The
Danish Council for
Strategic Research

Annual Report
2011/2012

http://en.fi.dk/dcsr

Foreword

The Council's remit
The Danish Council for Strategic Research funds research that seeks to overcome significant societal challenges and hence strengthen future growth, prosperity and welfare. The Danish Parliament makes allocations to the various main priority areas.

Critical funding level
Allocations made to the Council under the National Budget have been reduced from DKK 1.1bn in 2010 to just over DKK 800m in 2012. The Council's future capacity for contributing to value creation in society, strengthened interdisciplinary research, public-private partnerships, collaboration between Danish universities, international collaboration, research training and updating of university degree programmes rests on the National Budgets in the years ahead. The dwindling allocations made to the Council are critical in relation to society's need for research-driven sustained value creation.

Strengthened public-private partnerships
In 2011, in conjunction with the Danish Council for Technology and Innovation, the Danish Council for Strategic Research further elaborated on the SPIR (Strategic Platforms for Innovation and Research) concept as an instrument for strengthening public-private research and innovation partnerships. The new SPIR funding programme for welfare technology innovation and research has attracted participation by both large and small private-sector enterprises.

Strengthened international research collaboration
In 2011, the Council intensified its international efforts by participating in the first round of Joint Programming Initiatives under the European Research Agency (ERA), in the new ERA-NET scheme and by starting up a bilateral research collaboration with Brazil; all of which are promising initiatives in terms of internationalising Danish research and the potentials for private-sector enterprises and public authorities to subsequently reap the rewards of these alliances.

Dialogue on future strategic research areas
The Council remains an active contributor of proposals for the Danish Ministry of Science, Innovation and Higher Education's preparation of a basis for future prioritisation of Danish strategic research (RESEARCH2020).

We hope you enjoy reading this report.

March 2012

Peter Olesen
Chair of the Board,
The Danish Council for Strategic Research

Priorities 2012 of the Danish Council for Strategic Research

Strategic research is problem-oriented and interdisciplinary research that seeks to overcome significant societal challenges and thereby facilitate future growth, prosperity and welfare. The Council is guided by its basic principle of assessing the quality of applications on the basis of three equivalent criteria: the relevance, potential impact and quality of the research.

To that end, in 2012, the Council will be giving special priority to:

- *the Danish Council for Strategic Research as a catalyst in reinforcing the effect of research investments*
- *strengthening partnerships between public and private-sector research and between Danish and international research*
- *expanding research collaboration with new growth countries.*

The Danish Council for Strategic Research as a catalyst in reinforcing the effect of research investments

Strategic research is aimed at creating value for society. Global competition makes innovation all the more crucial in order for Denmark to measure up to the best in the world at conducting outstanding research and converting it into a national asset. The Council prioritises its role as a catalyst for strengthened interdisciplinary research, public-private partnerships, user involvement, research training, research management and the application of research in degree programmes.

These priorities are reflected in the grants awarded by the Council. In 2012, the Council will be devoting further attention to documenting the effect and applicability of the Council's grants.

The Council will continue its active inputs for the RESEARCH2020 process in the interests of creating a well-founded basis for Parliament's prioritisation of which significant societal challenges Danish strategic research is to be instrumental in overcoming.

Strengthening partnerships between public and private-sector research and between Danish and international research

Public-private research partnerships increase the probability of accelerating the translation of new knowledge into innovation and practical applications in society. A Gallup survey from 2011 revealed that some 80 per cent of researchers in receipt of Council grants state that corporate participation has increased the applicability of their research. A similar proportion state that the grant from the Council has resulted in increased collaboration between Danish research environments.

In 2010, the Council, in conjunction with the Danish Council for Technology and Innovation, took the initiative for establishing SPIR – Strategic Platforms for Innovation and Research – with the objective of making it more attractive for enterprises to engage in research alliances by involving them in both the planning and execution of the research and innovation activities with a view to accelerating the translation of research results into innovation. Given the great interest in the SPIR model, in 2012 the Council will be involved in further enhancing the model with initiatives such as a focus on utilising the results in teaching on academic and vocational degree programmes.

Extending research collaboration with new growth countries

In recent years, the Council has given higher priority to international research collaboration as a means of boosting Danish research and its applications for Denmark and the world at large. This has resulted in active international participation in 90 per cent of the Council's funding programmes. Building on this, the Council will continue its active involvement in Joint Programming Initiatives with a number of EU Member States. Starting from 2011, the Council has gone on to allocate funds for joint calls with China (energy), India (clinical research) and Brazil (foods). For 2012, the Council will seek to give further impetus to international collaboration with the new growth countries by facilitating an increase in joint calls in the coming years, provided that the Council secures the requisite funding capacity.

"Strategic research is problem-oriented and interdisciplinary research that seeks to overcome significant societal challenges"

Peter Olesen
Chair of the board
The Danish Council for Strategic Research

The quality concept of the Danish Council for Strategic Research

Strategic research is subject to special quality criteria. The Council assesses the quality of applications on the basis of three equivalent criteria: the relevance, potential impact and quality of the research.

This three-fold quality concept is applied both in evaluation of applications submitted to the Danish Council for Strategic Research and in its subsequent follow-up of the funded research activities.

