identified four types: concept studies and analyses, verification and testing, project management and consulting services.

Our work will have an international perspective because our clients are international. Iran and the Mid-East are obvious international candidates, while Norwegian/international companies such as BP, Shell, Conoco, Norsk Hydro and Statoil form the domestic market.

An advantage for our clients is that we are not dependent on particular suppliers or products. In political terms we are harmless, which is an advantage in certain parts of the world. Other advantages include our areas of special expertise, broadly based scientific competence and solid relationship with the national and international research scenes.

We have also put together multidisciplinary groups that are working on various other subjects such as "CO_2-free gas-fired power stations" and "Mobile systems".

mobile systems

There are already more than 3.5 million mobile telephone users in Norway. Most of us never switch of our telephones. This means that we are always available; we are on-line. Much of our wireless communication is based on the telephone. Within the near future, everything from household appliances to cars will be taking part in an ever more comprehensive process of intelligent electronic communication.

This is why SINTEF has set up an interdisciplinary group to work on mobile systems. We believe that this field will be an excellent platform for creating innovative products and services.

Sensors of all types will be connected together to make new types of information accessible. We will be on-line with everything and everyone, and connected up to virtually every type of machine – our cars, TVs, fridges, cookers or our own private image banks. No matter where we might be or where we might be going, we will have access to information and entertainment and will be able to contact whoever we wish. Moreover, our accessibility will be the same whether we are using our mobile telephone, the TV or a desktop, portable or handheld PC.

Much of the electronic wireless communication of the future will surpass both today's GSM system with GPRS (General Packet Radio Service) and the next-generation UMTS. Wireless data networks are already available in central parts of Norway and in the rest of the world. Both Japanese and European scientists envisage that the "mobile telephone" of tomorrow will have such additional functions as cash, tickets, credit cards and keys. Such developments are possible because the mobile telephone is protected by a personal code and is a personal instrument. It will also be possible to equip it with features that will enable it to communicate with other units, rather like today's remote control units.

As individuals, we will make use of the potential of these systems in a quite different way than we have done until now, and will have a new attitude to our senses and memory.

The advantage of a large organisation such as SINTEF is that expertise can be drawn from several different institutes and combined for various purposes. While SINTEF Telecom and Informatics develops information systems, scientists at SINTEF Electronics and Cybernetics are experts in developing sensors and instrumentation. Applied Mathematics is working on animations and 2D and 3D mapping systems on handheld PCs, and a number of other SINTEF institutes are also active in areas that border the field of mobile systems.

Our business idea will be to develop and sell systems based on mobile competence and technology. Customers are likely to come from a number of different sectors: tourism, health and transport are among the areas in which we believe that mobility will be an important competitive factor in the future, both as a means of making operations more efficient and with a view to offering new services. A taxi centre, for example, may need help to set up a system that will enable it to offer better, faster services. Well-established national clusters such as aquaculture, shipping, and the petroleum sector have considerable export potential. The aquaculture industry, for example, needs systems that can help logistics and communication along the value chain from egg to food on the table.

In such a world, we will need knowledgeable experts, and it as such that we at SINTEF intend to place ourselves at the leading edge of developments.

green gas-power

By signing the Kyoto Agreement, Norway has agreed to participate in international joint efforts on greenhouse gas emissions. Norwegian politicians are in general agreement that Norway must contribute domestic measures to these efforts, rather than depending exclusively on buying and selling quotas. This is the background to SINTEF's involvement in projects that aim to develop gas-fired power stations that will not emit CO_2.

In power stations of this sort, CO2 is collected and carried off by pipeline to be stored in microscopic openings in porous rocks beneath the seabed. Industrial and oil companies in Norway and abroad are currently developing the technology needed for power stations of this type, and SINTEF is active in many of these projects. We have also received funding from the Research Council of Norway to develop technology that could form the basis of new solutions. We have put this money into a wide-ranging programme that is dedicated to two sets of tasks:

• Solutions that will result in the cheapest possible gas-storage facilities using currently available technology.

• New technologies that may reduce the price of the next generation of power stations below that of currently used methods of collecting CO_2. If we succeed, we could have methods ready for testing by around 2010 - 2015, by which time we can envisage power stations that will be able to get rid of their CO_2 at a cost of NOK 300 per tonne.

According to estimates made by SINTEF Petroleum Research, it should be possible to store considerable amounts of CO_2 within geological strata on the Norwegian continental shelf. The Research Council has now decided to fund a five-year programme in which the Institute will study the possibility of injecting CO_2 to maintain pressure in oil wells as a means of improving oil recovery rates. If CO_2 from power stations can be used in this way, it will have a sales value that would compensate for part of the cost of the CO_2 scrubbing process.

What the cuts in emissions will cost in 2010 depends on how well Norway manages to clear up its own emissions. If Norway reduces CO_2 emissions at the rate proposed by politicians today, and if the least expensive measures are put into effect first, our calculations suggest that by 2010, any further reduction in emissions would cost more than NOK 300 per tonne. In such a case, CO_2-free gas-fired power stations would thereafter probably be Norway's least expensive method of preventing any further increases in domestic emissions of greenhouse gases.

flue-gas scrubbing

Three versions of gas-fired power stations with CO_2 capture can be envisaged. Of course, all of them would be more expensive than conventional gas-fired power stations. At present, only a standard power station with chemical flue-gas scrubbing can be regarded as proven technology.

Only three or four percent of the emissions produced by gas-fired power stations consist of CO_2. If this gas is to be separated, all the flue gases have to be passed through the scrubber, which therefore needs to be very large. Scrubbing technology is well understood, but so far it has only been used in small plants. Funding from industry and the Research Council is enabling us to develop this technology into the basis of more compact and cost- and energy-efficient scrubbers.

new solutions in sight

At the same time, several research centres are working on developing technology for other two types of power station. It is expected that a breakthrough in the technology envisaged here would make both of these versions cheaper than traditional gas-fired power stations fitted with scrubbers.

• *Hydrogen power stations:* in stations of this sort, the carbon in the natural gas is removed before the combustion stage, converting the gas into hydrogen, which becomes the fuel for the power station, and into CO_2, which can be removed for storage. However, using present-day technology, separating hydrogen from CO_2 is still an expensive and energy-intensive process. A number of oil and industrial companies are trying to develop a membrane that will be capable of performing this separation. At SINTEF, we are in the process of developing our own version of such a membrane. A successful membrane-based solution would save future power-station operators huge amounts of money.

