ANNUAL REPORT 2009

FRANSK-NORSK STIFTELSE (FNS)
FOR VITENSKAPELIG OG TEKNISK FORSKNING OG
INDUSTRIELL UTVIKLING

FONDATION FRANCO-NORVÉGIENNE (FFN)
POUR LA RECHERCHE SCIENTIFIQUE ET TECHNIQUE,
ET LE DEVELOPPEMENT INDUSTRIEL

ANNUAL REPORT 2009

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ANNUAL REPORT 2009

THE BOARD OF THE FOUNDATION

The Board of Directors of the Foundation consists of twelve voting members. The two governments appoint four members each and the Foundation's General Assembly appoints four members, two from each country. The Board elects its Chairman for a period of 3 years. Chairmanship alternate between France and Norway every third year. In 2009 the Board of Directors had the following composition:

France:

Olivier Appert, President and C.E.O
IFP
Chairman

Elisabeth Legrand *
Ministère de l'Education Nationale de l'Enseignement Supérieur et de la Recherche

Elisabeth Barsacq*
Ministère des Affaires Étrangères et Européennes

Ludovic Zekian*, Ministère de l'Economie, des Finances et de l'Industrie

Marie Marguerite Bourbigot
Pôle Mer Bretagne

Nathalie Delorme
Directeur des Relations Internationales, OSEO Innovation

Nakita Vodjdani
Agence Nationale de la Recherche

Claire Tutenuit
Déléguée Générale, Entreprises pour l'Environnement

Norway:

Ståle Selmer-Olsen
Det Norske Veritas
Vice-chairman

Sidsel Aarnæs Arbo
Nærings- og handelsdepartementet

Marit Aursand
SINTEF Fiskeri og havbruk

Egil Eike
Norges forskningsråd

Henning Reier-Nilsen
HNR Invest

Kristin Vinje
Simula School of Research and Innovation

* The members representing the three French Ministries have one vote only.

The Board of FFN/FNS held two meetings in 2009, 14 May at Kjeller and 27 November in Pau.

Ståle Selmer-Olsen and Sidsel Arbo Aarnes left the Board at the end of 2009 after serving six years on the Board. They have been replaced by Jan-Erik Strand and Kari Rossum. Kristin Vinje left the Board at the end of 2009 after serving on the Board for nearly three years. She was replaced by Sigrid Fossheim. The Board thanks Ståle Selmer-Olsen, Sidsel Arbo Aarnes and Kristin Vinje for their contribution to the work on the Board and for their efforts on behalf of the Foundation.

MEMBERS OF THE FOUNDATION

At the end of 2009 the Foundation had 31 members in Norway and **18 members in France**.

THE SECRETARIAT OF THE FOUNDATION

The secretariat of FNS/FFN is located at the Research Council of Norway in Oslo and at Institut Français du Pétrole (IFP) in Rueil Malmaison.

In Oslo the head of the secretariat was Else Boon until December 1, 2009. After having been secretary leader for 15 years, she left the Foundation on December 1, 2009, and was replaced by Randi Aarekol Basmadjian.

In Rueil Malmaison the head of the secretariat is Gérard Momplot assisted by Daniel Decroocq.

Associated secretariats:
Odd Mølster, Norwegian Embassy in Paris
Jean-Louis Duclos, French Embassy in Oslo

GOAL AND ROLE OF THE FOUNDATION

Goal

- Promoting long-term French/Norwegian co-operation through joint R&D projects.

Main objectives

- Support joint R & D projects where French and Norwegian industrial firms are main partners
- R & D projects have to lead to processes and products with industrial applications
- Connect French and Norwegian industry partners
- Organize workshops and seminars
- Promote cooperation between French and Norwegian researchers and industrialists

Research priorities

- aquaculture and food industry
- biotechnology and biomedical industry
- informatics and information technology
- environmental technologies and energy
- marine science and technology
- material science and technology
- oil and gas exploration and production

Requirements for proposal and project funding

The French-Norwegian Foundation promotes long-lasting French/Norwegian cooperation through the financing of joint R&D projects in which both industry and research institutes/universities are involved with the aim of creating cooperation lasting beyond the project-period.

- At least one French and one Norwegian industrial company should be partner. Preference is given to small and medium enterprises (as defined by the EU standards). A subsidiary of a foreign company having only manufacturing or commercial activities in France does not qualify for support on the French side.

- Applicants (at least one on each side) are required to be members of FFN/FNS. The applicants can become members at the time of submitting the proposal.

- The proposals shall demonstrate that the project is of interest for all participants in the project and contribute to the goals of FFN/FNS, including enhancing French-Norwegian industry cooperation.

- The scientific, technical, industrial and economic aspects of the project shall be clearly identified and the planned R & D activities shall identify the technological solutions having potential for industrial applications and marketing. The proposal (application form and project description) shall include a business plan dealing with the exploitation of the results.

- The proposal shall give a short description including the type of organisation for each partner.

- When large enterprises and research organisations are partners, exchange of research scientists, either post-doctoral fellows or graduate students, should be considered. If possible, the project shall also provide for such educational exchange.

- The maximum level of funding from the Norwegian and French public institutions or programs (including FFN/FNS) cannot exceed 50% of the projects costs.

- Project support can be obtained for a maximum of 3 years. FFN/FNS usually approves the project for one year, stating an intention of funding the subsequent year(s), subject to FFN/FNS having enough funds and the project reaching the milestones agreed to upon signature of the contract.

- "High risk" projects and projects with long term horizon qualify for funding. FFN/FNS funding is usually limited to the first phase of such long-term research.

- A consortium agreement governing the relationship between the project participants must be drawn up and signed before the parties enter into a contract with the Foundation. This agreement shall state that the parties agree on the ownership and sharing of any rights and products resulting from the project. The intention of this principle is to ensure that the collaborative parties have clarified all questions and issues related to implementation of the results of the project. The agreement should also cover the relationship to researchers participating in or working for the project.

- The Foundation also supports pilot studies and feasibility studies, including finding new and suitable partners, establishing agreements and working out joint R&D program and pilot studies for future EU or EUREKA programs.

- The Foundation can also support workshops and seminars contributing to the main objectives of the Foundation.

- An annual report must be submitted. A final report including three slides with results achieved must be submitted within three months after the project is finished.

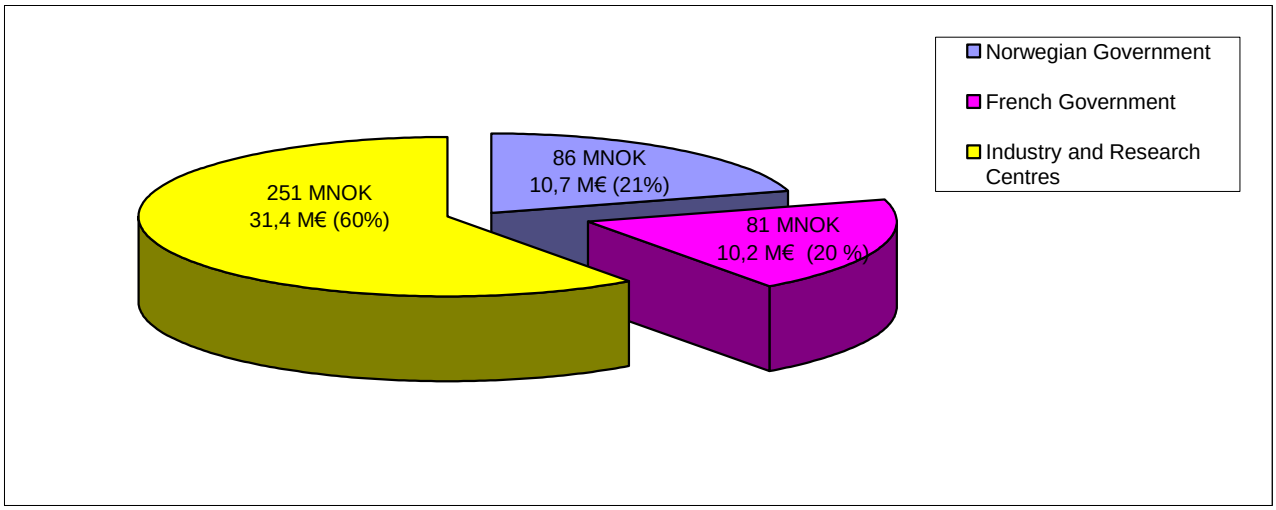
Funding

In Norway the projects are financed as a grant by the Foundation. In France funding is provided from other sources such as the Ministries (Research and Industry), Agencies (The French Agency of Research/ANR, OSEO-Innovation) and programmes or networks entitled to back R&D activities.

REVIEW OF THE FUNDING OF THE FOUNDATION

Since its establishment in 1983, the Foundation has been an important tool for the development of bilateral co-operation for scientific and technical research and industrial development between France and Norway. Until 1988 the Foundation mainly served as a catalyst for the technical co-operation between the two countries. After the Troll agreement was signed in 1986, the two parties agreed to use the Foundation to actively promote and co-ordinate bilateral research and development projects. Each country agreed to support the Foundation with up to 50 MNOK over a period of 10 years (1989-1999). A substantial industry involvement of at least 50 percent financing was set as a requirement. The intention of funding FFN/FNS over a 10-year period with a total of 100 MNOK on a 50/50 basis has been fulfilled and the industry has in fact covered 60 percent of the total costs. Since 1989 more than 100 projects and more than 30 workshops/seminars have been supported throughout the years. As shown in the figure below, the total R&D budget (1989-2009) is 418 MNOK of which the industry has covered 60 percent while the Norwegian and French governments have granted the remaining 40 percent.

Government and industry support 1988 – 2009



In 2009 the Foundation has been very active in promoting cooperation between France and Norway. There has been a special focus on cooperation between the French competitive poles and the Norwegian Centres of Excellence, Research Based Innovation and Expertise. There has been an increased interest for both seminar support and project funding in 2009. This has lead to a financial problem for the Norwegian part of the Foundation as the resources accumulated over the years are decreasing and the support received from the Ministry remain the same.