The relevance of the research is assessed with respect to the extent to which it addresses the societal challenges that form the basis for the research theme in question.

The evaluation may comprise the following elements:

- *The bearing of the hypotheses or research issues on the societal challenge that forms the basis for the research theme.*
- *Selection of the method of research in relation to the issues to be investigated.*
- *Incorporation of a sufficient body of expertise on the issues to be addressed, including interdisciplinary expertise.*
- *The involvement of private and public-sector actors in the process of formulating the issues and challenges to be addressed and in the ongoing research activities.*

Evaluation of the potential impact of the research concerns its anticipated positive impacts on public and private-sector stakeholders, including its potential to promote economic growth and the development of the welfare society from a global perspective.

The evaluation may comprise the following elements: The potential of the research to contribute to:

- *Value creation in the public and private sectors, and the projected timeframe for achieving this.*
- *Improvements in the welfare society.*
- *An improved knowledge base for society's decision-making and service provision.*
- *An increase in the level of expertise in defined research areas.*
- *Raising standards in postgraduate education and research training.*
- *Raising education standards generally.*
- *International collaboration with strong research environments and increased recruitment of talented researchers from Denmark and abroad.*
- *Stimulating innovation and hence the potential for increasing the number of new knowledge-based enterprises.*
- *Promoting the growth of small and medium-sized enterprises.*

The quality of the research is evaluated on the basis of the originality of the application and projected achievements on an international scale.

The evaluation may comprise the following elements:

- *The originality and innovativeness of the hypotheses or research issues.*
- *The theories applied and the research methods employed in relation to the research issues.*
- *Development potential and international positions of strength.*
- *The international reputation of the researchers.*
- *Publications, patents, licensing agreements and citations.*
- *The research manager's track record in research management of a high international standard.*

Vision

The Danish Council for Strategic Research seeks to strengthen problem-oriented research characterised by its

— High international impact

— Focus on significant societal challenges

— Potential to contribute to growth, prosperity and welfare improvements

Principles of the Danish Council for Strategic Research

The main principles applied to the Council's funding awards are outlined below.

— **Methodological freedom of research**
Applications for research funds must be confined to the broad thematic research issues set out in the respective call text. The methods applied must be the most relevant ones for research purposes for the specific research issues set out in the call text. In other words, both strategic and independent research enjoy full methodological freedom.

— **Interdisciplinarity**
The aim of strategic research is to shed light on or to resolve prioritised challenges in society. The societal challenges are often cross-cutting in nature and can thus also be resolved solely by means of cross-cutting (interdisciplinary) research initiatives. It will therefore often be necessary to address the issues from many different disciplinary perspectives – ranging from those of the natural sciences, health sciences and technical sciences to the social sciences and humanities.

— **Public-private partnerships**
Importance is attached to strategic research being conducted in an interaction between public and private-sector stakeholders.

— **International collaboration**
Strategic research shall serve to strengthen international research collaboration through the inclusion of international collaboration in the research activities funded by the Danish Council for Strategic Research. This might include collaboration with growth countries such as China, India and Brazil and with the EU Member States.

— **Environmental and health-related aspects**
Relevant environmental, health-related and ethical issues should be incorporated in the research activities.

— **Research management**
The Council emphasises good research management in strategic research.

— **Dissemination, publicity and communication**
Research activities funded by the Council shall also be characterised by transparency and visibility. The results of the research must consequently be communicated and publicised actively on an ongoing basis to society at large.

— **New fields of research**
Research activities may be initiated within established or entirely new fields of research, including where the feasibility of completing a given research activity might be subject to some uncertainty.

— **Risk-taking**
Originality and innovativeness should not be inhibited by risk aversion.

— **Monitoring**
The results of the research are to be assessed continuously as a basis for adjustment of goals and the frameworks for the research activity.

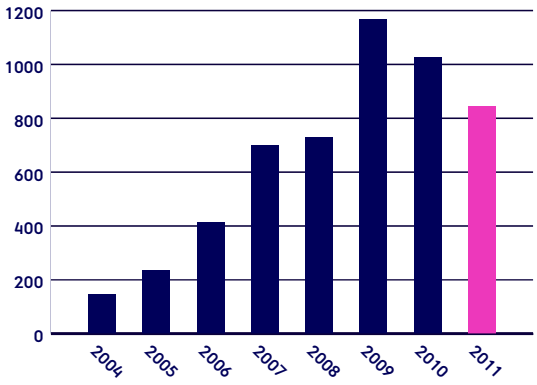
— **Coordination**
Strategic research programmes must be coordinated, to the greatest extent possible, with the allocation of funds for research and development within the ministries and relevant research councils and foundations.

Key figures

Total grants 2004–2011

The figures for grants made by the Danish Council for Strategic Research Council do not correspond exactly with the annual allocations under the National Budget, as some applications are considered in the year preceding the year in which the allocations are made under the National Budget. In 2009, the Council made allocations totalling DKK 1,167m. From that year onwards, total funding has come down, with Council awards in 2011 totalling DKK 845m.