• *Power stations with added oxygen:* in power stations of this type, pure

oxygen would replace air as the combustion gas. The exhaust gases would then only consist of water vapour (steam) and CO_2, and the steam could easily be separated from the CO_2 by condensation. However, oxygen still needs to be obtained by separating it from nitrogen in the air, and this is also an expensive and energy-intensive process with current technology. Here too, we are trying to develop a membrane-based separation process.

Other components and processes will also have to be developed before these types of power station can become a reality. We are studying these aspects of the problem in the course of strategic programmes and industrial projects along similar lines. But if power stations with carbon capture are to become as inexpensive as we hope, efforts will be needed to make the membrane technology work.

We have accepted this challenge because we are in a position to put together research groups that cut across subject and institute boundaries. At SINTEF, energy scientists, chemists and materials specialists work closely together to turn our ideas about these membranes into reality. The solution cannot be developed overnight. But precisely because all these experts are members of the same team, we believe that we will reach our goal

report of the board of directors – 2001

For the SINTEF Group, 2001 has been a year of good scientific results, the launch of several spin-off companies and heavy investments in laboratories and scientific equipment. The Norwegian Microtechnology Centre in Gaustadbekkdalen, which is being built in cooperation with the Research Council of Norway and in which SINTEF is investing NOK 75 million of its own funds, is the largest single scientific commitment in the history of the SINTEF Group.

The year was also financially satisfactory for the SINTEF Group. Profits before tax and minority interests came to MNOK 135.7 (MNOK 77.0 in 2000), from a turnover of MNOK 1,651 (1,547). This tendency represents a break in a lengthy downward trend in turnover for the SINTEF Group, and is in line with the general aims of the Group's development plan.

The SINTEF Group consists of 12 research institutes based in Trondheim and Oslo. The objective of the Group is to promote technological and other industrially oriented research in collaboration with the Norwegian University of Science and Technology (NTNU) and the University of Oslo (UiO). Our aim is to supply research-based expertise and associated services to Norwegian and international clients, and to develop both existing and new companies with potential for growth. We also try to create good links between research-based education and industrially oriented research.

Our institutes are SINTEF Civil and Environmental Engineering, SINTEF Applied Mathematics, SINTEF Materials Technology, SINTEF Applied Chemistry, SINTEF Electronics and Cybernetics, SINTEF Telecom and Informatics, SINTEF Industrial Management, SINTEF Unimed, MARINTEK AS, SINTEF Energy Research AS, SINTEF Petroleum Research AS and SINTEF Fisheries and Aquaculture AS. The first eight units are part of the SINTEF Foundation, while the last four are limited companies, whose principal shareholder is the Foundation. SINTEF is exempt from tax on profits.

The Group also includes Sinvent AS, in which the Group's commercial activities related to its shareholdings in start-up companies are located. Sinvent pays tax like any other commercial company.

science and markets

In 2001, SINTEF carried out 4261 projects for 2905 different clients. The following paragraphs describe a few examples that illustrate something of the range of these projects:

In 2002, the State took over the ownership of Norway's hospitals, which have now been organised in five regional organisations that are largely free of state control. This situation offers hospital management new challenges in terms of gathering, quality assuring and distributing information about their own efficiency, quality, availability and activity. SINTEF Unimed has long experience of presenting management data at national level, and is currently putting considerable resources into the further development of this concept so that it can be adapted to the requirements of the regional health organisations. SINTEF has also started collaborating with the Norwegian School of Management and the Centre for Health Administration at the University of Oslo, where the "Health University" project intends to become the leading national player in the market for management development and training.

Interest in environmental electricity generation from fossil fuels has grown as a result of the climatic problems caused by CO_2 emissions. The Norwegian Government has committed significant funds to research and development on technology for collecting and storing CO_2 from gas-fired power stations. SINTEF and NTNU have joined forces to take up this challenge in an interdisciplinary project which is being financed via the Research Council of Norway's Klimatek programme. We are both improving existing technology and developing new technology that will be capable of making the next generation of power plants much more reasonable in price than utilities based on current methods of CO_2 collection.

The use of biometric data is a reliable method of identifying individuals. Fingerprint analysis enables us to unambiguously identify a fingerprint. On behalf of the start-up company IDEX, SINTEF is implementing an idea for recognising fingerprints. The idea has been patented and development work resulted in IDEX signing a licensing agreement in 2001 with ST Electronics, the biggest electronics manufacturer in Europe.

In collaboration with Norwegian and Swedish partners, SINTEF Telecom and Informatics is developing PARAT – Personal Active Radio/Audio Terminal, which is a combination of an earplug-based wireless communications terminal and a hearing protector. The first version of the device has been designed for use by Norwegian and Swedish defence personnel, but there is an infinite number of applications for equipment of this type. The tiny, lightweight ear terminal has been designed for continuous use and ensures that hearing is continuously protected while messages can always be heard, whether they arrive from direct acoustic sources, a public address system or by radio. SINTEF has set up a separate company called NACRE AS to commercialise the technology. SINTEF will continue to be an important R & D partner for NACRE in the coming stages of development.

After the fall in oil prices in 1998, SINTEF Petroleum Research began to focus more sharply on a small number of geographical areas at inter-

SINTEF's Board of Directors from left: Jan Erik Korssjøen, Hans H. Faanes, Tom Ruud, Olav B. Ryan, Roar Arntzen (President of SINTEF), Terje Østvold and Per Ola Grøntvedt. Gerd-Liv Valla was not present.

national level. One of these areas was Iran. The Institute launched a systematic, goal-oriented campaign aimed at gaining the confidence of the National Iranian Oil Company (NIOC), and it won its first contract in summer 2000. This project, which was followed up by several other projects during 2001, consisted of drawing up a development and operating plan for the Azadegan field, which is one of the most important hydrocarbon discoveries of the past 20 years. These contracts were won in the face of strong international bidding competition, and have led to several other SINTEF institutes developing exciting project proposals for Iran. MARINTEK and SINTEF Energy Research, for example, have been awarded a contract to develop a national plan for the utilisation of compressed natural gas (CNG) in the transport sector.

SINTEF Fisheries and Aquaculture and five other fisheries research institutes were the subjects of a review carried out on behalf of the Ministry of Fisheries and the Research Council of Norway. The survey showed that SINTEF Fisheries and Aquaculture has managed to establish itself well in the marine research landscape, even although the Institute has been in existence for only three years. Among the points made about the Institute was that it "has a clear role as a developer of technology and virtually reigns the field in parts of its areas of activity. This gives the institute a special national responsibility to develop the knowledge base required for industrial development in the marine sector".