R&D PROJECT ACTIVITIES IN 2009

A total of 12 projects received funding in 2009 (Appendix 1); one is within aquaculture, one project is within biomedicine, one within energy and environment, one within information technology, two within civil engineering, five within material sciences and technology and one within marine technology. Five of the twelve ongoing projects are approved by EUREKA/Eurogia.

A total of 13 new project proposals were put forward to the Board for evaluation in 2009. Six were approved for funding. Only one of the approved projects started in 2009. Two will start in 2010 and three are still waiting for French funding.

The following six projects were approved for funding:

- Sonowand / Vermon
  Development and industrialization of ultrasound probes for sterile processing
  Started in June 2009

- Terra Orbit / Armines
  Geostatistical modelling of oceanographic data and climatology compilation
  Starting in 2010 provided French funing

- University of Bergen / Ifremer
  Molecular markers to estimate algal diets for molluscs
  Starting in 2010

- Norsk Elektro Optikk / Alcatel Thales
  Compact photo-acoustic mid-infrared spectroscopy sensor for extended range of chemical agents
  Starting in 2010 provided French funding

- Impetus Afea / Sarl Impetus
  NextGenFSI: Next generation numerical code for fluid-structure interation
  Starting in 2010

- SINTEF ICT / Tronics
  Monitoring of physiological pressure by implantable MEMS-MOPP-MEMS
  Starting in 2010 provided French funding

In addition to the above mentioned projects, seminar support and support for networking was given to the following events:

- French-Norwegian Seminar on Capture, Transport and Storage of CO_2, LeHavre
  NTNU / Ecole des Mines

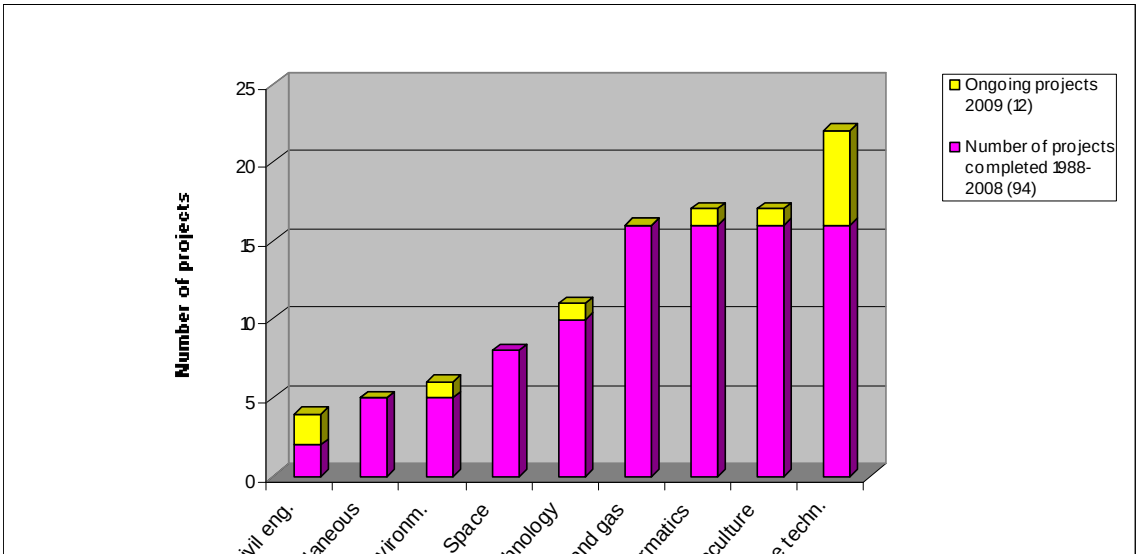
- French-Norwegian Workshop on Modelling and testing of degradation and damage mechanisms in materials technology for deep geothermal energy, Trondheim, SINTEF Materialer og kjemi
- French-Norwegian seminar on Marine Renewable Energy, Oslo
- Maison Norvège
- Pôle Mer Bretagne, Networkbuilding
- SINTEF Fisheries and Aquaculture / INRA, Networkbuilding
- Oslo Cancer Cluster, European Cancer Cluster Partnering

PROJECT FUNDING 1988 – 2009

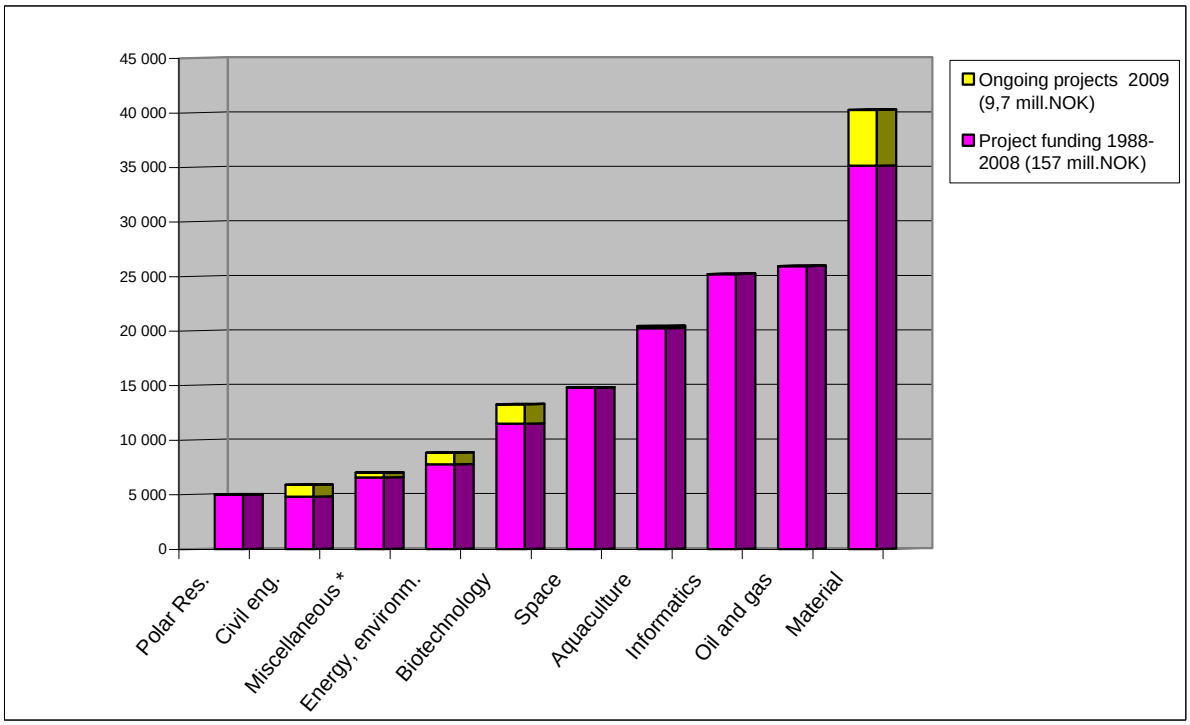
Up to mid-nineties oil, gas and offshore technology dominated the areas of activity. This has changed since and the fields of material sciences and technology, information technology and aquaculture have been dominant from 1999. Over the period 1988 – 2009 the number of projects within material science and technology have prevailed oil/gas. In 2009 material science and technology are still dominant. (Appendix 1).

Number and funding of completed and ongoing projects according to fields of activity are shown in the two figures below.

Number of projects financed 1989 – 2009 according to areas of activity

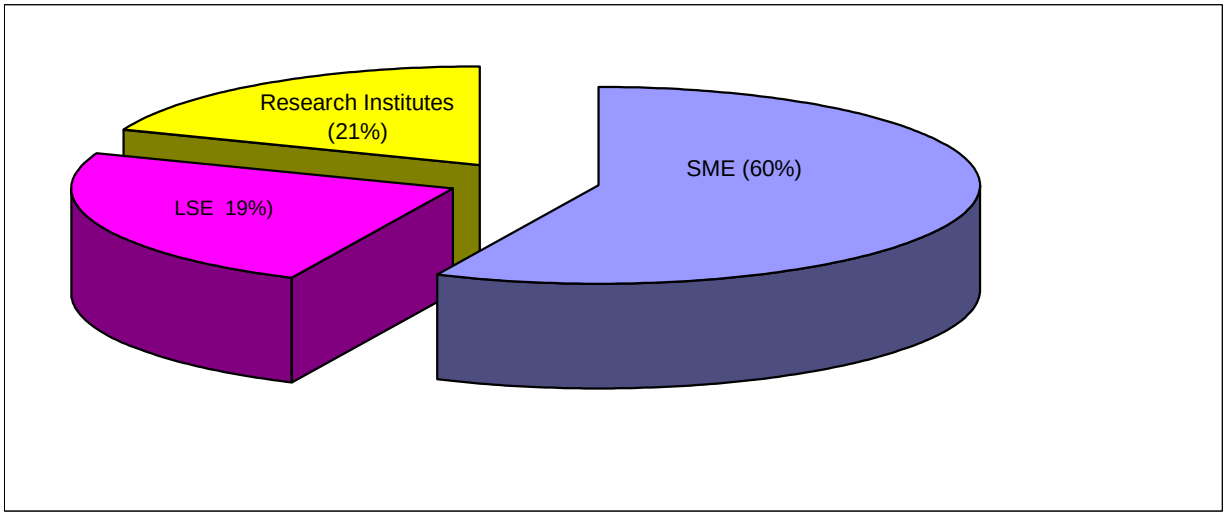


Project funding (including workshops) 1989 - 2009 according to areas of activity in 1000 NOK