Million DKK

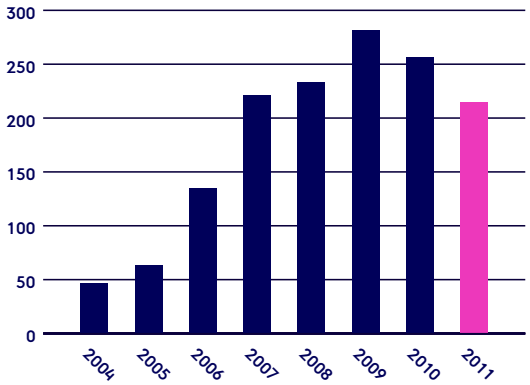


Research training 2004–2011

In the period 2004-2011, the Danish Council for Strategic Research co-funded an increasing number of PhD programmes.*

*The number of PhDs is the total number of PhD students participating in the funded research activity.

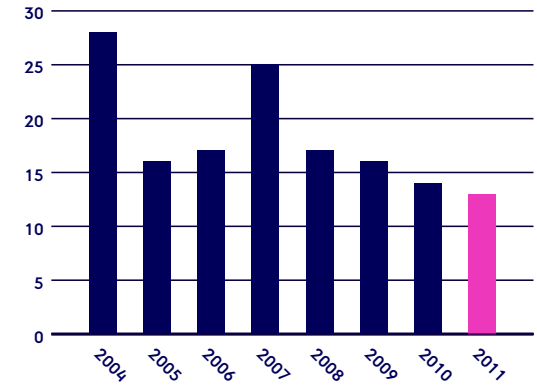
Number of PhDs



Success rate 2004–2011

The success rate, that is, the percentage of the total funding amount applied for that was granted by the Council, varied between 13 and 28 per cent.

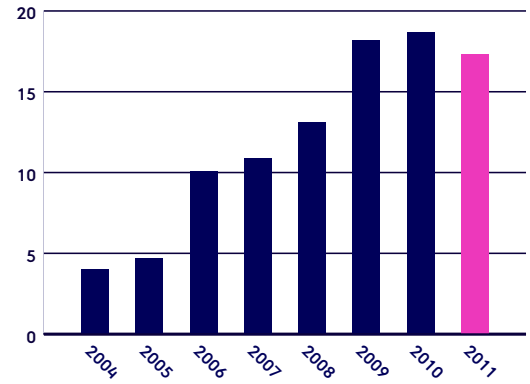
Per cent



Average grant size 2004–2011

The average grant size in 2011 was DKK 17.3m.

Million DKK



“Public-private research partnerships facilitate future growth”

Peter Olesen
Chair of the board
The Danish Council for Strategic Research

The Board and Organisation

The Board of the Danish Council for Strategic Research is appointed by the Minister for Science, Innovation and Higher Education.

The Board has the main responsibility for the Council's activities.

The members of the programme commissions are appointed by the Board. The members of the programme commissions must be recognised researchers and their combined expertise must embrace the interdisciplinary aspects within the programme commission's areas.

Our website *http://en.fi.dk/dcsr* provides further information on the programme commissions, the members of the Board and the activities of the Board.

The Danish Council for Strategic Research is comprised of a Board and a variable number of programme commissions. In 2012, the council is composed of a Board and the programme commissions presented on the organisational chart.

The Board

- Programme Commission on **Sustainable Energy and Environment**
- Programme Commission on **Individuals, Disease and Society**
- Programme Commission on **Health, Food and Welfare**
- Programme Commission on **Strategic Growth Technologies**
- Programme Commission on **Transport and Infrastructure**
- Programme Commission on **Education and Creativity**
- Programme Commission on **Peace and Conflict**

Chair
Professor Peter Olesen,
Director, ActiFoods ApS

Vice-chair
Mette Thunø, Dean,
Faculty of Arts, Aarhus University

Svend Erik Sørensen, Vice President,
Danish Crown

Professor Birthe Høgh, MD, Vice-Dean for Research,
Faculty of Health and Medical Sciences,
University of Copenhagen

Helle Westphal, Head of Department,
DHI Group

Professor Børge Obel,
Head of the Interdisciplinary Centre for Organizational Architecture, Aarhus School of Business and Social Sciences, Aarhus University

Professor Frede Blaabjerg,
Institute of Energy Technology,
Aalborg University

Professor Ole Lehrman Madsen,
Department of Computer Science,

Professor Per Michael Johansen, Dean,
Faculty of Engineering,
University of Southern Denmark

The secretariat

The Danish Council for Strategic Research is served by a secretariat within the Danish Agency for Science, Technology and Innovation.

The secretariat will be pleased to provide further information concerning the individual programmes and Danish strategic research in general.

The Agency's website at http://en.fi.dk/dcsr provides contact details for members of the secretariat's staff, by specialist area.

The many faces of strategic research

On the following pages we present a small selection of the many research projects granted funding by the Danish Council for Strategic Research.

Strategic research seeks to counter some of the major societal challenges faced by Denmark in both the short and long term. Given the complexity of most of these challenges, solutions to them tend to call for interaction between Danish and international researchers from widely differing branches of science and close collaboration with both private-sector enterprises and users.

International collaboration benefits Danish research

The Danish welfare society is constantly challenged by global competition, which makes great demands on Danish research in terms of quality and internationalisation. The Danish Council for Strategic Research is seeking to strengthen Denmark's position in the face of global competition through an international action plan. A component of this in recent years has been the initiative for joint funding programmes with the BRIC countries.