During the past year, SINTEF has felt the lack of stability in methods of financing research and development. The FUNN scheme, a system of subsidies that was set up in July 2001 with the objective of supporting company investment in R & D, was discontinued after only six months, in spite of the fact that the scheme could be characterised as a success. More than 700 companies started development projects based on support from FUNN, many of them employing SINTEF as their contract partner. A large proportion of these companies were planning development programmes designed to run for several years, and these had to be stopped at the end of the year. A tax-incentive scheme which replaced FUNN has a number of good aspects, but by no means meets the same set of needs. At the time of writing, the incentive scheme has yet to come into effect.

the financial scene

The SINTEF Group's gross revenues for 2001 were MNOK 1,651 (1,547), giving us an operating profit of MNOK 54.1 (40.6). Financial items came to MNOK 26.2 (36.4). The SINTEF Group's profits before tax and minority interests were MNOK 135.7 (77.0) which, after payment of MNOK 0.5 (1.5) in taxes, were transferred *in toto* to the equity capital of the various units of the Group.

The SINTEF Foundation had a gross revenue of MNOK 1,034 (1,029), which gave an operating profit of MNOK 23.6 (18.5). With financial items of MNOK 17.1 (7.6), the result before profits from subsidiary companies came to MNOK 40.8 (26.1).

The MARINTEK Group produced gross revenues of MNOK 207.9 (212.3) and an operating profit of MNOK 20.2 (25.2). With a financial result of MNOK 3.6 (2.4), annual profits came to MNOK 23.8 (27.6).
SINTEF Energy Research AS had gross revenues of MNOK 170.2 (160.8) and an operating profit of MNOK 5.5 (4.3). Financial items of MNOK 3.9 (22.7) left an annual profit of MNOK 9.4 (27.0).

SINTEF Petroleum Research AS generated gross revenues of MNOK 79.1 (73.9) and an operating profit of MNOK 1.3 (-1.2). Financial items amounting to MNOK 4.6 (4.0) left an annual profit of MNOK 6.0 (2.8).
In its third year of operation, SINTEF Fisheries and Aquaculture AS achieved gross revenues of MNOK 70.9 (35.2) and an operating profit of MNOK 1.3 (-2.1). With net financial items of MNOK -0.6 (0.06) annual profits came to MNOK 0.6 (-2.0).

The Sinvent Group had a gross turnover of MNOK 215.2 (143.7), leaving a post-tax profit of MNOK 39.6 (-2.4).

The profit and loss accounts and balance sheet with their associated notes show the financial operations and position of the Group as of December 31, 2001. There have been no subsequent developments of significance for the evaluation of the Foundation or the Group.

On December 31 2001, the SINTEF Foundation had an equity capital of MNOK 730.3 (633.8), equivalent to 62.3% (63.3%) of total assets. There is therefore no reason to doubt that conditions are appropriate for continued operation, and this assumption underlies the presentation of the accounts. The boards of the individual subsidiaries have carried out similar analyses and are in no doubt that continued operation is justified. The Board of the Foundation, which is identical with the Board of the Group, shares this view.

The Foundation has been advised by letter by Trondheim Taxation Department that it is considering extending the tax liability of the Foundation and its four research companies from 2001. The Board of the Foundation disputes the validity of such a change of status, and the possible effects of extended tax liability have not been taken into account in the annual accounts for the Foundation or the Group for 2001.

personnel

The SINTEF Group employed a total of 1929 persons (1852) on December 31, 2001. The SINTEF Foundation employed 1135 persons (1136) on December 31, 2001. 120 members of the research staff (15.3%) left SINTEF during the year to work in industry, the public sector, the universities or other units in the SINTEF Group, while 141 new members of staff joined us. A relatively high rate of replacement of research personnel is in accordance with SINTEF's objectives.

The Board of SINTEF wishes to recommend to SINTEF's Council that the proportion of women on the Board be increased.

The salary of the President of SINTEF came to MNOK 1.06 in 2001, in addition to the value of taxable benefits, which totalled MNOK 0.1 million. Fees paid to the Board of SINTEF came to MNOK 0.35. No payments were made to SINTEF's Council.

Auditors' fees amounted to MNOK 0.85, of which MNOK 0.32 were attributable to SINTEF. A further MNOK 0.32 were paid on other fees, of which MNOK 0.09 were on behalf of SINTEF.

work environment and external environment

Four meetings of SINTEF's Work Environment Committee were held in 2001. A climate of close cooperation with staff representatives ensures that information about important aspects of working conditions is exchanged and that HSE measures are discussed. Important matters dealt with by the Work Environment Committee included the establishment and awarding of the Work Environment Award, discussion of the topic of "feeling of togetherness " and our basic values, and a presentation of sick-leave and its causes in SINTEF.

Sick-leave has fallen from 4.2% in 2000 to 3.5% in 2001, most of this figure being due to long-term absenteeism. The positive trend in the fall in reports of injuries and in their seriousness has continued. All injuries have been reported and followed up.

Our good relationship with managers, HSE coordinators and safety representatives means that planned efforts regarding risk assessments and various aspects of the physical and technical work environment are dealt with in a satisfactory manner and in accordance with "Regulations for systematic health, safety and environmental efforts in our operations". During the year, SINTEF's chemical database has been further developed and has

been brought into operation. SINTEF has not experienced any irregularities with respect to the external environment in 2001.

Our most important challenges continue to lie in the field of psychosocial issues. Responding to the needs of our employees and dealing with these needs in a way that enables knowledge and creativity to thrive is a central task. The keyword in the context is “leadership”. For this reason, SINTEF has launched a wide-ranging leadership development programme to which internal and external resource persons are contributing.

prospects for the future

Fusions and buyouts, internal reorganisation and a growing degree of globalisation are current features of much of SINTEF’s traditional market sector. It has become harder to be a Norwegian contract research institute, particularly since SINTEF operates under much less advantageous conditions than our overseas competitors.

To an ever-increasing extent, SINTEF’s customers are demanding integrated solutions to their problems. This trend means that SINTEF will have to become better at integrating individual components of its know-how and at following its R & D services further out in the value chain. In this field we are pursuing an aggressive policy, not least in terms of developing new business areas. SINTEF Oil and Gas and SINTEF Public Sector are two pilot areas for which the Board has great expectations in the near future.