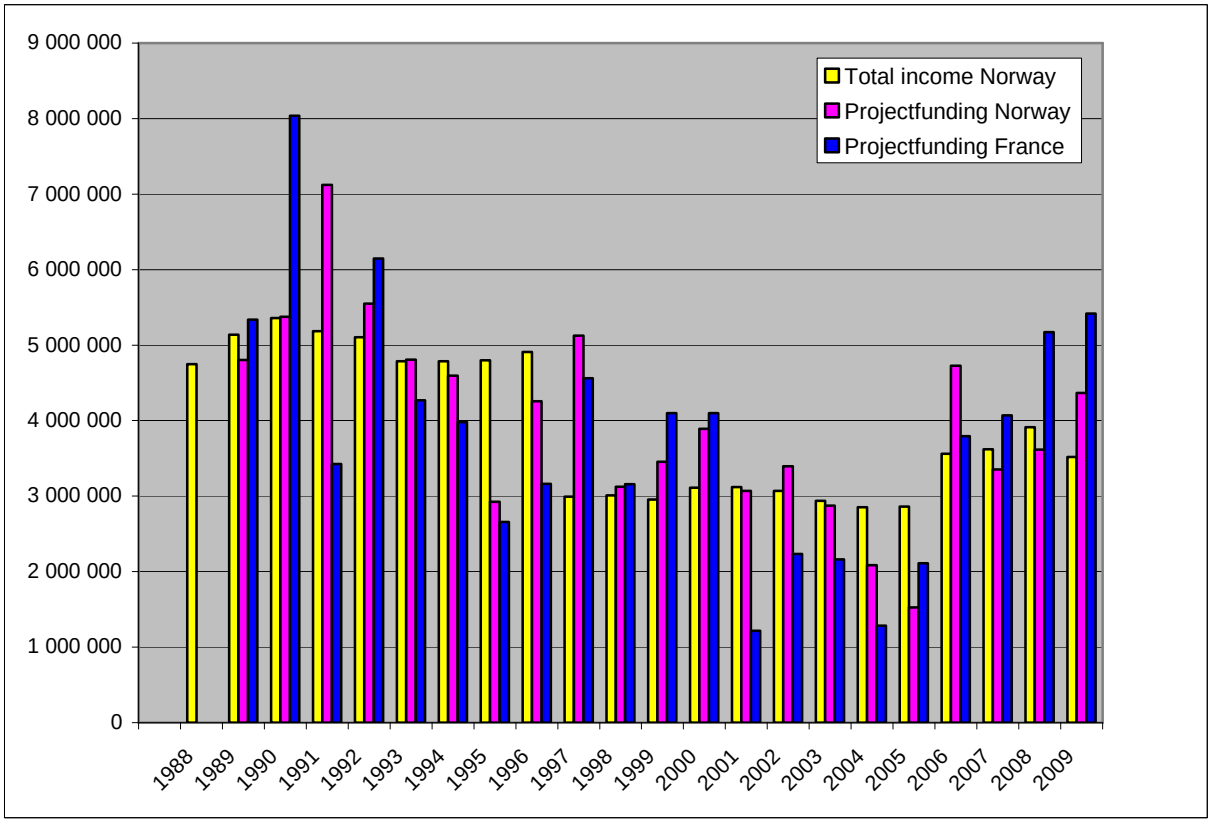
Of the total of 106 projects more than half (60%) have been awarded to Small and Medium-sized Enterprises (SMEs), 21% to Research institutes and 19% to Large Scale Enterprises (LSEs). Research institutes and Universities are required to have an industry partner. Both LSE and Research institutes are strongly encouraged to include doctoral students in the projects and over the years more than 50 doctoral theses have been performed through FFN/FNS projects.

Types of enterprises according to contract partner receiving FFN/FNS funding 1989 - 2009:



Project funding – income and expenditure

This figure shows the income and project allocations from 1988 to 2009. In Norway, the Ministry of Trade and Industry (through the Research Council of Norway) allocate an annual amount. The total income includes Eureka support and member fees. In France the income and project funding is the same amount as there is no allocation from the Ministries to the French part of the Foundation. Seminar funding is not included.



The allocation from the Norwegian Ministry of Trade and Industry started in 1988 but project funding started in 1989.

SEMINAR ACTIVITIES IN 2009

Three seminars were approved and partly funded in 2009. One was organized in 2009 and two will take place in 2010.

Seminar main objectives:

- Bring together French and Norwegian key actors in neuroscience and cancer,
- Stimulate private-public and research-industry collaborations,
- Initiate cooperation projects in the R&D sectors, including demonstration projects

Appendix 4 gives a list of the 33 seminars funded by the Foundation since 1984.

OTHER RESEARCH ACTIVITIES IN 2009

The Foundation together with the Research Council of Norway has had discussions with the French Agency for National Research on how to proceed on a common call for proposals. A Memorandum of Understanding (MoU) was signed in April 2008. A common call for proposals are still under discussion.

The Foundation together with the respective Embassies in France and Norway have been active in informing the various French clusters and Norwegian centres of research about activities going on in the two countries. Meetings have been arranged with interested parties and on the Norwegian side funding has been offered in order to arrange seminars and/or meetings for discussions. The work will continue in 2010.

Promotion of the Foundation will continue both on the website and in the press.

The Foundation is in close cooperation with EUREKA. For all EUREKA-approved FNS-projects, the Foundation has from 2006 automatically received additional funding by the Norwegian EUREKA-office (30% of the FNS-contribution). From 2010 this additional funding scheme is unfortunatelely no longer available.

FFN/FNS SUPPORT FOR EXCHANGE OF SCIENTISTS THROUGH THE ACADEMIES OF SCIENCES AND THE ÅSGARD PROGRAMME

Appendix 5 provides a summary of all the scientist exchanges funded by FFN/FNS. The National Academies of Sciences select the candidates to be supported. In the agreement from 1989 it was expected that one to two exchanges per year would be realistic. Exchange activity in certain years has been somewhat higher than the expected level and from 1997 somewhat lower than expected. From 1990 to 2003 a total of 12 French scientists and 10 Norwegian scientist have been financed within the agreement. Unfortunately there has been no exchange since 2003 between the Academies.

In 2006 the Scientific mission of the French Embassy in Norway and the Foundation launched an invitation programme for the visit of French researchers to Norway, named the Åsgard programme. The programme is open to all researchers, with emphasis on those 35 to 45 years old, whose scientific work is internationally recognised and who have just been, or will be, appointed group leaders in their home institutions.

French scientists are invited for a one-week visit to Norway within the framework of the programme. The goal is to create links between French and Norwegian researchers and research institutions in order to exchange scientific knowledge and skills that will lead to effective collaborations. From 2007 Norwegian scientists were included in the programme but none Norwegian scientists applied in 2009. (Appendix 5).

FFN/FNS' BASIC CAPITAL

In 2009 the total income including interest and bank costs was 9,7 MNOK, while the total expenditures ended up with 10,4 MNOK.

FFN/FNS ON THE INTERNET

http://www.ffn-fns.fr
http://www.forskningsradet.no/fns

Appendix:

1. FFN/FNS ongoing projects by field of activity in 2009
2. Results of ongoing projects completed in 2009
3. Projects completed: 1988 – 2009
4. Workshops and seminars: 1984 – 2009
5. Exchanges of scientists 1990 - 2009
6. Account report 2009

The Board approves the annual report for 2009.
May 25, 2010, Svolvær, Lofoten, Norway

Olivier Appert (s)
Chairman

Jan Erik Strand (s)
Vice Chairman

Elisabeth Barsacq (s)
Board member

Kari Rossum (s)
Board member

Marie Marguerite Bourbigot (s)
Board member

Marit Aursand (s)
Board member

Nathalie Delorme (s)
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Egil Eike (s)
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Claire Tutenuit (s)
Board member

Nakita Vodjdani (s)
Board member

Gérard Momplot (s)
Secretariat leader

Randi Aarekol Basmadjian (s)
Secretariat leader

FFN/FNS ONGOING PROJECTS BY FIELD OF ACTIVITY IN 2009

AQUACULTURE

Blue mussel bio-energetics in aquactulture as modelled with DEB (Dynamic Energy Budget) theory
IMR (Havforskningsinstituttet) (Øyvind Strand)
IFREMER (Marianne Alumno-Bruscia)
Duration: December 2008 – April 2010 (18 months)

BIOMEDICINE

Novel sonosensitive liposomes and systems for targeted ultrasound mediated drug delivery
Epitarget Therapeutica (former CancerCure AS) (Sigrid Fossheim)
EDAP-TMS SA (Emmanuel Blanc)
Duration: 2 years 2007 – 2010 (Σ!4056)

CIVIL ENGINEERING

Geosynthetics for innovative sustainable solutions in Arctic climate
Store Norske Spitsbergen Grubekompan / SINTEF (Arnstein Watn)
TenCate Geosynthetics France (Philippe Delmas)
Duration: 3 years 2006 – 2009 (Σ! 3702)

TMS (TEMASI) System
Saint-Gobain Byggevarer as (former Maxit) (Oddvar Hyrve)
MDB Texinov (Jacques Tankere)
Duration: 3 years .1.1.2009 – 31.12.2011 (Σ! 4572)

ENERGY AND ENVIRONMENT

Industrialisation of the Watercatox process for waste water treatment and liquid oxidation
Due miljø (Eddy Torp and Partow Henriksen)
Tredi (Sylvain Durecu)
Duration: 1.1.2008 – 2009/2010

INFORMATION TECHNOLOGY

STERIPROBE – Development and industrialization of ulstrasound probes for sterile processing
Sonowand AS (Atle Kleven)
Vermon S.A. (Philippe Auclair)
Duration: 2 years 1.7.2009 – 30.6.2011 (Σ! 4980)

MATERIAL SCIENCE AND TECHNOLOGY

Intercepting HISC by ultrasonic residual stress measurements
Det Norske Veritas (Majid Anvari)
Ultra RS (Siamack Atiabi)
Duration: 1 year - 2006/07 (Finish in September 2009)

Conception, development and testing of new aluminium casting alloys for elevated temperature applications in automobile engines
Hydro Aluminium (Petter Åsholt)
Montupet (Bruno Barlas)
Duration: 3 years 1.7.2006 – 30.6.2009 (Σ! 3698)