Denmark's international competitiveness is declining, while both production and research are increasingly sited beyond Danish borders. A twofold challenge in future will therefore be to strengthen Danish research while making it more attractive for business and industry to invest and retain their activities in Denmark.

Through participation in international research collaboration, the Danish Council for Strategic Research seeks to maximise the benefit for society of large-scale investment in Danish research and innovation. With the aim of positioning Denmark as a leader in the internationalisation of its own research and innovation, the Council has drawn up an international action plan setting out strategies and priorities for internationalisation.

Collaboration within the EU and globally

The Danish Council for Strategic Research is seeking to secure increased Danish participation in programmes and projects comprising joint calls for funding applications. At EU level, the Council is participating in a number of the Joint Programming Initiatives and in ERA-NET joint research programmes. In both contexts, the emphasis is on joint European research programmes in response to a number of the challenges facing Europe in the future.

Within the last few years, the Council has also been strongly committed to the conclusion of bilateral cooperation agreements with growth countries such as the BRIC countries. Since 2009 the Council's programme commissions have issued joint calls with China and India within Danish positions of strength such as sustainable energy, biotechnology and food research. In 2011, the Council issued its first joint call for research funding applications with Brazil.

My expectation is that Danish participation in international research programmes and joint initiatives will help to ensure that Denmark, Danish researchers and Danish research gain greater prominence and improved opportunities for influencing the international research scene, says chair of the Board of the Danish Council for Strategic Research, Peter Olesen.

New Danish bilateral cooperation with Brazil

One of the most recent international alliances is with the BRIC country Brazil. This joint effort holds huge potential, since not only is economic growth in Brazil expected to be significant in the coming years, but the country is committed to intensive research and development efforts.

Although Denmark has no tradition for strong links with Brazil, in February 2011, the Danish Council for Strategic Research opted to sign a cooperation agreement with the regional research council in the São Paulo region, which is undergoing rapid development and is indisputably Brazil's growth centre. Peter Olesen believes that the new links with the research centres in São Paulo will ultimately favour Danish research and the exports-oriented and technologically advanced segments of Danish business and industry.

Challenges and potentials of cooperation with Brazil

Research collaboration with the growth countries has traditionally been particularly challenging in the face of barriers such as cultural differences, protectionist legislation etc. that have to be eliminated before a viable partnership can be established.

The Council hopes that conclusion of the bilateral cooperation agreement will facilitate access to Brazil for Danish researchers, but also give individual Danish researchers or research institutions an incentive for seeking to establish relevant research alliances with Brazilian institutions and business and industry. The Council is consequently also giving high priority to the productiveness of the cooperation agreements for both the Danish and the Brazilian partners, and generally regards the agreements as a long-term investment holding both research and commercial potential.

Danish strawberries and Brazilian citrus fruit

The new cooperation agreement has so far resulted in a funding allocation of DKK 6.1m by the Danish Council for Strategic Research to the Danish component of a bilateral research project which aims to develop improved biological control of pests such as mites and aphids, for the benefit of producers in both Denmark and Brazil. São Paulo's research council has granted equivalent funding to the Brazilian partner.

Within the three-year project period, the Danish-Brazilian research team behind the project will be developing new biological pest control methods based on the interaction of natural enemies in the production primarily of Danish strawberries and Brazilian citrus fruit, but also apples on both sides of the Atlantic. Both the Danish and Brazilian research participants are experienced in this field, and this form of transnational collaboration and knowledge sharing is set to yield substantial synergetic benefits.

Bilateral cooperation

In 2011, the Danish Council for Strategic Research granted approx. DKK 35m for bilateral cooperation with the BRIC countries Brazil, India and China. In the food area, DKK 10m was awarded for research cooperation projects with Brazil, while DKK 9.4m was granted in the health area for a joint programme with India. Finally, in the environment area, DKK 15.4m was awarded for three Danish-Chinese research projects.

"Danish participation in international research programmes and joint initiatives will help to ensure that Denmark, Danish researchers and Danish research gain greater prominence and improved opportunities for influencing the international research scene."

Peter Olesen
Chair of the board
The Danish Council for
Strategic Research

Strategic research is also economic research

Economic research is perhaps not the first thing one associates with activities under the Danish Council for Strategic Research. Nevertheless, economists play a key role in a wide array of strategic initiatives. Indeed, economic research is a component of funding programmes from all the Council's programme commissions – across the research areas of renewable energy, transport, chronic diseases, healthy foods, education and growth technologies. This is because strategic research is a response to real challenges in society and therefore calls for the involvement of all relevant research disciplines and players in the field in achieving the best possible solution.

Economists contribute to solving a large number of significant national challenges, such as the goal of making Denmark independent of fossil fuels. Peder Andersen, Professor of Economics at the University of Copenhagen, together with a large team of economists and engineers has just been awarded DKK 17.9m for the INCAP project, the object of which is to ease the integration of wind energy into household electricity consumption. *INCAP will help to give alternative energy supplies a far better position and help to mitigate, if not solve, the climate threat,* says Peder Andersen.

In order to achieve the energy-supply switch to wind power, household electricity consumption has to adapt to the times of day when the wind blows and electricity is generated. This can be achieved by, for example, programming household appliances to switch off automatically when the price of electricity is high, i.e. when there is no wind.