SINTEF established Sinvent as a way of intensifying its efforts to create more, and more robust, spinoff companies. Investment Engine is being developed as an internal tool for identifying and commercialising promising business ideas. SG Venture is in the process of being provided with more capital so that it will be able to supply capital for the development phases of such ideas. New business areas and Investment Engine are two of the strategies in SINTEF’s development plan that will help to implement the plan’s general objective of profitable growth.

Public-sector investments in industrially oriented research are continuing their downward trend. There is a political objective to raise the national level of investment in R & D to the average OECD level, but this rise is taking its time to happen. As a result, SINTEF will continue to have to base its existence on winning research contracts from industry and the public sector.

During the past few years, a number of studies have pointed out that Norway needs to raise its level of onshore value-adding in sectors that are exposed to competition. New industries and companies will have to be developed to replace the inevitable downturn in the petroleum sector. SINTEF has been a locomotive in promoting both companies based on new knowledge and the renewal of existing companies and industries via the adoption of new technology.

The growth of a new type of R & D-intensive company is beginning to leave its mark on SINTEF’s range of activities. In SINTEF Electronics and Cybernetics, for example, we may note that nearly half of this division’s contracts come from about 20 relatively recently launched companies with original knowledge-based product concepts. These are companies that seek their capital in the venture-capital market, and that need SINTEF’s polytechnical expertise in order to develop their products as rapidly and cost-effectively as possible. In many such cases, SINTEF’s scientists also make a significant contribution to the basic ideas involved and to how such concepts are turned into products.

By the end of 2002 our new micro- and nanotechnology laboratory building will be ready for occupation. SINTEF’s investment of NOK 75 million is the largest individual financial commitment in the history of this institution. The laboratory is the first in Norway to be specifically designed for research and development in this field. This requires advanced instrumentation and high standards in the rooms in which the research will be carried out. The microelectronics laboratory is being built in collaboration with the Research Council of Norway and will also be utilised by the University of Oslo. Teaching linked to the laboratory will produce a large number of graduates in an exciting area for the industry of the future.

The first few months of 2002 have been good for the SINTEF Group, with our order reserve at the same level as it was this time last year.

Finally, the Board wishes to thank all members of staff of the SINTEF Group for the good work they have done during the past year.

Oslo, 14 March 2002

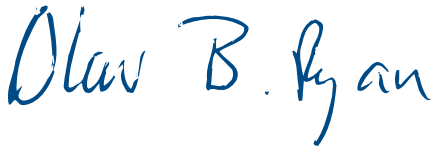
Hans H. Faanes

Tom Ruud, chairman

Terje Østvold

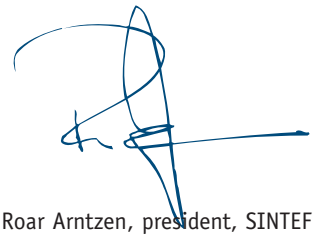
Gerd-Liv Valla

Jan Erik Korssjøen



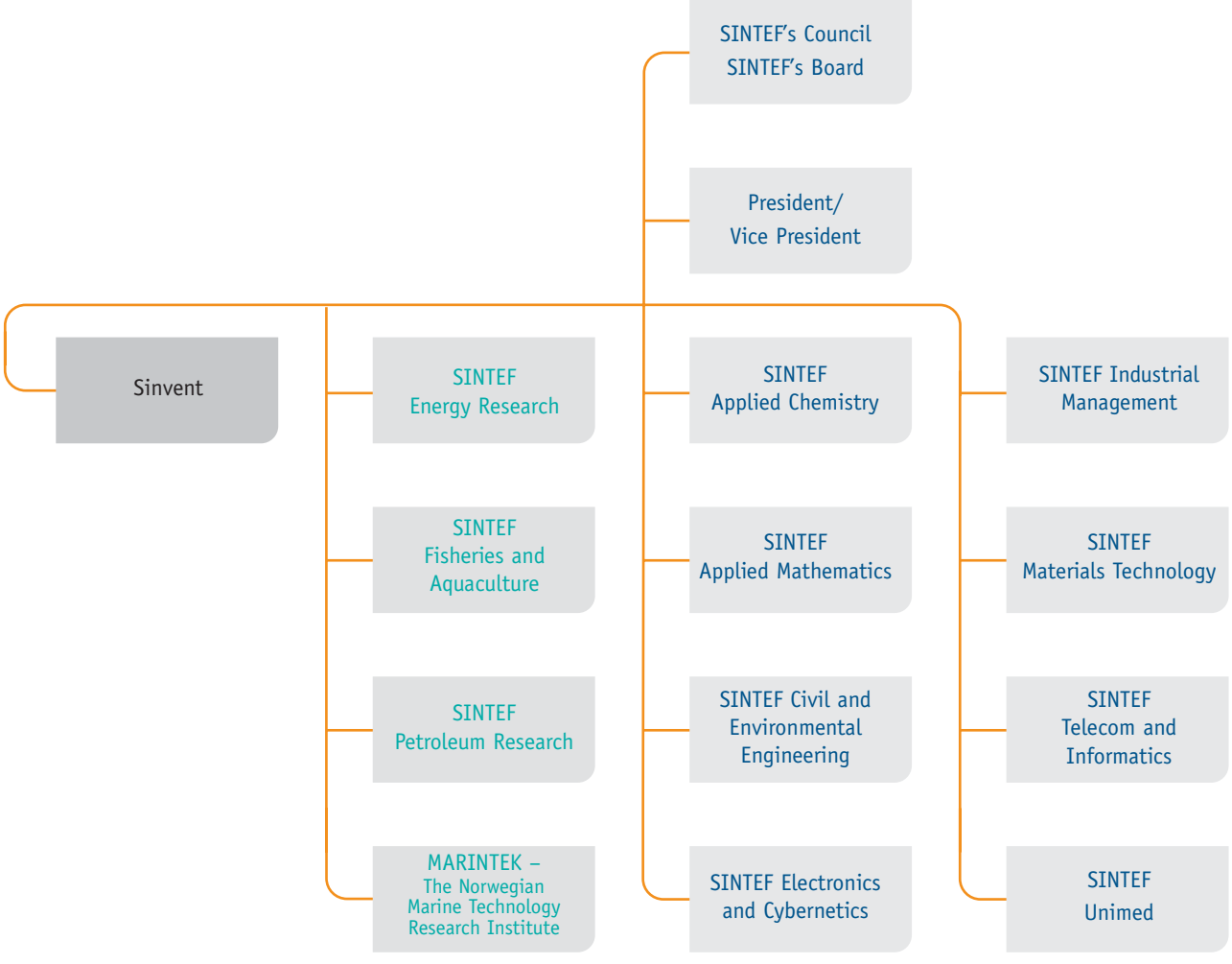
Olav B. Ryan

Per Ola Grøntvedt



Roar Arntzen, president, SINTEF

The SINTEF Group



SINTEF Applied Chemistry
Vice President, Research: Odd Ivar Eriksen
– Biotechnology
– Catalysis and Kinetics
– Chemical Engineering
– Environmental Engineering
– Environmental Technology and Analysis
– Hydrocarbon Process Chemistry
– Inorganic Process Chemistry and Analysis
– Organic Synthesis
– Polymer Chemistry
– Water and Wastewater
Employees: 170. Gross revenues: NOK 164 million.