Isotope separation of silicon for use in the photovoltaic industry
Isocilicon AS (Dag Øistein Eriksen)
Novasep Process SAS (Pierre Hilaireau)
Duration: 3 years, 1.6.2008 – 31.5.2011

Evaluation of Ready To Use crucibles for the crystallization of multi crystallised silicon ingot
NTNU, Material Science (Lars Arneberg)
Vesuvius France (Christian Martin)
Duration: 1 year 2008/09

Spark plasma sintering of ceramic proton conductors for solid oxide fuel cells
SINTEF Materialer og Kjemi (Marie-Laure Fontaine)
CIRIMAT, PNF2, EDF (Calude Estournes)
Duration : 3 years, Dec.2009 – Dec. 2012

MARINE TECHNOLOGY

New Solution for Deck Installation and Decommissioning : Deck Structure Installation Vessel
Det Norske Veritas AS (Siamack Atiabi)
Technip (Pierre Armand Thomas)
Duration: 1 year 2009 / 2010-
Eurogia EOG-0604

RESULTS FROM PROJECTS COMPLETED IN 2009

Store Norske Spitsbergen Grubekompan / SINTEF (Arnstein Watn)
TenCate Geosynthetics France (Philippe Delmas)

FNS Norway::	NOK 2 160 000		Industry/other sources:	NOK 2 818 000	
FFN France:	Euro	95 262	Industry/other sources:	Euro	137 284

Duration: 3 years, 2006 – 2009 (Σ! 3702)

Geosynthetics for innovative sustainable solutions in Arctic climate
The GISSAC-project was initiated as an answer as to how one can build environmental friendly soil structures in the Arctic by using locally available geological materials and geosynthetics.

TenCate Geosynthetics France has been pioneering developments in geosynthetic materials for 30 years. Bags made of the materials specially designed by the company for Arctic regions were used in the project in Svalbard. SINTEF provided expertise throughout the whole project and participated in the testing of the bags that took place in Svea on the site operated by Store Norske Spitsbergen Grubekompani (SNSK). Much of the field work was carried out by PhD-student Fabrice Caline from the University Centre in Svalbard (UNIS)/Norwegian University of Science and Technology (NTNU).

The project received funding from the European innovation network EUREKA and the French-Norwegian Foundation.

A significant amount of experience has been gathered.

As the project included purchasing a geotechnical borerig to serve the research partners at Svalbard, experience has been made on how soil investigations can be performed under Arctic conditions. We now have the possibility to take soil samples and to use the geotechnical tests performed on such samples to better design embankments (need no longer be so conservative in design, and therefore more economical) and to find suitable fill material for geotextile bags, as for grain size characteristics.

Experience has been gathered as to how to sew, fill and close the bags and suggestions as to how this procedure can be improved have made. The study also includes important experience as to how place the bags in a rational manner and to design structures that can sustain heavy ice and wave action. We have gathered experience on how any destroyed bags can be replaced. There are now several test sites in Svea applying the technique of geotextile bags and locally available fill.

The geotextiles used in the bags have undergone an intensive test programme and a lot of experience has been gathered on how the geotextile behaviour is influenced by the ice action and also by the UV-radiation (geotextiles placed on frames exposed to UV-radiation over a two year period).

The test site has also been heavily instrumented. The topographic location of each bag is measured, and also confirmed by video. Temperature measuring instrument has been installed under and inside the bags. One Geodetect strip has been placed under the bags in order to measure

deformations. The monitoring sea ice thickness and extension, crack formation, tidal movement and stresses in the embankment area have increased the knowledge about the how the sea ice affects the bags throughout the season.

Overall, the test structure has worked very well. The degradation of the geotextiles has been low and the structure fullfills its requirements three years after it was built. Other, and similar structures has been built in Svea after seeing how well our initial test structure works, in stead of choosing conventional approaches with erosion control structures built by rocks imported form the mainland. This is promising for the technique, both in a technical and economical perspective.

Det Norske Veritas (Majid Anvari)
Ultra RS (Siamack Atiabi)

FNS Norway:	NOK	500 000	Industry/other sources:	NOK	500 000
FFN France:	Euro	55 000	Industry/other sources:	Euro	70 000

Duration: 1 year - 2006/07 (delaid and finished first in 2009)

Intercepting HISC by ultrasonic residual stress measurements
As it had been planned, Neutron Diffraction technique was used to measure residual stresses in the pipe and compare them with ultrasonic measurements. The Neutron Diffraction measurements were performed at GKSS Research Center in Geesthacht, Germany. The investigated sample was a steel tube with a length of 510 mm, an outer diameter of 110 mm, and 12 mm wall thickness made of duplex steel UNS 32750 (1.4410; X2 CrNiMoN 25.7.4).
There was a weld in the middle of the tube joining two shorter tubes. The weld width was given as 20 mm. The scan line was required to be at the position marked with '90°' on the tube To check the symmetry, also the points with the same distances from the weld line in negative direction were measured

The older measurements performed by UltraRS showed unsymmetrical profile around the weld which were not acceptable. Therefore, DNV requested Ultra RS to do the measurements one more time. For this US measurement, Ultra RS proceeded differently in order to make the measurement with the same manner in both sides of the weld. The following procedure was adopted: On both left and right side of the weld, the 2 receptors were oriented toward the cord and they stopped the measure in the center of the cord. -50 mm to 0 mm and +50 mm to 0 mm. The wave propagation is the same on both sides. The new procedure was different from the previous one where the measurement was done with the displacement of the 2 receptors in the same direction from +50 to -50 mm.

General conclusions:

- The New US measurement gives different profile in the left side than the previous US measurement. This difference is due to the difference in the measurement configuration. Approaching the weld, the new configuration permits to the emitted wave to propagate in homogeneous medium (Base metal) since the transmitter is at about 15mm from the receptors. However, in the old configuration, concerning the measurement when we go past the weld (left side of the profile), the emitted wave is propagated in different media (Base metal , HAZ and weld metal), and this leads to different measurements in comparison to situation where the transducer is oriented differently to measure at the same point (new configuration case). The further the transducer is from the weld, the two curves old and new come closer.

- Recent microstructural studies and E modulus measurements shows that the dependence of wave speed on different direction in duplex is more influenced by E modulus values rather than grain orientation and number of passing boundaries. The wave speed values in simulated HAZ are not well explainable and need further investigation.

- To make good measurement, it is recommended to adopt the new measurement configuration in order to avoid the wave perturbation.

- The correlation between the US and Neutron Diffraction as reference is satisfactory. Quantitatively, the profiles seem to be consistent.

Hydro Aluminium (Petter Åsholt)
Montupet (Bruno Barlas)

FNS Norway::	NOK 1 620 000	Industry/other sources:	NOK 2 801 805
FFN France:	Euro 470 352	Industry/other sources:	Euro 605 679

Duration: 3 years 1.7.2006 – 30.6.2009 (Σ! 3698)

Conception, development and testing of new aluminium casting alloys for elevated temperature applications in automobile engines
The following activities and results have been achieved in the project during the different years:

The project was started later than planned in 2006, i.e. only four months were available for work. During this period the following was achieved:
- Literature survey in order to establish state-of-the-art for the industry and possibly new alloying elements to be explored in the frame of the project.
- Patent review.
- Casting and characterisation of first experimental alloys (Alloy family I).
- Definition of experimental matrix for alloys to be cast and tested in 2007 (Alloy family II).
- Evaluation and adaption of available thermo-mechanical testing equipment available in Hydro Aluminium (Gleeble).
- Use of thermo-dynamic simulation tools to identify possible alloying elements for improved elevated temperature properties (FactSage, Thermocalc)

Starting from the base of the work of 2006, the following was obtained in 2007:
- Casting of the entire matrix of experimental alloys (A356 + combinations of 5 different dispersoid forming elements) defined in 2006 (Alloy family II)
- Heat treatments to obtain precipitation of dispersoids able to give increased elevated temperature fatigue durability for the alloys
- Characterisation of microstructures in as cast and heat treated samples with advanced characterisation tools, optical microscope, SEM, TEM etc.
- Differential scanning calorimetry, hardness testing
- Further development of thermo-mechanical fatigue test in Gleeble equipment (thermal fatigue).
- Definition of new matrix of experimental alloys based on the Al-Cu binary system (Alloy family III)
- Casting and heat treatment of new experimental alloys (family III).
- Testing of selected alloys from alloy families II and III in thermo-mechanical fatigue test

The main activities in 2008 and 2009 are described below:

- Heat treatment optimisation of new experimental alloys (family II and III). Optimisation of time and temperatures necessary to obtain maximum utilization of the property improvement potential of the chemical elements added for dispersoid formation.
- Characterisation of microstructures for heat treated samples by use of SEM, TEM, EPMA, as well as hardness and electrical conductivity measurements. Results from this characterisation guided the optimisation of alloy chemistry and heat treatment optimisation.
- Elevated temperature tensile testing, fatigue testing and creep testing of experimental alloys.
- Further development of method and testing with the thermo-mechanical fatigue test equipment (Gleeble). Focus in 2008 was to establish a stress controlled test and to explore the effect of holding time on elevated temperature in each cycle. Focus in 2009 was to establish a test with reduced constraint in order to obtain thermally induced strain values more realistic in cylinder head applications.
- Production of A356 type alloy with different Fe contents and subsequent thermo-mechanical fatigue testing.
- Production of samples for more extensive testing of mechanical properties of selected family II (AlSi) and family III (AlCu) alloys, this time with melt filtration in the die.

- Creep testing of the selected alloys has proven that there are promising alloy candidates in both alloy families having superior creep properties compared with reference alloys

- By the end of 2009, work was also initiated to prepare a patent application for an alloy resulting from the alloy development work.

- During 2008, the French Ph.D. student and the Norwegian Post doc.where stationed in each others universities, i.e. Ph.D student Nadia Cherdoudi worked at NTNU in April/May while Post doc. Zhihong Jia worked at CECM in October/November.