Interdisciplinary collaboration is crucial

The economists will be examining the acceptability for consumers of their appliances being controlled automatically by fluctuating electricity prices. This will provide valuable insights into measures to induce households to adopt the new technologies. INCAP draws on the latest research in fields such as regulation theory, experimental economics and econometrics, and Peder Andersen explains that the project also holds major disciplinary challenges calling for new, basic research.

INCAP comprises key policy studies, but on a purely technical front entails the development of applications to adjust electricity intake in response to price signals. As such, the INCAP team is on a three-fold mission to develop new theory, novel technologies and contribute know-how with applications in executive energy policy. As to the question of what the benefits of the interdisciplinary approach and user involvement might be, Peder Andersen has a ready answer: *Without a combination of this kind, the project would not be feasible. That's the gist of it.* But he does add: *This project is also a chance to demonstrate yet again that collaborating out of the box can be very important.*

New economic research topic

In the wake of the international financial crisis and long-standing weak Danish productivity growth, it has become apparent that Denmark too faces key economic challenges. And if the trend is to be reversed, economic science will need to ally itself with other disciplines and think out of the box.

In June 2011, the Danish Council for Strategic Research hosted the conference on Future Challenges for Economic Research, which was attended by a number of the world's leading economists. The conference papers and discussions demonstrated clearly that there is a need for original, interdisciplinary research in order to achieve a more detailed understanding of the mechanisms and causes underlying the financial crisis and the declining economic growth in Denmark.

In follow-up to the conference, the Council has proposed a new research theme on economic growth, employment and financial stability in its input on the Danish Agency for Science, Technology and Innovation's forthcoming update to the prioritisation basis for strategic research, RESEARCH2020. Whether or not a future allocation will be made for an economic research programme under the Danish Council for Strategic Research will depend on the outcome of political talks in connection with subsequent national budgets.

There is a need for original, interdisciplinary research in order to achieve a more detailed understanding of the mechanisms and causes underlying the financial crisis and the declining economic growth in Denmark.

Cheaper and more reliable wind energy

"We will be investigating the entire production chain, from design through manufacture of individual components to turbine operation in order to better understand and describe component performance. You could say we are rewinding all the way back to the very first stage in turbine genesis for end-to-end research playback."

Professor Jesper Hattel
Department of Mechanical Engineering, Technical University of Denmark

The objective of the REWIND strategic research centre is to "reinvent" the wind turbine's drivetrain to make future wind energy more reliable and hence less costly. Researchers, manufacturers and turbine operators have formed an alliance that unites an unprecedented group of wind turbine competencies.

The moving parts of modern wind turbines are exposed to colossal loads, and the massive forces at work place high demands on the drivetrain inside the wind turbine nacelle, which converts the wind into electrical energy. For example, the moment of force at work in a large wind turbine is 33,000 times greater than that in an average family car.

REWIND started on 1 January 2011 and is led by Professor Jesper Hattel, Department of Mechanical Engineering, Technical University of Denmark. The concept for the centre is for researchers, manufacturers and turbine operators to conduct a coordinated research initiative to improve the reliability of heavily stressed metal components in state-of-the-art wind turbines - and hence to reduce the costs of operation and maintenance. *Over the next years, we will be investigating the entire production chain, from design through manufacture of individual components to turbine operation in order to better understand and describe component performance. You could say we are rewinding all the way back to the very first stage in turbine genesis for end-to-end research playback,* says Professor Hattel.

Wind power to cover 50 per cent of electricity consumption in Denmark by 2020

Many national energy strategies, and most recently the sitting Danish Government's "Our Future Energy" plan, have identified offshore wind farms as the main source of energy towards the year 2020, where the target is for 50 per cent of Danish electricity to be wind-powered. However, one challenge is that electricity generation from wind turbines is currently more expensive than from conventional coal and natural gas-fired power plants, which means that the production price has to be reduced to make wind power more competitive.

The wind turbine industry spends billions of kroner every year on operation and maintenance. At present, the projected useful life of wind farms is just 20 years, but if more durable components can extend turbine life, this will have a dramatic effect on electricity generation prices. *There is a whole raft of benefits to bringing together as many different disciplines and competencies as we are doing at this centre,* says Professor Hattel. *There is huge expertise and some very strong research teams in this area, but until now there has been no centre like ours where we have pooled all those capacities for a concerted interdisciplinary response to a common challenge.*

Inspiration from the automotive and aerospace industries

Through collaboration with an international advisory panel composed of six acclaimed researchers and including representatives of the automotive and aerospace industries, the REWIND partners will be integrating their experience and ideas with the drive to improve the reliability of large wind turbines.The new research-based knowledge generated by the project will result in recommendations for the wind turbine industry and its sub-suppliers on how manufacturing processes may be optimised.

One of the REWIND centre partners is DONG Energy, which is the owner and operator of a large number of the Danish wind turbines and also has installations abroad. DONG Energy has been collaborating closely with the Department of Mechanical Engineering at the Technical University of Denmark on research for a good many years. Manager John Hald has this to say about the partnership:

The REWIND centre is the first major initiative in which we are using our partnership to achieve an in-depth understanding of materials performance in wind turbine components. We have found that the form of collaboration established for the centre, whereby manufacturers and users are linked to a wide cross-section of university-based researchers, results in new ways of addressing the problems. This increases the chances of achieving the breakthroughs that will make wind turbine components more reliable and reduce the operating costs.

