



# REPORT OF THE BOARD OF DIRECTORS





SINTEF's Board of Directors. From left: Ingrid Selseth, Grete Aspelund, Arne Birkeland, Vigdis Olden, Walter Qvam, Marit Reitan, Tor Grande, Mari Thjømøe and Ole Swang. Photo: Gorm K. Gaare

## Report of the Board of Directors, 2017

SINTEF is a non-commercial research institute, organised in the form of a foundation with subsidiary companies. Through its outstanding solution-oriented research, knowledge production and commercialisation of research results, SINTEF generates significant assets for its Norwegian and overseas clients, for the public sector, and for society as a whole. Our vision is "Technology for a better society".

As by far the country's largest and most multidisciplinary research institute, SINTEF holds an important position in Norwegian society, and has major significance for asset creation and innovation in trade and industry. Maintaining such a position requires that we succeed against keen international competition. SINTEF's results show that the company performs well in important arenas of competition, such as in the EU and the Research Council of Norway. This demonstrates that we are in the forefront of international research, which is essential if we are to realise our vision of contributing to society and creating wealth for our clients.

SINTEF co-operates with clients throughout Norway and extensively in the international market. The company's

headquarters, with the vast majority of its employees, is in Trondheim, but SINTEF has for a long time had a significant presence in Oslo, Raufoss, Tromsø and Bergen. In line with our strategy of having close ties to industry, we have also in 2016 and 2017 established operations in Mo i Rana, Ålesund and the Grenland region of southern Norway. Our presence in Grenland has come about through the merger of research establishment Tel-Tek with SINTEF, which came into full effect in 2017.

SINTEF has established a partnership and a close strategic and collaborative relationship with the Norwegian University of Science and Technology (NTNU). SINTEF also has a close working relationship with the University of Oslo and a number of other national and international research institutes. This collaboration promotes high technical quality and is essential if Norway is to succeed in important research fields and as an innovative industrial nation.

The Board is pleased to see that SINTEF, after several years of weak results, achieved a yield commensurate with its ambitions in 2017. This is the result of determined effort and a number of demanding processes intended to reorganise parts of the company and promote more efficient

operations. However, it is also a result of the fact that we have been successful in compensating a downturn in sales linked to the petroleum industry with growth in other sectors, especially aquaculture and fisheries, energy, and building and construction. A yield at this level is necessary if SINTEF is to remain in the forefront and be able to make the necessary investments in laboratories, scientific equipment and skills development.

At the same time we have been successful in markedly increasing the number of our scientific publications and the Board is pleased with the number of awards to SINTEF and its clients in connection with announcements in the Research Council of Norway's industry-oriented programmes at the beginning of 2018.

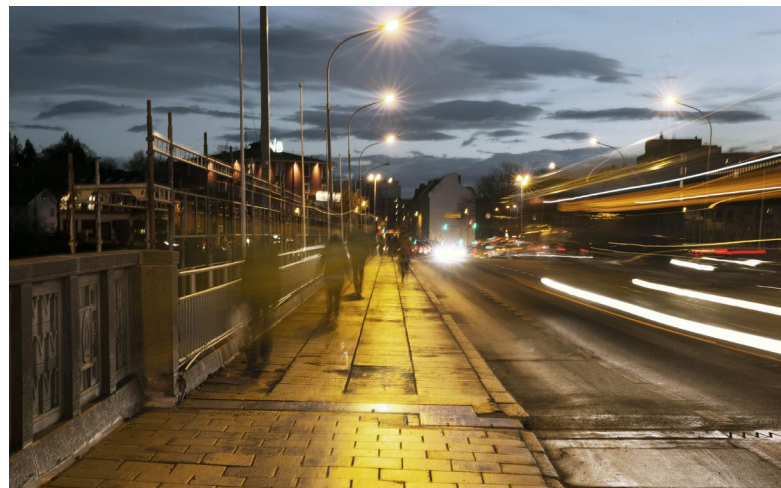
### Strategy and our role in society

SINTEF has a duty to develop society by means of contract-based research projects and innovation. Our main aim is to be a world-leading research institute that, together with our clients in the private and public sectors, generates value and develops solutions to some of the great challenges facing society today.

SINTEF's strategy places great importance on working as "One SINTEF": in other words through multidisciplinary work, making use of the best skills from throughout the Group, to create value in fields where Norwegian industry and research are particularly strong.

There is considerable pressure to reorganise in all areas of society, among other things in connection with digitalisation, automation, climate science, cost reduction, new value chains, and increased consumer power. This is of considerable importance to clients and research institutes, as well as for the way in which SINTEF organises and manages its own operations.

We see that our ability to work in a multidisciplinary manner and engender industrial and political dialogue concerning the premises for innovation is one of SINTEF's greatest competitive advantages. In the course of last year we implemented eleven strategic group-wide initiatives in which we use basic funding from the Research Council of Norway to stimulate multidisciplinary methods crossing traditional boundaries between industrial sectors and institutes, and to enhance our ability to make use of new empowering technology in fields in which we have strong



sector and domain expertise. We have also introduced a system for measuring purchases and sales between the institutes in order to stimulate improved interaction.

In 2017 we have again implemented measures to adapt our manpower to market requirements. SINTEF Digital in particular has been affected by reorganisation.

In 2017, SINTEF effected significant changes in its corporate structure in order to improve operational efficiency by consolidating activities in larger institutes and modifying our legal structure so as to facilitate growth in line with the objectives of the Foundation and reduce financial risk. From 1 January 2018, the Foundation's organisation has been modified in that all research activities now take place in subsidiaries which take the form of limited-liability research companies. The most important change was to transfer all employees in the SINTEF Foundation to SINTEF AS, effective from 1 January 2018. In this way the Foundation becomes the forefront of the SINTEF Group and the company is now legally well-equipped to support its various assignments: research activities, commercialisation of research results, property management, and financial management. The changes will help to reinforce our ability to fulfil our role in society while also reducing risk to the Foundation's capital assets. SINTEF's Council, NTNU (as founder), the Research Council of Norway and the Norwegian Foundation Authority have been involved in various aspects of this work.

SINTEF AS consists of the four institutes that have previously been organised directly as the Foundation. The institute known as SINTEF Industry is the result of the merger of SINTEF Materials and Chemistry and SINTEF Petroleum AS, effective from 1 January 2018, as well as amalgamation with the Tel-Tek Foundation effective from



22 November 2017. SINTEF's ambition is that SINTEF Industry will become an even more attractive joint-venture partner for all groups that are active in the petroleum and process industries, and will play a part in making the full range of SINTEF's extensive expertise available to our clients. The ambition for this integration of expertise is to generate research-related, strategic, market- and cost-related synergies for SINTEF's operations.