At the current time it can be summarized that the project has identified potential alloy candidates for the intended engine applications. The alloys have so far only been tested in lab scale tests. Full scale testing has not been possible within the time frame of the project. However, Montupet and Hydro have agreed on activities to pursue the opportunities after the formal closure of the project. Work will therefore continue also in 2010. A postponement of final reporting has therefore been agreed with the foundation (FNS).

NTNU, Material Science (Lars Arneberg)
Vesuvius France (Christian Martin)

FNS Norway::	NOK 425 000	Industry/other sources:	NOK 500 000
FFN France:	Euro 147 383	Industry/other sources:	Euro 65 785

Duration: 1 year 2008/09

Evaluation of Ready To Use crucibles for the crystallization of multi crystallised silicon ingot
Multi crystalline silicon is today solidified in silica crucible coated with a lining of pure silicon nitride powder. This lining is critical and source of a productivity lost due to its brittleness and process difficulty.

Purpose of this work was to evaluate and optimize on pilot scale a Ready To Use crucible (RTU) for this application. This fused silica crucible is already lined with a silicon nitride based coating and should exhibit optimal performance in term of releasing properties, reliability, durability, and ingot quality.

The most advanced coating version of RTU crucible was evaluated with two types of silicon feedstock (Virgin poly and UMG Elkem Solar product) and compared to the existing coating technology (called reference).

The RTU solution was proved to exhibit much higher mechanical strength and hardness than reference. During the project seven ingots were casted in the NTNU – SINTEF furnace. Each of them were characterized in term of resistivity , lifetime (Quasi steady State Photo-conductance), oxygen content (Fourrier transformed Infra red Spectroscopy).

The ingot made with RTU crucibles demonstrated, for both feedstock, less sticking, lower oxygen content, higher life time, than reference ingots. RTU and reference ingots were processed into cells by INES (France). The cells from RTU ingots exhibits high efficiency (close to 16.5%) slightly better than reference Ingot (average 16%). This could be explained by less contamination of the RTU ingot due to less sticking to the crucible.

Effect of coating impurities was investigated by evaluating the properties of an ingot obtained from a crucible lined with a coating containing 10 times more iron and Aluminium. Decreased lifetime related to impurities segregation was observed.

This project has permitted the qualification on pilot scale of a more resistant and more reliable coating for the PV ingot grower. It also contributes to the better understanding of the effect of the coating on PV properties.This ready to use crucible should help, in the future, to lower solar energy cost and achieve quicker grid parity.

FFN/FNS PROJECTS COMPLETED: 1988 – 2009

AQUACULTURE, AGRICULTURE AND FOOD INDUSTRY

- Developing system Biofish – Sea Bass, Sea Bream in Mediterranean (Project A and B)
  Oppdrett Service AS, Norway (Geirulv)
  Scorsa, France (van Obbergen and Guy Lebrun)
  Duration 1989 - 1991

- Study of Inter-relations Carotenoides-Vitamines A at salmons
  Akvaforsk, Sunndalsøra, Norway (Storebakken)
  INRA, Ascain, France (Coubert)
  Duration 1989 - 1990

- Air transportation – Norwegian Aquaculture – by ATR 72
  Air West A/S, Norway (Wågsæther)
  Avions de Transport Régional (ATR), France (Valerio)
  Duration 1990 - 1991

- Turbot grower feed. Protein requirement Feed production technology
  Norsk Bioakva A/S , Norway (Einar Wathne)
  UCAAB, France (Antoine Bon)
  Duration 1994 - 1997

- Scallop production – plan for co-operation
  Centre for Studies of Environment and Resources, UiB, Norway (Thorolf Magnesen)
  IFREMER-Brest-Drv, France (Jean-Claude Dao)
  Duration 1994 - 1997

- Control and management of quality with nutrition and feeding regime
  Domstein Salmon AS, Norway (Ola Sveen)
  Labeyrie SA, France (Laurent de Baynast)
  Duration 1995 - 1997

- Biactive compounds in fish and shellfish waste
  Institute for Fisheries and Aquaculture, Norway (Asbjørn Gildberg)
  Collège de France, Marine Biology Laboratory, France (Yves Le Gal)
  Duration 1995 - 1997

- Cellular immune system in salmoned fish
  University of Bergen, Fisheries and Marine Biology, Bergen, Norway (Curt Endresen)
  Université Pierre et Marie Curie, CNRS and INRA, Paris, France (Jacques Charlemagne)
  Duration 1996 - 1998

- Oral use of Propionibacterium acnes to improve health and growth in fish
  Nutreco ARC, Norway, (Alex Obach)
  Vétoquinol S.A., France (A. Rigoulot)
  Duration 1998 - 1999

- Alternative to antibiotic treatments in marine aquaculture. Application to bivalve larvae
  Centre for studies of environment and resources, UiB / Scalpro AS, Norway (T. Magnesen)
  UBO-IEUM-UMR CNRS, France (Christine Paillard)
  Duration 1999 - 2000

- New quality assessment methods for the Norwegian salmon industry
  SINTEF Fiskeri og havbruk and Norway Royal Salmon, Trondheim, Norway (Marit Aursand)
  Eurofins Laboratories and Laiem, Nantes, France (Michèle Lees)
  Duration: 1998-2001

- Substitution of fish meal by plant protein in diet of Atlantic Salmon and Rainbow Trout
  EWOS Innovation AS (NorAqua Innovation AS), Dirdal, Norway (Jan Vidar Jakobsen)
  UNCAA DPA UCAAB, Chateau-Thierry, France (Christine Azam)
  Duration: 1999 – 2002

- High-energy diets in aquaculture: Effects on salmonid quality
  Nutreco ARC AS, Stavanger, Norway (Wolfgang Koppe)
  National Institute for Agronomic Research (INRA), France (Geneviève Corraze)
  Duration: 2000 - 2003

- Structure, formation and daily growth of the scallop Pecten maximus shell
  Institute of Marine Research, Bergen (Øivind Strand)
  Institut Universitaire Européen de la Mer (Laurent Chauvaud)
  Duration: 2001-2003

- Adaptation of French sea bream technology for cod fingeling production
  Bergen Aqua AS, Bergen (Grethe Adoff)
  Ferme Marine de Douhet (Fréderic Cachelou)
  Duration 2001 - 2003

- Nutraceuticals from fish and shellfish hydrolysates
  BioHenk AS, Tromsø (Even Stenberg)
  Station de Biologie Marine du Muséum National d'Histoire Naturelle (Yves Le Gal)
  Duration: 2002 - 2004

BIOTECHNOLOGY / BIO-MEDICINE / BIOCHEMISTRY

- Development of 99-Tc-labelled drugs based upon Biological Substances
  Axix Research A/S, Oslo, Norway (Heggli)
  Compagnie ORIS Industrie, Gif-sur-Yvette, France (J.C. Saccavini)
  Duration 1989 – 1990

- Purification of marine oils by supercritical fluid fractionation
  Pronova Biocare, Norway (H. Breivik)
  Separex, France (M. Perrut)
  Duration 1991 - 1993

- Modelling of molecular recognition – a semi automatic approach
  MR Center, Norway (Steffen Petersen)
  Biostructure, France (Stéphane Boudon)
  Duration 1992 – 1993

- Detection and counting of residual leukocytes
  Dynal, Norway (Erik Ruud)
  Biocytex, France (Philipe Poncelet)
  Duration 1993 - 1994

- Repair of lesions induced in DNA by industrial compounds and drugs
  University of Bergen Department of molecular Biology, Bergen, Norway (Niels Aarsæther)
  Institut Gustave Roussy, Villejuif, France(Jacques Laval)
  Duration: 1998-2001

- The immune system in scallop, Doctoral studies at SARS Centre in Bergen
  Doctoral student Armaury Herpin, Laboratoire de Biologie et Biotechnologies Marine, Caen
  Duration: 2000-2002

- Development of biochemical procedures and read out platforms for manipulating and analysing nucleic acids
  LingVitae, Norway (Preben Lexow)
  Pasteur Institut, France (Aaron Bensimon)
  Duration: 2001-2003

- The Effect of Bioactive Fatty Acids on Atherosclerosis and Restenosis Development
  Thia Medica AS / Clinical Biochemistry Haukeland Hospital, UiB, Norway (Rolf K. Berge)
  Institut Pasteur de Lille, France (Bart Staels)
  Duration: 2002 – 2004

- Developing genetic tools for real time non-invasive imaging of tumorigensis in living mice
  Cgene AS (Harald Karlsen) / University of Oslo (Joel Glover)
  ENS Paris / IPSOGEN (Christo Goridis / Fabienne Hermitte)
  Duration: 2 years 2005 - 2007

CIVIL ENGINEERING

- Prediction creep settlements for foundations in permafrost
  Norwegian Geotechnical Institute, Oslo, Norway (Tom Lunne)
  GEOCEAN, Marseille, France (Alain Puech)
  Duration 1991

- Submarine Slides
  Norwegian Geotechnical Institute, Oslo, Norway (Harald Norem)
  CEMAGREF, Division Nivologie, St. Martin D'Heres, France (Gerard Brugnot)
  Duration 1991 - 1992

- Geosynthetics for innovative sustainable solutions in Arctic climate
  Store Norske Spitsbergen Grubekompan / SINTEF (Arnstein Watn)
  TenCate Geosynthetics France (Philippe Delmas)
  Duration: 3 years 2006 – 2009 (Σ! 3702)

ENERGY SAVING AND ENVIRONMENTAL TECHNOLOGY

- Technology transfer in water technology
  Aquateam, Norway (Schanke Eikum)
  Verseau, France (Lagarrique)
  Duration 1990 – 1991

- Integration of a gas turbine in a high speed vessel
  Ulstein International AS, Norway (Harald Nordal)
  Turbomeca, France (Watier)
  Duration 1991 - 1992

- Anode gas cleaning. Installation and operation of a Pilot Plant
  Elkem Aluminium ANS, Norway (Arne G. Berg)
  Procedair SA, France (Serge Commenges)
  Duration 1997