Public-private research partnerships foster new knowledge

Both researchers and enterprises stand to benefit from public-private research partnerships. The researchers gain new insights from end-users and market surveys, while the partnership gives the enterprises new insights into research, and new networks. For the small Danish firm Biomodics, a partnership with the Technical University of Denmark (DTU) resulted in a new patent.

The Danish Council for Strategic Research prioritises public-private research partnerships as a means of boosting research and its applicability. The LiCorT project is a case in point. This project is a partnership between DTU Nanotech, DTU Chemical Engineering and the small Danish firm of Biomodics. In 2008, the project group was awarded DKK 7.2m to develop a special sensor technology that will ultimately have applications in a number of complex warning and surveillance tasks.

Biomodics has participated in several different strategic research partnerships and the company's CEO Peter Thomsen sees a number of advantages to this type of collaboration. The motivation for joining this partnership was the opportunity to establish a brand new business area, that is, one that did not already exist. Peter Thomsen explains: *We were motivated by the access to new knowledge and the strong research environments available at DTU as well as the opportunity to make ourselves more attractive to our clients and associates through the credibility gained from a research partnership with DTU.*

Sensor technology for cancer treatment and food monitoring

The LiCorT (Liquid Core Waveguide Technology for Diagnostics) project involves developing a new sensor technology based on state-of-the-art research in optofluidic microchips and nano-porous polymeric materials. The aim is to develop a diagnostic device for use in e.g. cancer treatment, biological threat surveillance, pollution control and food safety. Biomodics' role in the project has been to investigate how the research results might be applied in developing new products.

LiCorT is essentially a user-driven project, which is why the researchers greatly appreciated the value of partnering with a company like Biomodics: *Biomodics have been very active and committed. In practice they acted as the end-user for us, conducted market surveys and investigated how the product might be commercialised,* says Professor Anders Kristensen, DTU.

Considerable effects of the partnership

The research project will shortly be concluded and Biomodics has gained a patent from the partnership. But that is not the only benefit: *The effects of the partnership have been considerable. The know-how and the contacts generated by the project are a huge gain for Biomodics, and the project has introduced new forms of collaboration and created new relations, which might well lead to new alliances down the road*, says Peter Thomsen.

These successful outcomes were by no means a given in 2007 when Biomodics decided to ally themselves with DTU researchers with a view to applying for funding from the Danish Council for Strategic Research – the very nature of research is too unpredictable for that. But there is a strength in that too: *The unpredictability of research often holds real competitive advantages, because it takes us from established science to the new frontier,* says Peter Thomsen.

Biomodics

Biomodics is a service and technology provider to the life science industry. The company develops solutions for diagnostics, labware and health care devices through the application of e.g. nanotechnology.

Biomodics is a small Danish company with its own R&D department, and the company collaborates with both approved technological service institutes and Danish and international firms and universities.

For the LiCorT project, Biomodics received DKK 1.4m in funding from the Danish Council for Strategic Research, and contributed co-financing of the same amount.

"The project had exciting potentials, and it was an excellent opportunity to establish a brand new business area, that is, one that didn't already exist."

Peter Thomsen,
CEO, Biomodics.


P74
PU
PU-P74
PU

Railway research to bring trains in on time

"The Danish taxpayers sponsored a costly lesson learned in the acquisition of the IC4 trains. We need to be better at handling this type of investment and we need to develop systems for ensuring punctual rail services," says David Pisinger.

Professor David Pisinger
DTU Management Engineering

Rail transport is one of the most efficient means of transport in terms of energy consumption and carbon emissions. However, disruptions to services and ensuing delays are preventing optimal use of the Danish railways. A new strategic research project addresses how rail services can be made more robust and efficient in order to persuade more people to travel by train in future.

Denmark's first interdisciplinary research environment in rail systems will be established over the course of the next four years with a grant of close to DKK 17m from the Danish Council for Strategic Research. This will take place under the RobustRailS project, as a research pilot ahead of the billion-kroner investments in both railway lines and signalling systems to be made in Denmark in the coming years. The project will develop planning and modelling tools corresponding to the advanced signalling system to be implemented across the entire Danish rail network towards 2021 according to the ERTMS version 2 European standard.

A more robust rail system

Increased use of the rail services as a means of transport is a vital contribution to sustainable transport. But if we are to persuade more Danes to use the rail system, we have to keep trains running on time, says Professor David Pisinger of DTU Management Engineering, who is leading the project. By combining technical expertise on rail services with optimisation models and verifiable IT systems, the project will be developing systems to improve the robustness of Danish rail services and analysing how many passengers would be willing to switch to rail travel if the trains ran without fail. The project will also provide a setting for training six PhDs and three postdoctoral researchers, and as such will be strengthening the research-based training of the many railway engineers that will be needed in the modernisation of the Danish rail system that will take place over the coming years.