SINTEF Applied Mathematics
Vice President, Research: Tore Gimse
– Computational Engineering
– Geographical Information Technology
– Geometry
– Numerical Simulation
– Optimization
Employees: 60. Gross revenues: NOK 39 million.

SINTEF Civil and Environmental Engineering
Vice President, Research: Bjørn Svensvik
– Architecture and Building Technology
– Cement and Concrete
– Roads and Transport
– Rock and Soil Mechanics
Employees: 99. Gross revenues: NOK 101 million.

SINTEF Electronics and Cybernetics
Vice President, Research: Ernst H. Kristiansen
– Automatic Control
– Instrumentation
– Microelectronics
– Microsystems
– Norwegian Microtechnology Centre
– Optical Measurement Systems and Data Analysis
– Photonics
Employees: 103. Gross revenues: NOK 95 million.

SINTEF Industrial Management
Vice President, Research: Tor Ulleberg
– Economics and Logistics
– Innovation and Industrial Development
– Institute of Social Research in Industry (IFIM)
– Knowledge and Strategy
– New Praxis
– Production Engineering
– Productivity and Project Management
– Safety and Reliability
Employees: 130. Gross revenues: NOK 159 million.

SINTEF Materials Technology
Vice President, Research: Unni Steinsmo
– Applied Physics
– Casting and Metal Forming – Trondheim
– Casting and Metal Forming – Oslo
– Corrosion, Joining and Surface Technology
– Electrochemistry and Ceramics
– Flow Technology
– Fracture Mechanics and Materials Testing
– Metallurgy and Particle Processing
– Polymers and Composites
Employees: 183. Gross revenues: NOK 195 million.

SINTEF Telecom and Informatics
Vice President, Research: Aage Jostein Thunem
– Acoustics
– Computer Science
– Distributed Information Systems
– Radio and Sensor Systems
– Signal Processing and Systems Design
– System Engineering and Telematics
Employees: 125. Gross revenues: NOK 116 million.

SINTEF Unimed
Vice President, Research: Tonje Hamar
– Health and Rehabilitation
– Health Economics, Quality and Access
– Management, Organisation and Health Services Interaction
– Mental Health Services Research
– Health Technology Assessment
– Epidemiological Research
– Health and Work Physiology
– Innovation
– Microbial Exposure and Indoor Air
– MR Center
– Norwegian Patient Register
– Patient Classification and Financing
– Ultrasound
Employees: 142. Gross revenues: NOK 123 million.

The SINTEF Group also includes four research companies:

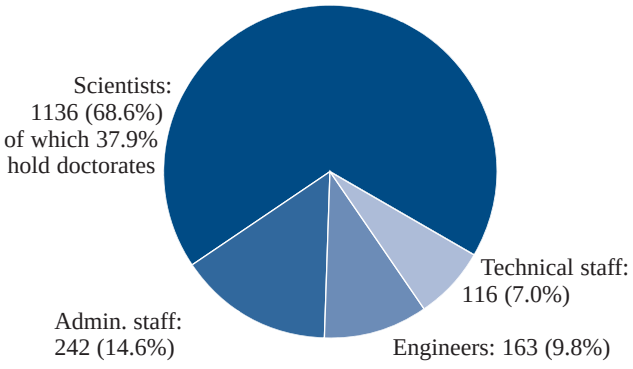
SINTEF Energy Research
President: Sverre Aam
– Energy systems
– Electric Power Technology
– Thermal Energy
– Refrigeration and Air Conditioning
Employees: 179. Gross revenues: NOK 170 million.

SINTEF Fisheries and Aquaculture
President: Karl A. Almås
– Bioresources
– Fisheries Technology
– Aquaculture Technology
– Food Processing
– International Development Programmes
– Coastal and Ocean Engineering
Employees: 80. Gross revenues: NOK 71 million.

SINTEF Petroleum Research
President: David Lysne
– Basin Modelling
– Subsea and Well Technology
– Seismics and Formation Physics
– Reservoir Technology
Employees: 73. Gross revenues: NOK 79 million.

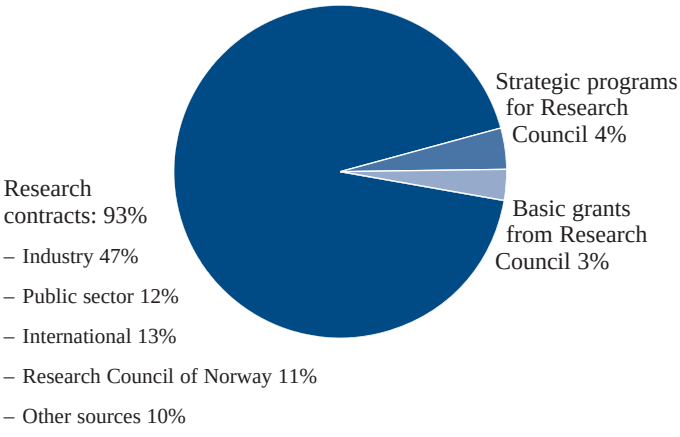
MARINTEK – The Norwegian Marine Technology Research Institute
President: Oddvar Aam
– Structural Engineering
– Machinery and Technical Operations
– Offshore Structures
– Ship Performance
Subsidiary: MARINTEK (USA), Inc.
Laboratories: Cavitation tunnel, Machinery laboratory, Marine structures laboratory, Ocean basin laboratory, Towing tank
Employees: 173. Gross revenues: NOK 208 million.

staff of the SINTEF Group's research institutes by professional category – total staff as of 31 December 2001: 1657