### **Technology for a better society**

By means of our high technical standards, combined with the excellent efforts of our employees, SINTEF continues to generate results for its clients and for society, helping towards achieving our vision of 'Technology for a better society'. The following are some examples of our activities in 2017:

By way of the SamKAD project, research scientists from SINTEF have assisted Oslo Municipality in digitalising work processes at the municipal emergency medical unit. The aim of this project was to improve organisation, procedures and patients' progress by using new and innovative systems. Millions have been saved and job satisfaction boosted since doctors and nurses became involved in selecting IT systems to rationalise their day-to-day routines. The results have led to significant growth in productivity: The number of person-years per patient was reduced by 28 per cent and personnel costs per patient went down by 20 per cent. Research scientists have involved the users actively in projects. Three nurses and one doctor have worked part-time in connection with the technological system, adaptations to clinical operations and training of employees. The project was implemented as a collaboration between the Health Service in Oslo Municipality (the project owner) and technology suppliers Imatis and CSAM Health, with SINTEF acting as a research and innovation partner. Oslo and Akershus University College participated in follow-up research. The company Imatis AS received the award for "Innovation Project of the Year" for its participation in the project.

China is seeking the advice of Norwegian research scientists for the development of hydroelectric projects. The Norwegian handbook that describes how power station developers can design waterways that facilitate salmon migration has now been translated into Chinese. For eight years, the CEDREN research centre, which was managed by SINTEF, worked on environmental design and

renewable energy until it was closed down in 2017. One of the most important contributions of the centre was to develop methods for hydroelectric generation and water system regulation. The methods have been published in the "Handbook for environmental design in regulated salmon rivers" and demonstrate how to study, develop and implement measures that take into account both power generation and environmental conditions for salmon. The book is becoming a standard reference work in Norway and has attracted considerable interest internationally. It has already been translated into English and in 2017 a Chinese translation was published.

Marine pollution that threatens life in the sea is receiving increasing international attention. One of the most serious challenges is the large amount of plastic in the world's oceans. It takes a long time for plastic to be broken down in the marine environment, and microplastic is found everywhere in the oceans. In the MICROFIBRE project, SINTEF is collaborating with commercial partners Helly Hansen, the Pierre Robert group, the Varner Group and Bergans, as well as two NGOs, PlasticSoup and 5Gyre, to study the impact of micro- and nanoparticles on the marine environment. Data from these studies are being used to identify textiles which cause least environmental impact and to find measures to limit the release of microfibre to the environment.



In the near future Norway is likely to experience a shortage of 100,000 skilled workers. It is important to encourage more people to start vocational training, and particularly important that they receive the right education at upper secondary school, during apprenticeship and following their employment in industry. Automation, robotisation and the need for a higher rate of innovation call for competent



professionals with interdisciplinary skills. The knowledge-building (KPN) project “SKILLS” focuses on determining the correct qualifications for the skilled workers of the future, on how vocational training establishments and companies can collaborate and on how on-the-job training can ensure that employees become highly performing personnel with the necessary skills. The SKILLS project is managed by SINTEF, with NIFU as a research partner and Sandvik Teeness, Pipelife and Siemens Power Electronics Centre as commercial partners. Three upper secondary schools that provide courses in industrial production, electrical engineering and automation are also participating. Learning Moment Technologies, a company from mid-Norway, is involved in the project as a developer of electronics-based training systems.

By making use of new research methods associated with transport and other emission-intensive construction operations, SINTEF wishes to contribute to expertise whereby an innovative procurement process can be established for the building and construction industry. The “Emission-free construction sites” project focuses on communication and transport, but will also study, among other things, processes, energy consumption, life-cycle analysis (LCA), optimisation, and digitalisation. Among other things, the project will result in a guide that will assist public sector builders in setting more effective requirements for emission-free construction sites, with Skanska and Bellona as partners and Omsorgsbygg Oslo KF, a municipal undertaking that performs property management on behalf of Oslo Municipality, in the role of project owner. In a continuation of the collaboration, at the end of 2017, SINTEF was assigned the research project “PILOT-E”, dealing with emission-free excavators. In this project, four

SINTEF institutes will co-operate to develop an emission-free excavator, in collaboration with NASTA AS (the project owner) and partners Siemens, Skanska, Bellona, Omsorgsbygg Oslo KF, and the government Agency for Public Management and eGovernment (Difi).

Rare Earth Elements (REE) are important constituents of wind turbines and electric vehicle motors, among other things. The EU wishes to break China’s almost complete monopoly with regard to these raw materials, and SINTEF will contribute to establishing the sustainable, stable and safe production of REEs in Europe. In the “REE4EU” project we have for some years been developing technology to recover REEs from the electronic waste which ends up on landfills. Now SINTEF, in collaboration with Yara and the Reetec company, will establish a new source of rare earth metals by extracting them from raw material that is fed into Yara’s fertiliser plant in Porsgrunn. The “SecREEs” project, of which SINTEF is the project manager, was recently granted NOK 125 million in funding from the EU’s Horizon 2020 framework programme.

### **Commercialisation of research results**

The company SINTEF TTO commercialises research results by facilitating the launch and development of new companies, patenting processes and the licensing of technology. By the end of 2017, SINTEF had 15 start-up companies in its portfolio, which during the year have received a total of NOK 32 million from SINTEF venture funding. If one takes into account investors in the public policy instrument system, these companies have received NOK 107 million in 2017.

One of the portfolio companies is the IT company Tellu IoT AS. As a result of technology and capital from SINTEF, the company is now established as the leading IoT (Internet of Things) platform for eHealth and personal data security in Scandinavia. The technology opens the way for advanced cloud services, scalability and robustness that makes the company the preferred choice in the field of eHealth.

In collaboration with the University of Cape Town in South Africa, SINTEF has developed a new diagnostic tool that uses ultrasound technology to detect raised intracranial pressure. Current methods of measurement require a pressure sensor to be surgically inserted into the cranium, with the associated costs and health risk. The new tool will make it possible for a doctor to measure intracranial

pressure (ICP) simply by scanning the patient's eye with an ultrasound probe, with no need for surgery. The diagnosis is immediate and can be made in an ambulance at the scene of an accident, instead of in an operating theatre. The technology is licensed to Nisonic AS and will be developed until clinical certification is obtained, permitting the product to be sold in the US, the EU and Africa.