- Wet Air Oxidation by Catalytic Membrane Contactor
  SINTEF Material Technology / Due Miljø, Norway (Henrik Ræder)
  Institut de Recherches sur la Catalyse (IRC)-CNRS, France (P. Gallezot)
  Duration 1998 – 2000

- Current forecasting in the North Sea and the Gulf of Lion
  Terra Orbit AS (Laurent Bertino)
  Actimar SA (Raymond Nerzic)
  Duration: 3 years 2006 - 2008

- Stabilisation of top of the line corrosion rate
  Institutt for energiteknikk (IFE) / Total Norge / Norske Conoco Phillips (Arne Dugstad)
  Total S.A / ENSEE Grenoble (Yves Gunaltun)
  Duration: 3 years 2006 – 2008

INFORMATION / TELECOMMUNICATION TECHNOLOGIES / ROBOTICS

- Fibre Optic Technology
  Alcatel STK, Norway (Flaarønning)
  Lab. de Marcoussis, France (Torchin)
  Duration 1989 – 1990

- Computer aided navigation of mobile robots using animated synthetic images
  SINTEF, Norway (V. Kallevik)
  CYBERNETIX, France (P. Baraona, D. Sangouard)
  Duration 1990 - 1991

- ACM, Advanced Configuration Management (NOMADE + EPOS)
  Norwegian Institut of Technology, Trondheim, Norway (Conradi)
  LGI, Nomade Team, Grenoble, France (Estublier)
  Duration 1991 - 1992

- Interactive home support systems for protected housing
  Man Machine Technology AS, Norway (Anderson)
  Pierron SA, France (Viala, Legrand)
  Duration 1992 - 1993

- Eviacsim – An interactive evacuation simulation system tool
  A/S Quasar Consultants, Norway (K. Harald Drager)
  Simulog, France (Bruno Arbaud)
  Duration 1992 - 1993

- High performance safety and security detector field bus
  Autronica AS, Trondheim, Norway (Gunnar Haveland)
  Automatismes Sicly, Le Blanc-Mesnil, France (Thierry Chabot)
  Duration 1994 - 1997

- TRICAD – Triangulation of CAD geometries
  ViewTech, Norway (Tor Helge Hansen)
  Transvalor, France (Etienne Wey)
  Duration 1999 - 2000

- Secure software distribution and payment over Internet
  Sospita AS (Protective Technology), Mandal, Norway (Ulf Carlsen)
  Gemplus, Gémenos, France (Pierre Girard)
  Duration: 1999-2001

- HP-Sim: High Performance Seismic Imaging)
  Para//ab / Norsk Hydro, Bergen, Norway (Tor Sørevik)
  Armines-Geophysique, Fontainebleau, France (Philippe Thierry)
  Duration: 2000-2001

- 3D Geometry System integrated with haptic and kinaesthetic solutions
  Compu Touch AS, Norway (Frank Robert Berg)
  Atomic Energy Commission, France (CEA) (Guy Le Bras)
  Duration: 2001-2002

- Software Components for Building Complex 3D Geological Models (2001-2003)
  GeoCap AS, Norway (Olav Egeland)
  Armines / IFP, France (Jean-François Rainaud)

- Medical Device Software Assessment for Certification
  Det Norske Veritas AS, Oslo, Norway (Torbjørn Skramstad)
  ISO*SCOPE*, Toulouse, France (Christian Rouve)
  Duration: 2000 - 2004

- Simulation and planning for Robotic Education and Distant Surgery
  Sim Surgery AS, Norway (Jan Sigurd Røtnes)
  IRCAD, France (Luc Soler)
  Duration: 2003-2004

- Development of innovative IT solutions for Shipbrokers
  Unified Messaging Systems, Norway (UMS) (Harald Lindbäck)
  AXS Marine SA, France (Fabrice Demichel)
  Duration: 2003-2004

- Modelling electricity prices in European markets with an emphasis on risk analyses
  Kjell Magnus Maribu – postdoctoral studies at École des Mines de Paris
  Duration : Six months 2006

- Localisation of drifting objects and decision aid system for maritime search and rescue (SAR)
  CMR Computing / Met.no (Kjell Røang)
  ACTIMAR / IFREMER (Raymond Nerzic)
  Duration: 2006 – 2008 (Σ! 3652)

MATERIAL SCIENCE AND TECHNOLOGY / MARINE TECHNOLOGY

- Advanced light metals for car engines
  Hydro Aluminium, Sunndalsøra, Norway (L. Auran)
  PSA Velizy, France (R. Moore)
  Duration 1988-1992

- Postal container for ATR
  Hydro Aluminium, Norway
  Avions de Transport Regional (ATR), France
  Duration 1990 - 1991

- Microstructurally based modelling of plastic anisotropy
  Hydro Aluminium, Metallurgical R&D Center, Sunndalsøra, Norway (A. Aaflot)
  Pechiney Recherche, Voreppe, France (B. Marandet)
  Duration 1991 -1992

- Recovery of Aluminium Alloys
  Hydro Aluminium, R&D Materials Technology, Norway (Trond Furu)
  Pechiney CRV, France (D. Duly)
  Duration 1993 - 1996

- Modelling and improved cooling of aluminium extruded sections
  Hydro Aluminium, R&D Materials Technology, Norway (Antonie Oosterkamp)
  Bertin & Cie, France (J. Street)
  Duration 1994 - 1997

- Electrophoretic and sol-gel methods for anticorrosive mineral coatings
  SINTEF Materials Technology, Norway (Christian Simon)
  Institut Français du Petrole, France (Benjamin Cabot)
  Duration 1994 – 1997

- Piezo-composites in underwater transducers
  Simrad Norge AS, Horten, Norway (Helge Bodholt)
  Imasonic, Besançon, France (Gerard Fleury)
  Duration 1996 - 1998

- Carbon particle upgrading by plasma
  SINTEF/NTNU, Norway (Jon Arne Bakken)
  ARMINES, Centre d'Energétique, Sophia Antipolis, France (Laurent Fulcheri)
  Duration 1998

- Development of high performance and safety improved work clothing for the oil industry
  SINTEF Unimed, Øglænd Pioner, Norway (Arvid Påsche)
  Pinatel et Chapuis Textiles, France (Pierre Baleix)
  Duration 1998 - 1999

- Inductive plasma purification of metallurgical silicon using inductive plasma in order to obtain silicon with purity suitable for solar cell manufacturing
  Elkem ASA, Kristiansand, Norway (Pål Runde)
  PREMIS Technologies, Ascoux, France (N. Perrodin)
  Duration: 1999 – 2001

- High temperature pressure sensor (2000 - 2001)
  PreSens, Oslo, Norway (Frode Meringdal)
  Cea Leti, Grenoble, France (Bernard Diem)
  Duration: 2000 - 2001

- Aluminium components subjected to impact loading conditions
  SIMlab, NTNU / SINTEF / Hydro Aluminium, Norway (Magnus Langseth)
  LMT-Cachan / Renault, France (Ahmed Benallal)
  Duration: 2003-2005

- Novel silicon feedstock by agglomeration of silicon powder and further refining by thermal treatment and reactive metallurgy
  Silicon Technologies AS, Norway (Bruno Ceccaroli)
  EMIX SA, France (Didier Landaud)
  Duration: 2005

- Up-scaling of advanced ceramic membrane processes for fish oil separation
  Due Miljø and SINTEF Materia, Norwayl (Eddy Torp and Bente G. Tilset)
  CTPP / IFREMER, France (Charles Delannoy) and NOVASEP Orelis
  Duration 2004

- Up-scaling of advanced ceramic membrane processes for fish oil separation
  Due Miljø/SINTEF, Norway (Eddy Torp and Bente G. Tilset)
  CTPP / Novasep Orelis, France (Charles Delonnoy)
  Duration: 3 years 2005 - 2007 (Σ! 3198)

- New process for solar silicon. Refining by thermal treatment and reactive metallurgy
  Rec Silicon AS, Norway (Bruno Ceccaroli / Erik Sauar)
  EMIX S.A, France. (Didier Landaud)
  Duration: 3 years 2006 – 2008 (Σ! 3314)

- Intercepting HISC by ultrasonic residual stress measurements
  Det Norske Veritas (Majid Anvari)
  Ultra RS (Siamack Atiabi)
  Duration: 1 year - 2006/07 (Finish in September 2009)

- Conception, development and testing of new aluminium casting alloys for elevated temperature applications in automobile engines
  Hydro Aluminium (Petter Åsholt)
  Montupet (Bruno Barlas)
  Duration: 3 years 1.7.2006 – 30.6.2009 (Σ! 3698)

- Evaluation of Ready To Use crucibles for the crystallization of multi crystallised silicon ingot
  NTNU, Material Science (Lars Arneberg)
  Vesuvius France (Christian Martin)
  Duration: 1 year 2008/09

OIL AND GAS INDUSTRY, OFFSHORE TECHNOLOGY

- Feasibility Study on Natural Gas Distribution in North Rogaland
  Gasmet A/S, Forus, Norway (Rolf Rønningen)
  Sofregaz, Paris, France (Saillard)
  Duration 1989

- Deep Diver External Monitoring
  SINTEF, Trondheim, Norway (Arvid Påsche)
  COMEX SA, Marseille, France (Imbert)
  Duration 1989 - 1990

- Drilling and production operation for offshore field on Norwegian waters with the Jack-up TPG 500
  Wiltech Production System (WPS), Oslo, Norway (Robert Reed)
  Technip Geoproduction, Paris, France (Pierre-Armand Thomas)
  Duration 1989 - 1990

- Vertical resonant motions of tension leg platforms
  Norwegian Institute of Technology, Trondheim, Norway (Geir Moe)
  IFP, Rueil Malmaison, France (B. Molin)
  Duration 1989 - 1990

- Diver survival equipment
  SINTEF, Trondheim (Arvid Påsche) and Statoil/Norsk Hydro/OD, Norway
  COMEX S.A., Marseille, France (Jean Pierre Imbert)
  Duration 1989 - 1990