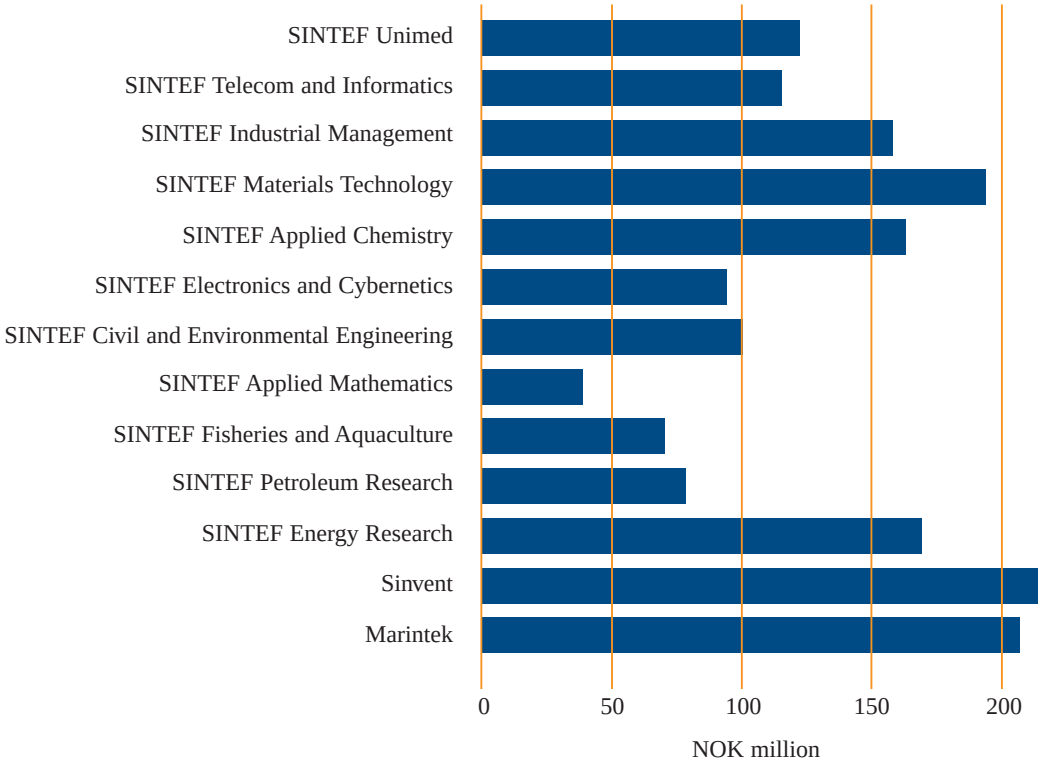


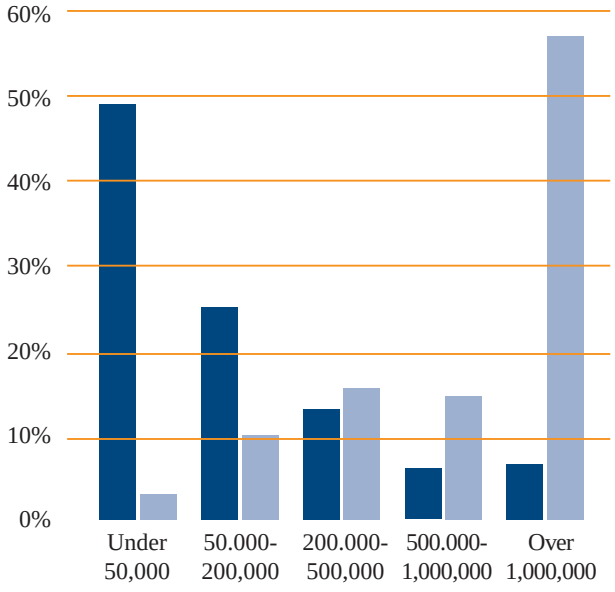
The SINTEF Group also includes the Sinvent Group, which had 272 employees at the end of 2001.

institute revenue sources by category



gross revenues





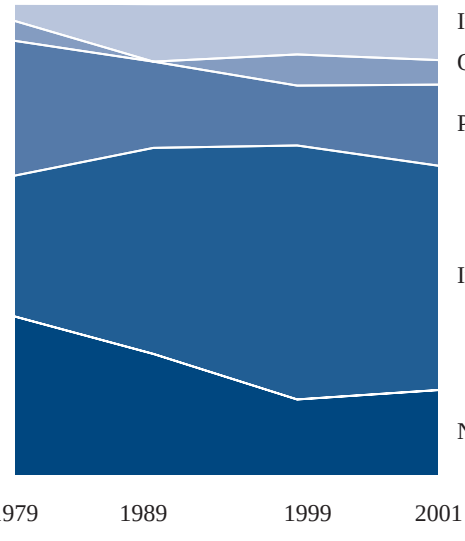
number of projects completed in 2001:

– project size and proportion of turnover (4261 projects in total)

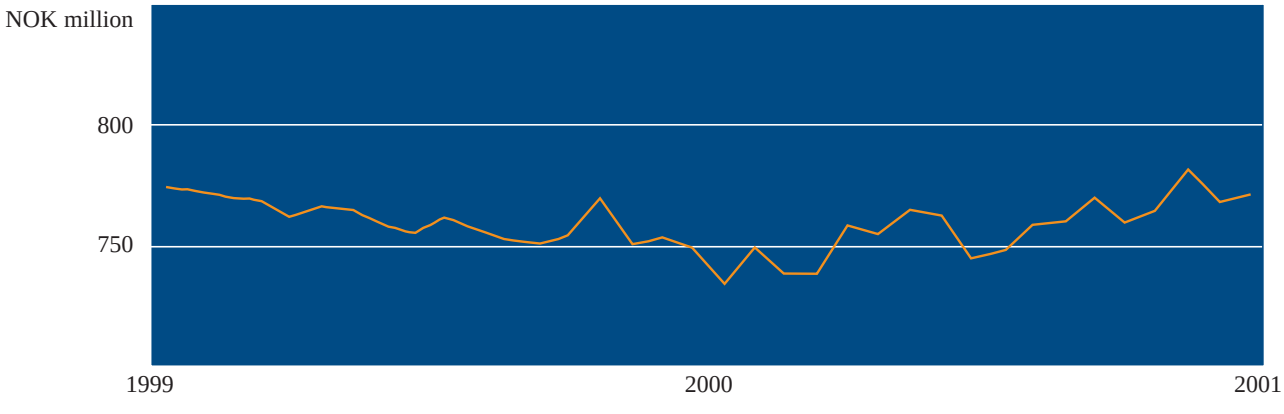
Project size

Proportion of turnover

sources of revenue



net income
for each preceding 12-month period – the SINTEF foundation



BALANCE

(Highlights of the financial statements)
Balance sheet on 31. December 2001 (all figures in NOK thousand)