In order to take the next strategic step in its commercialisation work, the Board decided in November 2017 to invest NOK 110 million in the SINTEF Venture V fund, which will be ready to start investment during the first half of 2018. The European Investment Fund has granted up to EUR 25 million, subject to certain conditions. SINTEF's management is currently working to obtain additional funding from other, private investors.

## Health, Safety and the Environment

SINTEF is working systematically to ensure employee safety and a sound working environment. There is effective co-operation between employees and management, which is of considerable importance in creating a sound, health-promoting working environment.

SINTEF's main strategy defines four general objectives for HSE work. SINTEF shall have:

- A sound and health-promoting working environment
- No occupational sickness absence
- No injuries, accidents or losses
- Operations with a clear environmental profile

In 2017, SINTEF received certification according to three standards: ISO 14001:2015 (environmental management systems), ISO 9001:2015 (quality management systems) and OHSAS 18001:2007 (working environment management systems).

Certification of the entire organisation consolidates SINTEF's status as an integrated enterprise with a common management system, providing high quality services to its clients. Retaining these certifications entails continuous improvement work and recertification was carried out in December 2017.

SINTEF's goal is zero personal injuries. Unfortunately, in 2017, 31 personal injuries were registered, of which 15 required medical treatment. Five injuries resulted in

absence from work and 16 were classed as first aid injuries. The number of personal injuries has shown a negative development in the last three years. In 2017 the institutes worked on initiatives to reduce the number of injuries. The above-mentioned incidents indicate that this work must still be given high priority. In the course of several years a number of investigations, studies and analyses have been carried out to ascertain the causes and assess preventive measures.

In 2017, the Group's management resolved that an HSE campaign would be implemented with the aim of substantially reducing personal injuries and achieving permanent changes in the behaviour of personnel in laboratories and workshops. Special improvement work will be initiated in four areas of focus:

- Intensified effort to improve technical safety
- Managers shall exhibit clear safety management behaviour
- Employees must give more thought to risks and barriers
- Employees shall learn to be more aware.

The HSE campaign and planned follow-up goes further than such work has in the past in that it describes the duties and responsibilities assigned to different roles in the organisation. The project will be implemented throughout the organisation and will be a comprehensive and high-priority effort in 2018.

All recorded HSE incidents shall be reported weekly to Group Management. In the spring of 2017 a falling trend was noticed in the number of recorded observations of hazardous conditions. Group Management placed emphasis on the reporting of incidents, and in the last four months of the year a positive development was seen in the form of an increase in recorded observations.

In co-operation with NTNU, joint safety inspections and HSE reviews have been carried out in the laboratories in which both organisations work. Managers from NTNU and SINTEF, led by the Rector and the Group President, have visited shared laboratories with a focus on HSE and collaborative agreements. The goal is to develop the dialogue between managers and employees to support improvement work and develop sound common practice.

In 2017, the indices H1 (injuries resulting in sick leave) and

H2 (personal injury frequency) were 1.4 and 4.3 respectively. The introduction of “one-pager” HSE reports that describe on one A4 page specific incidents, causes and lessons learnt, have resulted in increased awareness of incidents, follow-up and experience-sharing. The one-pager HSE reports are used as documentation in many situations: at management meetings, departmental meetings, WEC meetings and external meetings.

HSE training is necessary in order to maintain control over operations so that incidents can be avoided. In 2017 the eLearning course “HSE in laboratories and workshops for all employees of SINTEF” was revised and made compulsory for everybody. Regular training is carried out at the individual institutes to ensure the safety of employees in the laboratories and workshops.

The use of chemicals is an important aspect of SINTEF’s research activities. In 2017 an internal quality audit was carried out at six laboratories, the theme being the handling of chemicals. The audit showed that a significant amount of work has been carried out and that we are operating in accordance with current statutory regulations.

In terms of intelligence, the risk situation puts SINTEF among vulnerable companies in the fields of R&D and high technology. This is made evident by, among other things, the Norwegian Police Security Service’s open threat assessments. SINTEF is intensifying its work with security measures, including internal and external audits and control measures.

The Personal Data Protection Officer arrangement associated with the Norwegian Centre for Research Data (NSD) continues, and SINTEF has appointed a personal data protection co-ordinator who is a member of the Group Staff and also heads an interdisciplinary group for work connected with the Norwegian General Data Protection Regulations (GDPR).

## Financial independence

In 2017 SINTEF reported an ordinary operating profit of NOK 206 million, compared with NOK 80 million in 2016. Profit before taxes was NOK 234 million, compared with NOK 97 million in 2016.

Net operating revenues in 2017 showed an increase of 3.8 per cent, compared with 2.8 per cent in 2016. The Tel-Tek

foundation is included in the accounts for the whole of 2017, with a net revenue of NOK 30 million.

We focus strongly on sales efforts, costs reductions and other measures designed to ensure good profitability. In the period 2015-2017 we have carried out cost initiatives with a combined annual effect of over NOK 300 million.



At the start of 2018 all the institutes have generally healthy order books. This is the result of proactive sales efforts combined with many significant resource adaptations carried out in recent years. We are seeing a positive development in most of our market areas, including oil and gas, at the beginning of 2018.

At the close of 2017, the liquidity situation is still satisfactory and is being monitored closely. SINTEF has established a joint arrangement within the Group for the investment of its liquidity reserves. The portfolio is invested in accordance with “Regler for finansforvaltning i SINTEF” (Rules governing financial management at SINTEF) dated October 2017. In 2017 an average of NOK 320 million has been available for financial management, compared with NOK 292 million in 2016. Our low-risk profile contributed to a positive yield of 4.8 per cent in 2017 (compared with 0.2 per cent in 2016 and 8.4 per cent in 2015).

SINTEF is exposed to currency exchange fluctuations as a result of some of its project revenues being in foreign currencies, although project costs are entirely or largely in Norwegian kroner. Futures contracts are employed to reduce this risk. We have specifically evaluated risk and freedom of action in the event of a serious collapse of the Euro.



It is essential that SINTEF succeeds in creating a financial surplus which can be invested in new research and skills development. In 2017, SINTEF invested NOK 114.5 million in laboratories, scientific equipment and other operating equipment. The corresponding amount in 2016 was NOK 100.2 million.

SINTEF currently enjoys a robust financial position. As of 31 December 2017, SINTEF's equity is NOK 2,348 million, which is 57 per cent of its total assets. Corresponding figures for 2016 are NOK 2,178 million and 60 per cent. The corresponding figures for the SINTEF Foundation are NOK 2,156 million (NOK 1,929 million in 2016), which constitutes 66 per cent (66 per cent in 2106) of total assets.