- Concrete semi-submersible production platform with rigid well risers
  Oddfjell Drilling and Consulting Co. A/S, Kokstad, Norway (A.K. Nilsen)
  Doris Engineering, Paris, France (J. Martin)
  Duration 1991 - 1992

- Offshore loading system for LNG and LPG
  Seanor Engineering a.s., Norway (Oddvar Bøyesen)
  FMC EUROPE S.A, France. (Chris Pashalis)
  Duration 1992 - 1994

- Gas leak detection (GLD) system for pipelines
  Simrad Marine, Norway (Kjell Dalland)
  Metravib, France (Pierre Schindler)
  Duration 1993 - 1994

- Development of methods for inspection of steel layers in flexible pipes
  Robit, Norway (Morten Eriksen)
  Coflexip, France (Barthelemy Laurant)
  Duration 1993 - 1994

- New Multilevel downhole seismic acquisition system
  READ Well Services AS, Norway (Karl A. Berteussen)
  IFP, Rueil Malmaison, France (Jean Laurent)
  Duration 1994 - 1996

- A new generation of zeolite catalyst for hydrocracking
  Statoil Research Centre, Norway (Bente Bøe)
  Institut Français du Pétrole, France (Eric Benazzi)
  Duration 1997 - 2000

- Travel support in connection with the establishment of possible co-operation between NTNU and IFP
  Professor Gudmundsson, NTNU, Trondheim, Norway
  Duration 1998

- Fatigue behaviour of offshore loading hoses
  Advanced Production and Loading (APL) AS, Norway (Jan V. Aarsnes)
  Trelleborg Kleber Industries, France (Jacques Cognard)
  Duration 1999 – 2000

- Increased Field Profitability by Improved Uncertainty Management
  Det Norske Veritas (DNV), Norway (Øivind Johnsen)
  Institut Français du Pétrole (IFP), France (Daniel Averbuch)
  Duration 2002 - 2003

- Application of a new encapsulation process in petrochemistry
  KeraNor/SINTEF Materials Technology, Norway (Christian Simon)
  Institut Français du Pétrole/Université de Franche-Comté, France (Alain Fossy)
  Duration: 2002 – 2004 (Extended to a EU project (NANOCAPS) in March 2004

- Stabilisation of the top of the gas lines corrosion rate
  Institutt for energiteknikk (IFE) / Total Norge / Norske Conoco Phillips, Norway (Arne Dugstad)
  Total S.A / ENSEE Grenoble, France (Yves Gunaltun)
  Duration: 3 years 2006 - 2008

SPACE TECHNOLOGY

- Aerospace Vehicle Numerical Flow Simulation and Wind Tunnel Test
  CFD, Trondheim, Norway (Helge Nørstrud)
  Aerospatiale, Toulouse, France (Corinne Rey)
  Duration 1990 - 1992

- Technology Program – Thermal Protection Materials for Propulsion Systems
  Raufoss, Norway (Haugen)
  SNPE Paris, France (Faure)
  Duration 1992 - 1993

- Zeolite Synthesis under Microgravity
  SINTEF (SI), Norway (Stöcker)
  Université de Paris VI+VII, France (Robert)
  Duration 1991 - 1992

- Save filter bank for flexible multi beam payload
  Ame Space, Norway (Øivind Andreasen)
  Alcatel Espace, France (Herve Snorre)
  Duration 1993 - 1995

- French / Norwegian study of increased space technology industrial co-operation
  Europavia Norge A/S, Norway (J.C. Width)
  CNES, France (Yves Rebillard)
  Duration 1993

- Development of adaptive mesh for space propulsion systems
  CDF Norway AS, Norway (Helge Nørstrud)
  SNECMA, France
  Duration 1994 - 1996

- Development of a bi-propellant flow control valve for satellite propulsion
  Raufoss Technology AS, Raufoss, Norway (Per Eger)
  Aerospatiale Espace Défense, Les Mureaux, France (J. Astier)
  Duration 1996 – 1998

- Introduction to the French Aerospace Industry
  Einar Sørensen, Norway
  Duration 1999

MISCELLANEOUS

- Olympic winter games – Albertville 1992 / Lillehammer 1994
  Potential fields of industrial co-operation
  NIA, Norway(Per Axel Prydz)
  COJO/LOOC. France
  Duration 1991 – 1992

- Creative project – 1st step marketing study
  Statoil, Norway (EUREKA support)
  CETIM, France (FNS support)
  Duration 1993

- Development of a new generation self-contained closed circuit breathing apparatus
  Thelma AS, Norway (Arvid Påsche)
  Fenzy S.A, France (Robert Michel)
  Duration: 2001 – 2002

- Developing an Intangible Asset Valuation Tool
  InSpire Invest AS (Jan-Olaf Willums)
  Integral Development Asset Management (Antoine Dehen)
  Duration: 2005/06

- Consumer conceptions of local food
  SIFO (Virgenie Amilien)
  INRA and UMR MOISA (Fatiha Fort)
  Duration: 2005 - 2007

WORKSHOPS AND SEMINARS: 1984 - 2009

Workshops and seminars are organized in order to help French and Norwegian companies and researchers to identify subjects of co-operation for developing new markets and achieving joint industrial initiatives.

The Foundation organizes a seminar when a topic of joint interest emerges as beneficial to the French and Norwegian industries. Sometimes they are held in France, sometimes in Norway. The host country organizes exchanges of views and visits to companies and industrial sites for groups of about 15 representatives of companies and research centres who are in a position to commit their organisations to a co-operative initiative in the future.

Seminars last for three to five days, and usually include:

- a general presentation of the participating organisations and their research and development strategy
- exchanges of views in small groups on topics selected for possible collaborative efforts
- company visits and bilateral discussions aimed at establishing fields of co-operation.

To date, the following seminars have been organized or supported by the Foundation:

Oslo, 1984:	Materials
Brest, 1984:	Aquaculture
Paris, 1985:	Offshore technologies
Paris, 1986:	Artificial intelligence
Trondheim, 1987:	Studies and research for marine technologies
Oslo, 1989:	Materials
La Rochelle, 1989:	Aquaculture
Caen, 1989:	Smart cards
Rueil-Malmaison, 1991:	Major risks
Paris, 1991:	Space technologies
Oslo, 1992:	Robotics and subsea operations
Paris, 1992:	Polar research at Svalbard
Paris, 1993:	INSROP presentation
Oslo, 1994:	Prevention and treatment of nuclear and chemical pollution
Tromsø, 1995:	Telemedicine
Rueil-Malmaison, 1998:	Water treatment in oil and gas production
Nantes, 2000:	Agriculture business and Information technology
Ås, 2001:	Management of water quality
Stjørdal, 2004:	Knowledge Management in integrated Drilling Operations
Brest, 2004:	Technologies for Search Assistance and Rescue
Paris, 2005:	Workshop for planning collaboration between INRA and Aquaforsk within aquaculture research
Bergen, 2005:	Workshop on operational oceanography
Montpellier / Palavas 2005:	Workshop on Recirculation water technology
Oslo, 2005:	Seminar on Hydrogen and transport
Brest, 2006:	Workshop on Technologies for Search and Rescue and other Emergency Marine Operations
Oslo, 2007:	Carbon Capture and Sequestration
Grenoble, 2007:	Micro and Nano Optics Workshop

Paris, 2008	Cancer and neuroscience seminar
Brest 2008:	Third international workshop on Technologies for search and rescue and other emergency marine operations.
Paris 2009:	New renewable energy
Bergen 2009:	Symposium on Nano and Micro Frontiers in Biology and Medicine
Toulouse 2009:	European Cancer Cluster Partnering
Le Havre 2009:	Doctoral student seminar on Capture, Transport and Storage of CO_2

EXCHANGE PROGRAMME
NATIONAL ACADEMIES OF SCIENCE 1990 - 2003
ÅSGARD PROGRAMME from 2006

1990
Prof. Paul Malliavin (mathématiques)
10, rue Saint Louis en l'Isle, 75004 Paris

Prof. Johannes Dale (chimie)
Universitetet i Oslo, Kjemisk institutt, Pb 1033, 0315 Oslo
(Coopération avec M. Julia)

1991
Nicole Le Douarin (biologie anim. et vég.)
Institut d'Embryologie Cellulaire et Moléculaire du CNRS et du Collège de France
49 bis, avenue de la Belle Gabrielle, 94736 Nogent-sur-Marne Cedex

Prof. Tom Andersen (géologi)
Universitetet i Oslo, Mineralogisk-Geologisk Museum, Sarsgate 2, 0562 Oslo

Prof. Per Enger (zoologi)
Universitetet i Oslo, Biologisk institutt, Genetisk fysiologi, Pb 1051 Blindern, 0316 Oslo

Prof. Olav A. Laudal (mathématiques)
Universitetet i Oslo, Matematisk institutt, Pb 1053 Blindern, 0316 Oslo

1992
Prof. Marc Julia (chimie)
Ecole Normale Supérieure, Laboratoire de Chimie
57, rue Geoffroy-Sant-Hilaire, 75005 Paris
(Coopération avec M. Dale)

Prof. Jaques Dixmier (mathématiques)
(Coopération avec M.O.A. Laudal)

Prof. Pierre Buser (médecine)
Université Pierre et Marie Curie, Institut des Neurosciences
9, Quai Sant-Bernard, 75005 Paris

Prof. Jacqueline Tjøtta (mathématique)
Universitetet i Bergen, Matmeatisk institutt, 5007 Bergen
(Coopération avec Mme Lévy)

1993
Prof. Thérèse Lévy (physique)
Université de Paris VI, Modélisation en Mécanique URA 229
(Coopération avec Mme Tjøtta)

Prof. Paul Ozenda (biologie)
Université Joseph Fourier, Laboratoire de biologie alpine
Saint-Martin d'Hères
(Coopération avec M. Holten)

1994
Prof. Øyvind Andersen (chimie)
Norsk institutt for Naturforskning (NINA)
Tungasletta 2, 7005 Trondheim
(Coopération avec M. Ozenda)