The SINTEF group			SINTEF	
2000	**2001**	**Balance on 31.12.**	**2001**	**2000**
		ASSETS		
		Long-term assets		
6 746	–	Deferred tax advantage	–	–
6 746	**–**	**Intangible assets**	**–**	**–**
294 007	304 213	Real estate, buildings and other fixed assets	262 349	261 620
–	27 487	Buildings under construction	27 487	–
40 678	52 752	Scientific equipment	27 784	23 187
20 112	8 584	Other equipment, fixtures, etc.	5 045	7 324
354 797	**393 036**	**Long-term operating assets**	**322 665**	**292 131**
–	–	Investments in subsidiaries	228 893	172 783
19 218	3 232	Other shares	31	31
–	–	Consolidated long-term receivables	47 690	32 187
5 882	12 494	Pension fund	–	–
6 808	14 935	Other long-term receivables	13 208	6 326
31 908	**30 661**	**Financial long-term assets**	**289 822**	**211 327**
393 451	**423 697**	**Total long-term assets**	**612 487**	**503 458**
		Current assets		
1 982	1 517	Inventory of finished goods	1 328	1 537
77 245	83 313	Work in progress	57 083	58 200
79 227	**84 830**	**Goods**	**58 411**	**59 737**
399 148	464 947	Accounts receivable	278 872	228 575
–	–	Consolidated current receivables	26 450	18 146
13 926	89 889	Other current receivables	1 896	2 686
413 074	**554 836**	**Receivables**	**307 218**	**249 407**
16 460	43 204	Shares	–	–
119 850	221 543	Bonds and other securities	103 195	57 111
136 310	**264 747**	**Investments**	**103 195**	**57 111**
259 675	217 585	Cash, bank deposits	90 408	130 529
259 675	**217 585**	**Bank deposits, cash, etc.**	**90 408**	**130 529**
888 286	**1 121 998**	**Total current assets**	**559 231**	**496 784**
1 281 737	**1 545 694**	**TOTAL ASSETS**	**1 171 717**	**1 000 242**

BALANCE continued

(Highlights of the financial statements)

The SINTEF Group			SINTEF	
2000	**2001**	**Balance on 31.12.**	**2001**	**2000**
		EQUITY AND LIABILITIES		
		Equity		
69 455	63 596	Share premium reserve	62 300	62 300
69 455	**63 596**	**Paid-up equity**	**62 300**	**62 300**
–	–	Reserve for valuation variances	195 354	139 246
564 346	666 695	Other equity	472 637	432 256
77 038	98 999	Minority interests	–	–
641 384	**765 694**	**Earned equity**	**667 991**	**571 502**
710 839	**829 290**	**Total equity**	**730 291**	**633 802**
		Liabilities		
58 317	47 123	Pension liabilities	38 137	50 781
–	4 700	Deferred tax	–	–
58 317	**51 823**	**Long-term liabilities**	**38 137**	**50 781**
–	3 262	Mortgage loans	–	–
–	**3 262**	**Other long-term liabilities**	**–**	**–**
67 857	90 943	Accounts payable	58 372	46 012
–	10 541	Credit line	–	–
1 486	4 637	Tax due	200	–
163 933	194 544	VAT, tax deductions, social security, etc.	127 170	102 937
187 576	225 505	Advance payments from customers	149 824	124 827
–	–	Consolidated current liabilities	20 660	9 771
91 729	135 150	Other current liabilities	47 064	32 112
512 581	**661 319**	**Current liabilities**	**403 289**	**315 659**
570 898	**716 404**	**Total liabilities**	**441 426**	**366 440**
1 281 737	**1 545 694**	**TOTAL EQUITY AND LIABILITIES**	**1 171 717**	**1 000 242**

Oslo, 14. March 2002

Hans H. Faanes

Tom Ruud
(Chairman)

Terje Østvold

Gerd-Liv Valla

Jan Erik Korssjøen

Olav B. Ryan

Per Ola Grøntvedt

Roar Arntzen
(President, SINTEF)

INCOME STATEMENT

(Highlights of the financial statements)

Income statement for period 1 January - 31 Decemberr 2001 (all figures in NOK thousand)

A complete set of annual accounts, with notes, can be found on the SINTEF website: http://www.oslo.sintef.no/annual/)

The SINTEF Group			SINTEF	
2000	**2001**		**2001**	**2000**
		OPERATING INCOME AND EXPENSES		
1 261 111	1 442 713	External project revenues	779 058	813 314
194 662	122 031	Projects funded by the Research Council	168 996	136 401
48 068	50 405	Grants from the Research Council of Norway	33 000	33 000
42 738	35 409	Other revenues	52 939	46 099
1 546 579	**1 650 559**	**Gross revenue**	**1 033 994**	**1 028 814**
359 053	360 256	Direct project expenses	262 467	264 913
1 187 526	**1 290 303**	**Net operating income**	**771 527**	**763 901**
843 747	897 080	Salaries and social security	522 416	523 077
56 259	51 570	Depreciation	31 916	37 123
–	2 243	Write-down	–	–
51	3 421	Losses on accounts receivable	3 421	–
246 865	281 883	Other operating expenses	190 183	185 185
1 146 922	**1 236 197**	**Gross operating expenses**	**747 936**	**745 385**
40 604	**54 106**	**OPERATING PROFIT**	**23 591**	**18 516**
		FINANCIAL INCOME AND FINANCIAL EXPENSES		
20 655	31 055	Ordinary financial income	18 669	9 938
19 662	–	Other financial income	–	–
3 932	4 826	Financial expenses	1 487	2 372
36 385	**26 230**	**Net financial income**	**17 183**	**7 566**
–	55 393	Extraordinary sales	–	–
76 989	**135 729**	**Profit before consolidation of subsidiaries**	**40 774**	**26 082**
–	–	Share of results of subsidiaries	54 954	29 551
76 989	**135 729**	**Profit before taxes**	**95 728**	**55 633**
1 546	15 969	Taxes	393	–
78 535	**119 760**	**Profit before minority interests**	**95 335**	**55 633**
22 902	24 425	Minority interests	–	–
55 633	**95 335**	**NET PROFIT**	**95 335**	**55 633**
		Dispositions		
		Transferrred to equity	95 335	55 633
		Total dispositions	**95 335**	**55 633**

CASH-FLOW ANALYSIS

Cash-flow analysis for the period 1. January – 31. December 2001 (all figures in NOK thousand)