The annual profit for the SINTEF Foundation in 2017 was NOK 152 million, compared with NOK 57 million in 2016. This is allocated in its entirety to "Other Equity".

Our equity and operational status, combined with cost-saving initiatives and a satisfactory order book, provide us with a good basis for declaring the organisation a going concern. The Boards of the subsidiary companies have made similar assessments, and all have concluded that we have the basis of a going concern. The Board is not aware of any circumstances that have arisen since the close of the accounting year which affect its opinion regarding the financial position of either the Foundation or the Group. On this basis the Annual Accounts have been prepared according to the going concern principle.

## Clients

SINTEF creates opportunities for private and public sector clients and contributes to their wealth generation and to the healthy development of society. This is our most important contribution to society.

In 2017, SINTEF completed 5,691 projects for a total of 3,707 large and small clients. These comprised assignments for both private and public sector clients in fields such as renewable energy, oil and gas, the marine and industrial sectors, building and infrastructure, as well as enabling technologies, health and welfare and social science research.

A significant number of projects are carried out involving cross-disciplinary collaboration among the various SINTEF institutes. A wide-ranging approach with the involvement of



various technical groups provides unique opportunities to develop effective, multidisciplinary methods. A multidisciplinary focus is essential as a basis for delivering solutions to meet the great and complex challenges currently facing society, especially in connection with digitalisation, health and welfare issues, and the so-called "green transition".

Participation in the major, forward-looking research centres which are partly financed by government entails significant interaction with Norwegian and overseas clients. SINTEF is currently participating in nine Centres for Research-Based Innovation (CRIs) and eight Centres for Environment-Friendly Energy Research (CEERs) which were established in 2016 and 2017. Taken together, these activities involve the participation of just over 200 industrial enterprises. Participation in these centres provides these companies with long-term knowledge development at the forefront of international research, and contributes to important networks and enhanced competitiveness.

Understanding the needs of our clients is of critical importance. The process of enabling effective dialogue with clients in an atmosphere of trust at all organisational levels is high on Group Management's list of priorities. This also involves increased levels of dialogue and contact with the public authorities, firstly in Norway, but also in the EU and in other countries. In 2017, SINTEF arranged a series of high-level meetings with many international companies, public authorities and institutions.

Contact between research scientists and their clients is important for the development and implementation of high-quality projects. Project management, good implementation capability and team work are key to effective project work. SINTEF's Group Management focuses



strongly on project quality and has intensified its efforts in this area during 2017.

In 2017 a framework agreement applying to the entire Group was entered into with Yara. This collaborative agreement encompasses R&D operations aimed at developing the company's fertiliser manufacture, "smart farming" and new digital systems for reducing the environmental impact of food production. One of its elements is the establishment of an innovation hub at the Gløshaugen Campus in Trondheim, where NTNU will also be involved in the work.

The industrial community at Raufoss, where SINTEF Raufoss Manufacturing (SRM) plays an important role as an R&D operator, has developed strongly in 2017. In the Norwegian National Budget for 2018, SRM was allocated basic funding as a research institute from the Research Council of Norway. During 2017, SRM and other members of the Raufoss cluster were also incorporated in SIVA's new Catapult scheme, which will promote the establishment and development of national centres in which companies can test, simulate and visualise technologies, components, products, services and processes. In November, NCE Raufoss was recognised as a "change driver in Norwegian industry", which is a new aspect of Innovation Norway's cluster programme. The Board points out that this is an environment where very close contact exists between research and industry, and interaction enhances the innovation and productivity of highly competitive companies. We have considerable responsibility for producing good results from the publicly awarded assignments we have acquired in 2017.

SINTEF implements a large number of projects in collaboration with clients associated with the Research Council of Norway's industry-oriented programmes. These projects are classified as Private Sector Innovation Projects and Private Sector Skills Projects. In 2017, SINTEF participated in 435 applications for funding totalling NOK 6.2 billion. SINTEF's share of the amount applied for was NOK 2.4 billion. An analysis performed in February 2018, when 95 per cent of the applications had been processed, showed that 33 per cent of them had been approved. SINTEF's budget for approved projects was around NOK 690 million.

## Research fields

It is essential that SINTEF maintains an appropriate balance between scientific publication and contract-based research.

The most important form of advertising of our research results occurs when new technology and systems are made use of by our clients and by society. However, international publication is also of considerable value, and the Board underlines the importance of SINTEF contributing to its own skills development and the global advance of new knowledge by means of publication.

Publication contributes to creating awareness of and reinforcing scientific quality, and is essential to success in relation to demanding clients and for recruiting the best research talents. Our aim is to publish at least one peer-reviewed scientific publication per research scientist per year. In 2017 the figure was 0.9 publications per research scientist per year, compared with 0.71 in 2016.

SINTEF's international standing is significant for the effective exploitation of research funding in Norway. This is clearly expressed in connection with the EU research programmes, where SINTEF has succeeded in becoming by far the largest Norwegian player. Participation in the EU Framework Programmes is key to enhancing the quality of SINTEF's scientific output, enabling it to remain in the forefront of international research in fields such as ICT, biotechnology, energy, nanotechnology, and materials science.

Investment in laboratory facilities is crucial if Norway is to continue to develop as a knowledge-generating nation, boost its global competitiveness, and attract the best students and research scientists. In the last ten years SINTEF has invested NOK 1,312 million in laboratories, scientific equipment, and buildings. In collaboration with its partners, SINTEF has achieved good results in the Research Council of Norway's Financing Initiative for Research Infrastructure in 2016. This has contributed to initiating investments in national infrastructures in 2017 in which SINTEF is a partner or participant.

In May 2017 the Norwegian Ministry of Trade, Industry and Fisheries announced a quality assurance study (KS1) linked to alternative models for a future knowledge centre for ocean space technologies – the Ocean Space Centre. This investment is of major importance for Norway as a leading maritime nation, for marine and maritime industries, and for SINTEF and NTNU. The conclusion of the KS1 report necessitated a revision of the project's content and a joint report by SINTEF and NTNU will be submitted in the spring of 2018, focusing on optimised development and

an enhancement of digital systems. It is positive that the Government's new policy platform emphasises the importance of the Ocean Space Centre.

Strategic collaboration with universities and other research institutes is vital if we are to maintain robust national research arenas. The strategic collaboration between NTNU and SINTEF is of considerable importance. This collaboration contributes towards keeping SINTEF's applied research in the international academic forefront, while enabling NTNU to carry on extensive research activities directed at finding specific solutions to issues facing industry and society.