In order to ensure a broad-based, interdisciplinary approach to the project, Professor David Pisinger will be collaborating with researchers from three other departments at the Technical University of Denmark (DTU): DTU Transport, DTU Photonics and DTU Informatics. Moreover, leading railway researchers in Spain, the Netherlands and Germany will be involved, while the project group will also be made up of representatives of DSB (Denmark's largest train operating company), Banedanmark (the state-owned company responsible for rail network maintenance and traffic control) and the Danish Transport Authority. Banedanmark is looking forward to the joint project: *We are delighted to be participating in the project now launched by DTU to build up a Danish research environment devoted to rail systems,* says CEO Jesper Hansen.

Costly lesson learned

The watchword for the coming years' research is "robustness". According to Professor David Pisinger, the broad-based interdisciplinary basis for the research project will make it possible to commit to making every element in the Danish rail system more robust. With the forthcoming investments, a system will need to be created for effective detection of minor failures, and which can rapidly restore services to normal following severe breakdowns and other disruptions to services. *The Danish taxpayers sponsored a costly lesson learned in the acquisition of the IC4 trains. We need to be better at handling this type of investment and we need to develop systems for ensuring punctual rail services,* says David Pisinger. The project has consequently been designed so that the in-depth insights of practitioners can be combined with the researchers' ability to develop optimisation models, forecasting tools and robustness studies.

Need for rail research

As David Pisinger sees it, Denmark needs a more scientific basis for developing and operating its rail system. The funding from the Danish Council for Strategic Research for transport research will be used in amassing a firm basis of knowledge for ensuring that the nation gets full value for money invested in the rail system. This knowledge will in turn form the basis for training rail specialists of the future.

Sustainable food production

The high volume of water used in industrial food production presents a challenge, since water is a costly and scarce resource. One of the sub-projects of the SPIR platform, inSPIRe, responds to this challenge with a solution for reducing the volume of water used in production. A range of dairies involved in this component of the project will be able to apply the new know-how.

SPIR (Strategic Platform for Innovation and Research) is a joint initiative between the Danish Council for Strategic Research and the Danish Council for Technology and Innovation. The aim is to make it attractive for industry to engage in planning and carrying out research and development activities.

In 2009, the inSPIRe group was awarded a grant of DKK 60m by the Danish Council for Strategic Research and the Council for Technology and innovation for a project that aims to enhance productivity and competitiveness in the food sector. From day one, SPIR platform membership included five universities, more than 40 enterprises and five approved technological service institutes ('GTS institutes'). InSPIRe is an excellent example of a public-private partnership in which the contribution of all parties is vital for sustained impetus and ultimate success. The platform embodies a range of main themes, each of which is addressed by different types of sub-projects.

Reuse of process water

The sub-project "Applying PAT for optimization of water management" addresses wastewater in dairy production and involves analysis of the purity of the water in real time, i.e. while production is in progress. PAT (process analytical technology) is based on spectroscopy in which light is transmitted through water. The amount of light absorbed provides an indication of the purity of the water. The potential application is thus to be able to reuse the process water that is currently discharged as wastewater in order to reduce the cost and increase the sustainability of manufacturing. The technology developed by the project will also have applications in a number of other sectors.

Frans van den Berg, associate professor at the University of Copenhagen's Faculty of Life Sciences (LIFE), and head of this project, outlines the advantages of this partnership: *When we collaborate with industry, we are better able to identify where research is genuinely needed. That aside, it is interesting to take on an applied research project, since it involves addressing 'real problems'. In the future, water will be an even scarcer resource, and given the time it takes from theory to implementation, it is essential to devote efforts to enhancing production processes here and now.*

Towards a sustainable dairy industry

The industry also benefits from the alliance. *Arla Foods' links with the universities are multifaceted,* says Henrik J. Andersen, head of Open Innovation at Arla Foods. He highlights aspects such as opportunities for identifying future employees, for networking, gaining entry to new business markets and cost-efficiencies through access to skills, knowledge and expertise. Arla Foods hopes that the applied approach will be the fastest, most assured means of optimising and reducing water and chemicals consumption. "Ultimately this will make Arla Foods an even more sustainable business," is the verdict from team leader Hans Henrik Holst, project manager of Arla Foods Ingredients.

It is essential to have the researchers on site in our facilities and actively involved in obtaining samples for subsequent analysis at the university. This provides insights into the practical problems, while we see it as a willingness to gain greater insights into operational processes in practice. But it also ensures mutually constructive dialogue on the challenges of both this and future joint research projects, says Hans Henrik Holst.

Hope of continued collaboration

The alliance allows many small and medium-sized enterprises in the dairy industry to gain ongoing insights into new research results. Both the spokesman for the small Danish cooperative dairies, Poul Johannes Pedersen of the Thise Mejeri dairy and the spokesman for the Danish independent dairies, Jens Beierholm of the Nørup Mejeri dairy, see this as a new and unique opportunity. Both Arla Foods and the small Danish cooperative dairies and the independents are therefore hoping that the inSPIRe platform can continue and extend the partnership between the Danish food industry, the universities and other knowledge institutions.

"When we collaborate with industry, we are better able to identify where research is genuinely needed. That aside, it is interesting to take on an applied research project, since it involves addressing 'real problems'."