Prof. Michel Rohmer (chimie)
Université de Haute Alsace, Ecole Nationale Supérieure de chimie de Mulhouse
(Coopération avec M. Skattebøl, Univ. i Oslo, Kjemisk institutt)

1995
Prof. Øyvind Andersen (chimie)
Universitetet i Bergen, Kjemisk institutt, 5007 Bergen

Prof. Robert Naquet (médecine)
Institut Alfred Fessard, Avenue de la Terrasse, 91198 Gif-sur-Yvette Cedex
(Coopération avec Mr. O. Ottersen)

1996
Prof. Andrée Marquet (chimie bio-organique)
Université Pierre et Marie Curie, Lab de chimie organique biologique
URA CNRS 493, 4, Place Jussieu, 75252 Paris Cedex 05

Prof. Ole Petter Ottersen
Universitetet i Oslo, Institutt for medisinske basalfag, Anatomisk Institutt
Pb 1105 Blindern, 0317 Oslo

1997
Prof. Yvonne Choquet-Bruhat
Université Pierre et Marie Curie
4, Place Jussieu, 75252 Paris Cedex 05
(Cooperation avec Mr. A. Lauvdal)

1998
Prof. Olav Arnfinn Laudal
Universitetet i Oslo, Matematisk institutt
Pb 1053 Blindern, 0316 Oslo
(Cooperation avec Ms. Y. Choquet-Bruhat)

2001
Prof. Ragni Piene
Universitetet i Oslo, Matematisk institutt
Pb 1053 Blindern, 0316 Oslo
(Cooperation avec Prof. Marie-Lise Chanin)

2003
Prof. Pacal Estraillier
Université de la Rochelle, Laboratoire Informatique/Image/Interaction
(Norwegian Mapping Authority, the Norwegian Space Center and SINTEF - geographic data processing)

2006 - *Åsgard Programme*

The following eight scientists were awarded a Åsgard fellowship in order to visit Norwegian research institutions in 2006:

Céline Nauges (Economics for Development)
INRA Toulouse – Oslo and Ås

Laurent Douce (Inorganic chemistry, liquid crystals)
IPCMS, Ecole de chimie de Strasbourg – Oslo and Bergen

Emmanuel Hadji (Materials, nanotechnologies)
CEA Grenoble – Oslo and Trondheim

Mohammed El Ganaoui (Physics, numerical modelling)
Université de Limoges – Oslo, Trondheim and Ås

Claude Touzet (Medicine, neurobiology, memory)
Université de Marseille – Oslo and Trondheim

Pierre Villeneuve (Biology, lipids)
CIRAD, Montpellier – Oslo and Ålesund

Claude Estournès (Chemistry, hydrogen)
CNRS, Université de Toulouse
Visit within the framework of the follow-up actions of the French-Norwegian Seminar on Hydrogen organised in Oslo in December 2005

Fabrice Mauvy (Condensed matter)
Université de Bordeaux
Visit within the framework of the follow-up actions of the French-Norwegian Seminar on Hydrogen organised in Oslo in December 2005

2007 - *Åsgard Programme*

The following nine scientists were awarded a Åsgard fellowship in order to visit Norwegian research institutions in 2007:

Denis Gauthier (Research for development)
CIRAD, Montpellier/Mali
Visit within the framework of the follow-up actions of the French-Norwegian Seminar on Development organised in May 2006

Anne-Marie Caminade (Chemistry)
Université de Toulouse – Trondheim, Oslo

Benoît Dugué (Sport sciences)
Université de Poitiers – Oslo

Emmanuel Picavet (Political phylosophy)
Université Panthéon-Sorbonne (Paris I) – Oslo

Eric Brangier (Cognition and interaction studies, psychology)
Université de Metz – Trondheim, Oslo

Attar Al-Nawar (Cardiac surgery, cell therapy)
Hôpital Bichat – Oslo

Agnès Michelot (Environmental law)
Université de La Rochelle – Bergen, Oslo

Catherine Picart (Biophysics)
Université Montpellier II – Bergen, Oslo, Trondheim

Jocelyn Chanussot (Signal and image processing)
Institute of technology Grenoble – Trondheim, Bergen, Oslo

The following two scientists were awarded a Åsgard fellowship in order to visit French research institutions in 2007:

Tor A. Benjaminsen (Agriculture, environment and life science)
Norwegian University of Life Sciences, Ås – CIRAD, IRD and EGREF Montpellier

Reiner Anwander (Chemistry)
University of Bergen – Toulouse and Lyon

2008 - *Åsgard Programme*

The following 10 scientists were awarded a Åsgard fellowship in order to visit Norwegian research institutions in 2008:

Ludovic Escoubas (Photovoltaics, Optoelectronics)
Université Paul Cézanne, Aix-Marseille III – Trondheim, Oslo

Pierre Millet (Hydrogen)
Université Paris XI, Institut de Chimie Moléculaire et des Matériaux d'Orsay – Trondheim, Oslo

Alessandro Tonello (Optics, Photonics, Telecommunication)
Institut XLIM, Université de Limoges – Trondheim, Oslo

Yann Bugeaud (Mathematics)
Université Louis Pasteur Strasbourg – Bergen, Trondheim, Oslo

Stéphane Oliet (Neuroscience)
Centre de Recherche INSERM U862, Université Bordeaux – Trondheim, Oslo

Stéphane Bellemin (Chemistry, Catalysis)
Université Louis Pasteur Strasbourg – Oslo, Bergen

Desdemona Fricker (Neuroscience)
Université Paris XIII, CHU Pitié-Salpêtrière – Oslo, Trondheim

Lydie du Bousquet (Software engineering)
Laboratoire d'Informatique de Grenoble, Université J. Fourier Grenoble I – Trondheim, Oslo

Luc Massou (STIC)
Université Paul Verlaine, Metz – Oslo, Kristiansand

Sylvie Neyertz (Chemistry)
Université de Savoie, Chambéry – Trondheim, Oslo, Bergen

2009 - *Åsgard Programme*

JeanSciare
CEA-LSCE – Tromsø, Oslo

Yvette Veyret
Université Paris X – Nanterre – Oslo, Stavanger

Brian Rudkin
ENS Lyon – Oslo, Bergen

Pierre-Xavier Thivel
Université de Grenoble – Bergen, Oslo Trondheim

Alain Ponton
Université Paris Diderot – Trondheim, Oslo, Ås

Christine Contino-Pepin
Université d'Avignon – Bergen, Oslo

Laurent Billonnet
Université de Limoges – Stavanger, Oslo Trondheim

Farid Chemat
Université d'Avignon – Oslo, Tromsø, Ås

Income and expenditure account (NOK)
1.1. - 31.12.2009

	2009			2008		
	France	**Norway**	**Total**	**France**	**Norway**	**Total**
Income:						
Governmental funding Secretariat	172 000	250 000	422 000	184 000	250 000	434 000
Governmental funding Projects*	5 377 136	2 750 000	8 127 136	5 011 088	2 750 000	7 761 088
Governmental project funding (through FFN)	248 000	0	248 000	0	0	0
Eureka / The Research Council of Norway**		480 000	480 000	0	768 000	768 000
Seminars	40 000	0	40 000	18 525	0	18 525
Member fees	116 800	95 300	212 100	145 600	83 200	228 800
Total Income	**5 953 936**	**3 575 300**	**9 529 236**	**5 359 213**	**3 851 200**	**9 210 413**
Expenditures:						
Administration and.Board meetings	212 703	311 873	524 576	315 086	435 214	750 300
Governmental project funding *	5 377 136	4 047 500	9 424 636	5 011 088	3 099 990	8 111 078
Governmental project funding (through FFN)	124 000	0	124 000	124 000	0	124 000
Seminars	40 000	319 022	359 022	37 050	115 750	152 800
Total Expenditures	**5 753 839**	**4 678 395**	**10 432 234**	**5 487 224**	**3 650 954**	**9 138 178**
Finance:						
Plus values SICAV BNP - Paris	10 270	0	10 270	25 120	0	25 120
Bank interest		194 352	194 352	0	377 708	377 708
Bank interest paid to France***	0	0	0	0		
Bank costs	-436	0	-436	-474		-474
Total	**9 834**	**194 352**	**204 186**	**24 646**	**377 708**	**402 354**
Result	**209 931**	**-908 743**	**-698 812**	**-103 365**	**577 954**	**474 589**

Exchange rate: 1€ = 8 NOK

*In France Governmental funding is, more often than not, paid directly to project partners
** Eureka-approved projects approved before 2009 get 30% funded from the Research Council as an additional income
***Accumulated interest on capital reserve paid to France

FNS / FFN (France and Norway)
Balance sheet as per 31.12.2009 (NOK)

	2009			2008		
	France	**Norway**	**Total**	**France**	**Norway**	**Total**
Assets:						
Bank deposit BNP Paris (Secretariat)	569 194	0	569 194	853 680	0	853 680
SICAV (BNP - Paris Secretariat)	1 145 905	0	1 145 905	651 488	0	651 488
Accounts receivable	0	0	0	0	38 375	38 375
Bank deposit Norway	0	4 762 121	4 762 121	0	5 103 369	5 103 369
Total Assets	**1 715 099**	**4 762 121**	**6 477 220**	**1 505 168**	**5 141 744**	**6 646 912**
Liabilities						
Secretariat reserve	1 505 168	*	1 505 168	1 505 168	*	1 505 168
Fixed Capital (France and Norway)	0	1 000 000	1 000 000	0	1 000 000	1 000 000
Retained Equity	0	3 699 463	3 699 463	0	3 121 509	3 121 509
Result	209 931	-908 743	-698 812		577 954	577 954
Short term liability	0	971 401	971 401	0	442 281	442 281
Total Liabilities	**1 715 099**	**4 762 121**	**6 477 220**	**1 505 168**	**5 141 744**	**6 646 912**

* included in Retained Equity

Exchange rate: 1€ = 8 NOK