Third party analyses demonstrate that our 67-year collaboration has been highly significant for Norwegian research and innovation. The management of SINTEF and NTNU are working actively to maintain this valuable collaboration in the future.

SINTEF is an active participant in international research projects. Together with NTNU, we are engaged in a strategic collaboration with leading research centres in Japan and the USA in the fields of energy and materials science. There has been much focus on our involvement in the European Energy Research Alliance (EERA), which has an important strategic role in the field of European energy research. In 2017, Nils Røkke of SINTEF was appointed as the leader of EERA, which is a collaboration between 250 research institutes in 29 European countries.

Priority is assigned to the SINTEF Group's main areas of focus, typically involving three-year cross-disciplinary research projects in fields that are of special importance to SINTEF. The following areas of Group focus were initiated in 2013 and were completed at the start of 2017: Bio-based products from sustainable resources, ManagelT, SEATONOMY, and welfare technology. In total, SINTEF has invested NOK 180 million in twelve Group areas of focus since 2006. In 2017 eleven new strategic Group initiatives commenced which will be completed in 2018. These are connected with the fields of BigData, health and welfare, petroleum technology, mobility, autonomy, smart towns, 3D printing, circular economy, clean seas, and SINTEF's role as an agenda setter in social debate.

Long-term research centres financed by the Research Council of Norway are of major importance for technical development, innovation and asset creation in industry.

These are long-term focus areas that demand high scientific quality and collaboration between participants in research and industry. For SINTEF, organisations such as the Centres for Research-Based Innovation (CRIs) and the Centres for Environment-Friendly Energy Research (CEERs) are particularly important.

Assessments show that many innovations and considerable assets are developed through these research centres. When the NOWITECH CEER, which SINTEF Energy Research led from 2009, was closed down in 2017, an analysis showed that 40 innovations and/or start-up companies linked to marine wind power technology had been created there. The potential value of eight of these was calculated, and it was found that they could create assets amounting to NOK 50 billion by way of cost savings and production enhancement. This is more than 100 times the financial investment of NOK 320 million that the Research Council of Norway, the research establishments, and industry has contributed to the research centre.

## People

SINTEF's aim is to be an attractive workplace offering unique development opportunities. The working environment survey carried out at the beginning of 2018 shows that SINTEF's employees give the company a high approval rating. Progress since the previous study in 2016 is associated especially with the issues of the quality of collaboration with other parts of SINTEF's organisation, of our evaluation of our projects and effective project support apparatus, and of the perception of assistance from staff and support functions. Compared with other institutes that use the same survey, SINTEF scores particularly highly in aspects connected with management.

Follow-up measures since the previous survey were implemented during 2017 according to plan. The response rate this year was 93 per cent. The results of the survey confirm that overall, SINTEF is a good place to work, although some items for improvement were also identified. These challenges are being looked into, and work is being carried out to utilise the results as a basis for future improvements.

It is important to boost the quality of middle management. SINTEF is working systematically to develop its management resources, with a focus on individual managers and team spirit. Increasing emphasis is placed on the development of managers for major, complex projects and on



enhancing their aptitude for efficient teamwork, crossing technical and organisational boundaries in “One SINTEF”.

In 2017 a considerable amount of effort was put into developing a new system for employee development that will be implemented throughout SINTEF in 2018.

SINTEF continues to be successful in competition for skilled employees in the global market. We place great emphasis on taking care of and fostering the development of our current staff, while at the same time working to safeguard future recruitment by means of brand development and promotional activities in the domestic and global markets. Across the board, SINTEF achieves a very high approval rating in surveys in which students rank the attractiveness of workplaces. In 2017 we are in fifth place among Norway’s most attractive employers of technology students according to the major survey carried out by Universum.

2017 was another year in which SINTEF focused on safeguarding its operations in challenging economic times, while simultaneously making the best of the potential for growth. Staff reductions were carried out in some of

the research groups in order to adapt capacity to reduced activity in certain markets, most notably in the oil and gas sector.

As of 31 December 2017, SINTEF had a total of 1,916 employees. In 2017 SINTEF experienced an overall staff turnover of 7 per cent, and within the scientific personnel category the turnover was 8 per cent. Employees leaving SINTEF represent an important contribution to skills development in industry and the public sector.

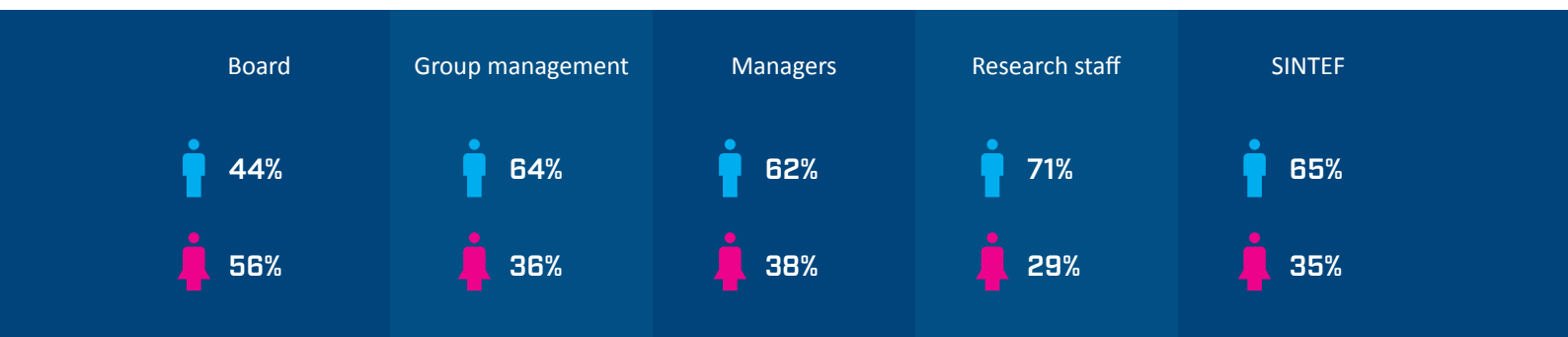
56 per cent of the research scientists at SINTEF have Ph.D. degrees, an increase from 44 per cent in 2009. 436 of our employees in 2017 (23 per cent) hail from a total of 75 countries outside Norway. This shows that SINTEF is attractive to international research scientists and that we contribute to bringing highly qualified manpower to Norway. SINTEF’s foreign employees provide a valuable source of scientific and cultural expertise. The majority of employees from outside Norway are from Germany and France.