The SINTEF Group			SINTEF	
2000	**2001**		**2001**	**2000**
		Cash-flow from operations		
76 989	135 729	Profit before tax	95 728	55 633
–	–	Percentage of profit from subsidiaries	- 54 954	- 29 551
56 259	53 813	Ordinary depreciations/write-downs	31 916	37 123
–	- 375	Gains from sales of fixed assets	–	–
–	- 55 393	Gains from sales of commercial activities	–	–
80 789	- 128 488	Change in investments	- 46 084	60 188
22 849	- 6 068	Change in work in progress	1 117	21 752
- 64 165	- 65 799	Change in accounts receivable	- 50 297	- 11 058
17 252	23 086	Change in accounts payable	12 360	10 635
37 709	47 361	Change in other accrued or deferred items	67 665	1 589
–	- 1 679	Tax paid	- 193	–
227 682	**2 187**	**Net cash-flow from operations (A)**	**57 258**	**146 311**
		Cash-flow from investment activities		
- 95 907	- 101 046	Purchases of long-term operating assets	- 64 065	- 71 611
- 18 305	- 8 127	Investments in long-term financial assets	- 22 385	- 12 459
8 716	9 369	Sale of tangible fixed assets	1 715	355
–	71 379	Sale of short-term financial properties	–	–
- 105 496	**- 28 425**	**Net cash-flow from investment activities (B)**	**- 84 735**	**- 83 715**
		Cash-flow from financial activities		
–	3 262	Instalments on long-term debt	–	–
- 15 560	- 17 806	Changes in pension liabilities	- 12 644	- 18 460
–	- 1 308	Changes charged directly to equity	–	–
- 15 560	**- 15 852**	**Net cash-flow from financial activities (C)**	**- 12 644**	**- 18 460**
106 626	- 42 090	Net change in cash holdings (A+B+C)	- 40 121	44 136
153 049	259 675	Cash balance on 01-01-01	130 529	86 393
259 675	**217 585**	**Cash balance on 31-12-01**	**90 408**	**130 529**

To the Council of the Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology (SINTEF)

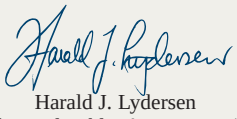
Auditor's report for 2001

We have audited the annual financial statements of SINTEF as of 31 December 2001, showing a profit of NOK 95 335 000 for the parent company and a profit of NOK 119 760 000 for the Group. We have also audited the information in the Board of Directors' report concerning the financial statements, the going concern assumption, and the proposal for the allocation of the profit. The financial statements consist of the balance sheet, the statements of income and cash flow, the accompanying notes and the Group accounts. These financial statements are the responsibility of the Foundation's Board of Directors and the President. Our responsibility is to express an opinion on these financial statements and other information according to the requirements of the Norwegian Act on Auditing and Auditors.

We have conducted our audit in accordance with the Norwegian Act on Auditing and Auditors and generally accepted auditing standards in Norway. Generally accepted auditing standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. To the extent required by law and generally accepted auditing standards, an audit also comprises a review of the management of the Foundation's financial affairs and its accounting and internal control systems. We believe that our audit provides a reasonable basis for our opinion.

In our opinion:
- the financial statements are prepared in accordance with Norwegian law and regulations and present the financial position of the Foundation and of the Group as of 31-12-2001 and the results of its operations and its cash flows for the year then ended, in accordance with generally accepted accounting principles in Norway
- the Foundation's management has fulfilled its duty to maintain the Foundation's accounting process in such a proper and well-arranged manner that the accounting process is in accordance with Norwegian law and generally accepted accounting practices
- the information in the Board of Directors' report concerning the financial statements, the going concern assumption, and the proposal for the allocation of the profit is consistent with the financial statements and complies with the law and regulations.

Trondheim, 14 March 2002
Deloitte & Touche



Harald J. Lydersen
State Authorised Public Accountant (Norway)

SINTEF's prize for Outstanding Research

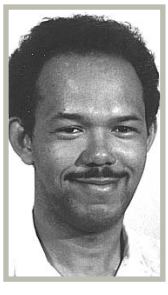
The Prize for 2001 has been awarded to

Duncan Akporiaye

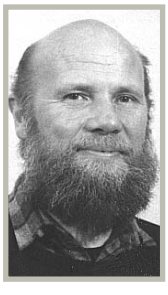
Ivar M Dahl

Arne Karlsson

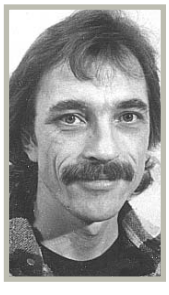
Rune Wendelbo



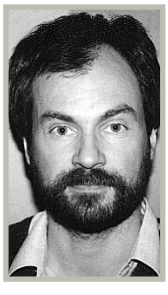
Duncan Akporiaye



Ivar M. Dahl



Arne Karlsson



Rune Wendelbo

The prize has been awarded for their development of a combinatorial system for the synthesis of inorganic materials (zeolites) under extreme synthesis conditions. Combinatorial chemistry is a technique which permits the rapid synthesis, characterisation and testing of new materials with special properties. This research group has developed and patented a microsystem that performs such syntheses at high temperatures and pressures. This groundbreaking work has made them the first group in the world to simultaneously synthesise 100 zeolites – an important group of materials that are used both as catalysts and adsorbants. The group's publications have aroused international interest, and they will play a central role in the further development of combinatorial synthesis. The activity has brought a significant amount of contract research revenue to SINTEF.

SINTEF's prize for Outstanding Teaching at NTNU

Professor Kolbjørn Hagen received SINTEF's award for outstanding teaching.

SINTEF's prize for outstanding teaching at NTNU this year has gone to Professor Kolbjørn Hagen of the Department of Chemistry, in recognition of his focus on the student in his teaching. Hagen has taught all levels of his subject for many years, first in the Department of Chemistry at NLHT/AVH and subsequently in the Department of Chemistry in the Faculty of Chemistry and Biology at NTNU. The citation primarily draws attention to his introductory-level teaching in general chemistry, in which he places great stress on giving his new students a thorough introduction that will stimulate their interest in the subject, which forms the basis of all their further studies in chemistry. Both students and colleagues stress the pleasure he takes in teaching, and the way in which he transmits his knowledge by creating a sense of trust in the teaching process and via personal contact with his students, both in the classroom and elsewhere. Professor Hagen was presented with the award during the matriculation of new NTNU students on August 16, 2001.

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