In 2017, the sickness absence rate was 4.0 per cent, which is somewhat higher than the goal of 3.5 per cent. Occupational sickness absence was recorded at 0.3 per cent. SINTEF is an “Inclusive Working Life” (IA) enterprise and sickness-related absences are systematically followed up by the relevant institutes. Line managers, supported by HR personnel, are jointly responsible for the follow-up of sickness absences.

### Equal opportunity and family policy

The Board and Group Management are fully committed to promoting equal opportunity at SINTEF. One of SINTEF’s objectives is to increase the proportion of women among both its research scientists and managers. The President of the SINTEF Group is a woman. When vacancies arise,

The gender distribution within SINTEF is shown in the table below





SINTEF aims actively both to recruit women and to develop female managers from its own ranks. Structural imbalances in the recruitment foundation from the educational establishments are nevertheless reflected in SINTEF's staff.

In 2013, the Research Council of Norway awarded SINTEF a three-year project (the so-called Balance Project) to promote a better gender balance among its high-level technical positions and research managers. It has provided valuable know-how that can be applied both at SINTEF and at other Norwegian research centres.

SINTEF is a party to the following agreements: NHO/Tekna, NHO/NITO, NHO/Forskerforbundet, NHO-Abelia/LO-NTL and NHO-Abelia/Parat. Salaries and conditions of employment are determined by negotiation and discussion with employee representatives in the respective labour organisations. Women are considered on an equal footing with men. We carry on systematic monitoring to ensure that undesirable salary differentials do not arise.

81 per cent of our work force are full-time employees. 24 per cent of female employees and 17 per cent of males work part-time. One reason for part-time employment is that employees can take advantage of the opportunity to reduce their working hours while receiving an early negotiated pension. SINTEF makes little use of temporary employment. At the end of the year, 47 employees (2.4 per cent) were in temporary positions, 20 of them women and 27 men.

SINTEF's working environment survey for 2016 revealed no significant gender differences among employees in terms of how they perceived their work situation. We will continue to develop focused initiatives to ensure that SINTEF remains an attractive workplace for both sexes.

One of SINTEF's ambitions is to be successful in the global recruitment market. Many vacant research positions are advertised in English, and applicants worldwide have access to job advertisements.

To ensure that foreign employees are well taken care of, SINTEF has established an integration programme for employees from other nations and their families. The programme offers expat services, free Norwegian lessons, and teaching in English at the SINTEF School. Diversity management is one of the themes of the SINTEF School's manager development programme. Findings from the



working environment study indicate that overseas employees enjoy working at SINTEF.

SINTEF goes to great lengths to meet the needs of employees with special requirements. As part of our IA objectives we are committed to adapting workplaces to those of our employees who either have, or develop, disabilities. This work takes place in close co-operation with the Norwegian Labour and Welfare Administration (NAV), and we make full use of available public support arrangements. It is a defined IA objective that we shall pursue the current practice of focusing on skills in connection with recruitment, rather than on any limitations resulting from a disability.

SINTEF shall be an organisation with room for rounded individuals who have a life outside their workplaces. We therefore allow flexible arrangements to meet the individual's needs, such as flexible working hours for all employees, and special arrangements for parents with young children.

## Internationalisation

SINTEF's ambition is to be a world-leading research institute. Internationalisation is an integral part of SINTEF's business operations. We have been successful in the following fields of our internationalisation strategy: The strengthening of our academic network, participation in the EU research programmes, international sales of R&D services, and international recruitment. However, we must acknowledge that we have yet to find workable solutions to the problem of establishing a profitable presence outside Norway.

SINTEF is by far the largest Norwegian participant in the EU Framework Programmes for research and development. As part of the EU 7th Framework Programme which was completed in 2013, SINTEF was granted participation in 254 projects, and the role of Project Co-ordinator in 55 of these. A total of EUR 149 million in support funding has been awarded by the EU. Research linked to some of the projects commenced in the 7th Framework Programme will continue until 2018. We have a high level of activity in connection with Horizon 2020 (the 8th Framework Programme) which commenced in 2014. As of March 2018, SINTEF has been granted participation in 147 projects in this programme, including the role of co-ordinator in 42. The EU has awarded SINTEF a total of EUR 99 million in support funding.

The fact that SINTEF is competitive in the EU research market shows that we have the ability to develop internationally recognised expertise, as well as to establish consortia consisting of Norwegian and international companies and research institutes. In many cases, Norwegian companies obtain funding and opportunities to collaborate with their clients with regard to innovation by way of our projects. In order for us to fulfil our role in society, it is essential for us to be able to develop international networks and globally competitive solutions that bring state-of-the-art know-how to our clients.

The biggest challenge we face in connection with EU research projects has been that there is sometimes a lack of clarity regarding framework terms and that the EU's compensation arrangements are tailored to research practices in other countries, where the host nations cover the greater part of the costs. SINTEF is pleased that the authorities established the "STIM-EU" scheme in 2015 and that the framework funding has been gradually increased in subsequent national budgets. As a result of the scheme, EU research has become a smaller drain on the resources of the institutes, but the funding is still not enough to cover our costs in EU projects. The Board emphasises that SINTEF relies on this investment in research being rewarded with greater activity linked to industrial clients so that our overall research portfolio can deliver acceptable financial returns.

SINTEF has an office in Brussels on the same premises as NTNU and the University of Bergen. The aim of establishing a presence here is to further consolidate our networks and participation in EU-funded research collaboration.

Our experience from 2016 and 2017 shows that our presence in Brussels is important. In September, SINTEF's Group Management arranged a seminar in Brussels, including important meetings with the European Commission and with Norwegian authorities and industry representatives.

The authorities have set out an ambitious EU-related research strategy that has been followed up with consolidation of the budgets for STIM-EU and other stimulation schemes. Further funding increases, in step with the extended scope of the EU programme, are crucial if the stated research strategy aims are to be met and stable terms of reference established. It is essential that SINTEF should receive full coverage of its costs for participation in EU projects, equivalent to the coverage for projects funded by the Research Council of Norway.

SINTEF's international sales in 2017 amounted to NOK 449 million, compared with NOK 448 million in 2015. This corresponds to 14 per cent (14 per cent in 2016) of SINTEF's total sales. We have fulfilled assignments for clients in 59 countries. EU projects represent about 50 per cent of our international activity (50 per cent in 2016).



## External environment

SINTEF's policy with regard to the external environment places requirements on how we pursue our research activities. By working systematically to reduce impact on the environment, SINTEF is assuming environmental responsibility and meeting the expectations of its clients. The last of these entails that we wish by means of our research projects to contribute towards environmental benefits for our clients.

SINTEF is certified according to ISO 14001, which requires continuous improvement work with regard to the external environment.

Environmental issues shall be assigned priority not only in connection with our own activities, but also during projects and in the application of the results of our projects. In 2017 improvements have been effected in the methods used for environmental assessment.

Our most important contributions to the environment are our world-leading research and development activities to develop renewable energy, climate-related and environmental technologies. Our environmental work is communicated actively to the outside world by means of the dissemination of our research and expertise in the field of environmental science.

In 2017, SINTEF experienced no reportable incidents that impacted on the external environment.



## Ethics

SINTEF operates on the basis of a clear ethical platform. “Ethics, values and leadership” are key aspects of SINTEF’s principal strategy. Our ethical guidelines are freely accessible to everybody on SINTEF’s website.

Ethics-related work at SINTEF encompasses research, business and relational ethics. SINTEF’s research ethics are based on the regulations of the national ethics committees, on the principles promoted by the European Group on Ethics in Science and New Technologies, on international conventions such as the Vancouver Convention, and on Norwegian law. In 2017 a new Norwegian Act relating to the organisation of research ethics was passed.

SINTEF complies with the EU Charter and Code, or the “European Statement on Researchers” and “Code of conduct for the recruitment of research scientists”. From an EU perspective, this is both an obligation and an aid to creating an attractive European research environment.

SINTEF expects and requires its suppliers and business partners to be familiar with and accept our ethical values. Suppliers and business partners involved in our activities are obliged to submit written acceptance of our code of ethics.

Ethical issues are on the agenda in management groups and departments. For many years it has been our practice that HSE and ethical issues top the agenda in all internal meetings. Group Management regularly includes ethics as a topic in its meetings, which are attended by the company’s Ethics Ombudsman.

Following up ethical guidelines is the responsibility of management. In addition, SINTEF has an Ethics Council and its own Ethics Ombudsman. The Ethics Council consists of six members, all of whom are either managers or elected SINTEF employee representatives. Five council meetings were held in 2017. Issues handled by the Ethics Council are new requirements and guidelines resulting from the Act relating to the organisation of research ethics work, ethical dilemmas linked to research, the need for training in research ethics, and arrangements for ethical dilemma training at SINTEF. SINTEF’s ethical guidelines are in the process of revision which will be completed in 2018.

The Ethics Ombudsman acts as an advisor and discussion partner for SINTEF’s entire organisation and also participates in connection with a number of external activities. The Ethics Ombudsman arrangement means that SINTEF satisfies the requirements of the Norwegian Working Environment Act with regard to internal channels for reporting concerns or seeking advice.

During 2017, SINTEF developed a new tool for risk management in projects, in which considerable emphasis is placed on social responsibility and risk linked to ethical problems.

SINTEF personnel currently have seats on three Norwegian research ethics committees, for Medicine and Health, Social Science and the Humanities, and Natural Sciences and Technology.



## **SINTEF's role in society**

SINTEF's role in society is a key component of our principal strategy and daily operations. The strategy states that SINTEF contributes to the development of society by means of research and innovation, that we contribute to wealth creation, develop solutions to meet the challenges facing society today and communicate know-how, solutions and our recommendations in a proactive and resolute manner.

Many of the major social challenges of our time are described in the UN's 17 Sustainable Development Goals. A significant part of SINTEF's research is connected with the development of solutions to challenges described in these goals. This includes such themes as climate and the environment, food, health, energy, clean water, and the development of future workplaces. This research integrates our role in society as part of our core activities, in line with our vision.

Our social responsibilities also address the way in which we administer our business activities, linked to issues such as human rights, employee rights and social conditions, the external environment, and the battle against corruption. SINTEF has developed policies and guidelines linked to all these fields, which have been incorporated into our management system and code of ethics. Employee rights are also safeguarded by means of SINTEF's collective salary agreements and the monitoring of our responsibilities as an IA enterprise.

SINTEF is a member of the UN Global Compact, and actively applies its ten principles on human rights, work standards, the environment and anti-corruption. SINTEF annually reports on its status (Communication on Progress) in relation to these principles in accordance with the requirements set out in the Compact. This status report is part of SINTEF's annual reporting process and is published on our website.

SINTEF is a member of Transparency International, an organisation dedicated to the elimination of national and international corruption, and adheres to the guidelines and advice provided by this organisation.

An active dialogue with wider society is a key aspect of SINTEF's role. This includes both our role as a supplier of terms of reference and research-based facts as a basis for public debate and the shaping of policies, and work

to strengthen the terms of reference for research and for SINTEF. In 2017 we consolidated our efforts relating to contact with society and the authorities.

## **Corporate governance at SINTEF**

SINTEF wishes to be seen as professional in its leadership and management practices, while also having innovative ability and non-bureaucratic decision-making structures.

SINTEF's central administrative bodies are the Board of Directors and the Council. The Board is the Foundation's principal administrative body, while the Council acts in an advisory function, with authority as stipulated by the Norwegian Act relating to Foundations and SINTEF's Articles of Association.

SINTEF's Council acts in a supervisory role to ensure that the Foundation's objectives are adhered to in accordance with the Articles of Association. It also appoints the Board, determines the remuneration of Board members and appoints an auditor. The Council is headed by the Rector of NTNU. 25 Council members are elected by the board of NTNU, half of whom are appointed on the basis of recommendations from the University of Oslo, the Norwegian Confederation of Trade Unions (LO), the Confederation of Norwegian Enterprise (NHO), the Norwegian Society of Graduate Technical and Scientific Professionals (Tekna) and the Board of SINTEF. Three Council members are selected from among SINTEF's employees.

The Board of the SINTEF Foundation also acts as Board of the SINTEF Group and the Board of SINTEF AS. The activities of the four limited companies are governed by their Articles of Association, shareholders' agreements, inter-Group agreements, and instructions issued to their respective Boards. Principles for the Group's administration and co-ordination with related activities have been established in accordance with SINTEF's overall goals and strategy.

The Board is made up of nine persons. Two have full-time posts at NTNU, four are from industry or public sector administration, and three are permanent employees at SINTEF. The Board has responsibility and authority in all matters that are not assigned to the Council. The Board acts in accordance with SINTEF's Articles of Association and the Norwegian Acts relating to Foundations and Limited Liability Companies. The Board appoints the Group President and determines his or her salary and

other employment terms, as well as determining the framework and principles for remuneration of the Group Management. The Board held eight meetings in 2017, two of them by means of telephone conferencing.

SINTEF's Group Management is responsible for the management of the entire scope of SINTEF's business activities. The Group President is responsible for daily operations in accordance with the Articles of Association of the Foundation and group agreements and in all other respects in accordance with the Acts relating to Foundations and Limited Liability Companies. The Group President has authority to act on behalf of the Foundation and SINTEF AS, except in connection with the purchase, sale and mortgaging of property and the purchase and sale of companies.

SINTEF has established a system of financial risk reporting on a four-monthly basis. The risk environment is discussed by the management and Board of each of the research institutes, as well as at Group Management and Board levels. Risk-reducing initiatives are defined and implemented on a continuous basis.

In 2017, SINTEF was certified according to the ISO 9001, ISO 14001 and OHAS 18001 standards following a certification process carried out by DNV GL.



The management system includes a joint system (Synergi) for handling accident reports, unwanted incidents, other non-conformances, and proposals for improvement. SINTEF is registered in the Achilles Joint Qualification System for suppliers to the oil and gas industry.

In order to reinforce its corporate governance, the Board of SINTEF resolved in a meeting on 14 September 2016 that an annual Report on Corporate Governance shall be prepared, in accordance with the Norwegian recommendation for corporate governance and company management (the NUES Standard). The report is based on the fifteen articles of the NUES recommendations and describes how the Foundation satisfies those recommendations. The

report is published at the same time as SINTEF's Annual Report.

## Future prospects and challenges

Society is undergoing significant changes, of greater importance and at a higher tempo than ever before. Digitalisation, automation, artificial intelligence, new materials, and advanced robotic technology are causing enormous changes in all aspects of social and working life. These developments are opening the way for both challenges and new opportunities. SINTEF possesses high levels of skills and expertise in these fields, and aims to make an active contribution towards a successful restructuring of the business and public sectors. The combination of cutting-edge skills in enabling technologies and domain know-how related to solid Norwegian industries and areas of society is one of SINTEF's competitive advantages.

Digitalisation is also of major importance to SINTEF's work processes, communications, knowledge-sharing and research. This must be the object of continuous focus in the future.

New technology is of major significance for the development of wealth creation and solutions to the key challenges currently facing society. SINTEF has an important duty to contribute towards ensuring that its clients are able to boost their profitability by means of efficient processes and new technologies that can create new products and growth in new markets. In the public sector there is considerable need connected with, among other things, health and welfare, mobility, the environment, public safety, and the efficient management of services. While these are fields in which SINTEF possesses considerable expertise, growth requires the development of larger research markets with an emphasis on innovation and development in the public sector.

A successful readjustment of society calls for an increasing extent of interdisciplinary and multidisciplinary approaches and technological know-how. Technology is to an increasing extent merging what were once distinct fields and sectors in new ways. Key issues here are the fields of smart grids, electronic mobility, autonomy, and cyber risk.

One of SINTEF's greatest strengths is that we can offer multidisciplinary expertise and work across organisational boundaries in collaboration with various technical groups.

In order to develop sound solutions, it is crucial to be fully aware of the interplay between people, technology, and the safety of society. Our aim is to achieve a close integration of research in the fields of technology and the natural and social sciences. Putting into operation the principle of “One SINTEF” is of crucial importance in the development of a revised strategy that will be developed during 2018.

In 2016 the OECD carried out a national study of the Norwegian innovation system which emphasised the important role and significance of the research institutes in Norwegian industry. However, the OECD is concerned about the very low level of financing of the technical-industrial institutes. Whereas SINTEF’s basic funding is 7 per cent, many corresponding institutes in Europe receive funding of 20–50 per cent. The OECD comments that low basic funding has kept the research institutes closer to their clients, but also makes them dependent on highly solvent clients in established industries. This may tend to lock industries in old sectors and impair their capability of renewal and expertise development in new fields of commerce. The Board is therefore pleased that the new Government White Paper on greener, smarter and more innovative industry proposes augmenting the basic funding of the technical-industrial research institutes. We hope that this will be addressed in a revised long-term plan for research and higher education which will be submitted by the Government in the autumn of 2018.

The challenge of climate change and the so-called “green transition” represents a key motivation for restructuring. SINTEF intends to concentrate its efforts on climate change technology and adaptation, renewable energy, energy storage, energy efficiency, and CO<sup>2</sup> capture and storage (CCS). We are assigning high priority to our future research activities in these fields.

The dramatic fall in oil and energy prices has had a serious impact on the Norwegian economy, resulting in declining levels of activity in many sectors and geographical areas. This has resulted in significant challenges and a need for reorganisation also in SINTEF. Between 2014 and 2017, SINTEF’s sales connected with the petroleum industry fell by over 20 per cent. This revenue loss has been compensated for by increased activity in other fields, such as building and construction, aquaculture, renewable energy, and process industry. Petroleum research will continue to be important, but the focus has changed. More of the

research in the field is now connected with cost reductions, lower emissions and digitalisation.

The 2017 Government White Paper on greener, smarter and more innovative industry shows that there is potential for growth in Norwegian Industry, both in goods manufacture and the process industry. Developments in fields such as digitalisation, robotisation, advanced materials, skilled workforce, and organisation may contribute to a re-industrialisation of Norway. We are positioning ourselves to participate in this development, among other things by the creation of SINTEF Industry, by consolidating the position of SINTEF Raufoss Manufacturing and through close collaboration with our industrial clients.



Through the establishment of SINTEF Ocean, we have achieved a more integrated approach to the aquaculture industry. The potential for increased growth connected with the sea in coming decades is significant, which is of considerable importance for Norwegian wealth creation and sustainable global food supplies. SINTEF’s ambition is to be a competent R&D partner for industry, the public authorities and society by combining leading scientific research with our position in the international forefront of analysis and concept development. Realisation of the growth potential in the field of aquaculture depends on our success in solving environmental problems, especially in connection with salmon louse, escaping fish and sustainable feed production. SINTEF is actively involved in the development of solutions to these problems.

SINTEF sees it as a challenge to be able to provide effective assistance to start-up companies and small and medium-sized enterprises (SMEs). Closer collaboration with competent business owners’ communities and industrial clusters will be an important element in developing better R&D support in these fields. The Board is pleased that



Norwegian Government Report 2018:5, “*Kapitaltilgangs-utvalget*” (the Capital Access Committee) highlights the need to improve access to capital in the seed capital phase. We will work actively with this issue in the consultative process.

The Board would like to thank all employees and joint-venture partners for their efforts and co-operation in 2017. We also wish to thank the co-owners of subsidiaries and representatives from the business community and society who participate in SINTEF’s many boards and councils.

Trondheim, 14. March 2018

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Tor Grande

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