Frans van den Berg
Associate professor
Faculty of Life Sciences (LIFE), University of Copenhagen

Non-discrimination means differentiated treatment

Photo:
Cookery courses are just some of several possible measures to improve the health status among different immigrant groups. The language and cultural skills centre in Glostrup, serving the Vestegnen suburbs with large immigrant populations, is one of the partners in the SULIM project, and teaches topics such as healthy eating.

Immigrants and their descendants are more prone to ill-health and lifestyle disease than the rest of the population. While this is recognised as a major problem for both the individuals affected and for society as a whole, there is a lack of knowledge about effective prevention. A new strategic research project will pave the way for developing and implementing a preventive initiative.

The Danish Council for Strategic Research has granted DKK 17m for SULIM (Towards Sustainable Healthy Lifestyle Interventions for Migrants), the first research project in Europe to conduct a large-scale survey to determine how preventive efforts surrounding health, physical exercise and nutrition for this specific group might be mounted for greater effect than is currently the case.

At present, the Danish health service works to the principle of equitable, non-discriminatory treatment for all citizens, and consequently sends out the same messages by the same channels to the general population. However, minority groups tend to be bypassed in this communication because they often have other attitudes to body and health than ethnic Danes, and because they may also be unaware of how to make use of the Danish health service. Different groups of immigrants are affected by different cultural, social and financial issues, and have so far been neglected in communication concerning health.

The complexities of prevention research
SULIM starts by examining initial immigrant encounters with society and in an interdisciplinary collaboration with schools, doctors, local authorities and language schools etc. investigates best practices in targeted interventions for the different groups. The project consults for example with a number of general practitioners who are in direct contact with immigrants with young children. Another group of project participants is made up of pupils and teachers from years 6 and 7 at Bellahøj School.

Professor Allan Krasnik MD, of the University of Copenhagen's Danish Research Centre for Migration, Ethnicity and Health (MESU) is the project coordinator and keenly commends the interdisciplinary approach: *"Prevention research among immigrants is a good example of a complex of issues that have to be identified in an interaction of the theories and methods of a many different disciplines. SULIM creates a setting for a close and mutually reliant collaboration between health and social science researchers from very different research environments seeking jointly to identify the potentials for new forms of prevention adapted to immigrant-specific circumstances and problems."*

Health in different phases of life
The project is divided into six sub-studies, each of which homes in on problems specific to immigrants and their descendants in a given phase of life, such as pregnancy and infant care, obesity in young children and unhealthy lifestyle, and issues surrounding contact with the health service. As a new move in prevention research, the project will obtain large volumes of data, which will provide unprecedented opportunities for quantitative research.

The results of the studies will help local authorities and other actors to adopt more effective methods of prevention for improving health among minority groups. The prevention methods might include education in secondary schools and language schools in use of the Danish national health service, cookery courses and courses in how to tackle lifestyle problems through dietary improvements and physical exercise.

Better health for immigrants

Diabetes, cardiovascular disease, stillbirth and osteoporosis affect two-three times as many immigrants as ethnic Danes. For example, only a small percentage of ethnic Danes suffer from type 2 diabetes, whereas a full 12-17 per cent of immigrants from countries such as Iraq, Pakistan, Lebanon and Somalia are affected. Overweight and lack of exercise are thought to be the causes of many of these problems. However, causes other than lifestyle factors include cultural differences and genetic factors. SULIM will both be documenting the causes and determining how to target interventions at the right audiences.

Ears pricked in hearing aid design

At SPIRE, a strategic research centre, efforts are underway to bring changes in the private-sector perceptions of innovation. This is being achieved through the involvement of a theatre group and interdisciplinary collaborative projects combining anthropology and design.

In 2008, Professor Jacob Buur of the Mads Clausen Institute at the University of Southern Denmark was awarded a grant of DKK 20m for the SPIRE research centre. The centre's total of 10 sub-projects bring together six university disciplines, a theatre group and a number of enterprises – ranging from small-scale entrepreneurs to large international firms – in developing a new approach to user-driven innovation, which they call participatory innovation.

A new take on innovation

The concept involves the end-users of a given product in the initial concept design phase, since users often have valuable insights on how products and services should ideally be designed. For the SPIRE centre, participatory innovation entails bringing different groups into play in the conceptual process – and not just the end-users. The centre's research will be describing methods for how enterprises can collaborate with different stakeholders in product and service innovation.

We want to get away from industry's misapprehension that innovation is down to the individual engineer's ingenuity, and that the only route to new inventions is to get the engineer working harder. Instead, by involving several different parties, you can gain new perspectives on what you're developing, says Professor Buur.

One method for altering conventional attitudes to innovation is to involve the Dacapo theatre group, which acts out scenarios surrounding e.g. user collaboration within enterprises. Here the researchers can pick up on audience reactions, on the problems of changing ingrained responses and embracing new ideas.

Alternative product development

Interdisciplinary collaboration is important at the SPIRE centre; a case in point being Ditte Nissen Storgaard's PhD project. An anthropologist, she is collaborating with a designer, the pharmaceutical company Novo Nordisk and the hearing aid manufacturer Oticon. The focus of her PhD project consists of the pre-users of, respectively, insulin and hearing aids.

A German study estimates that up to two-thirds of people with a hearing impairment do not wear a wearing aid, and Ditte Nissen Storgaard is trying to find out why. *We addressed the issues surrounding hearing aids by challenging user perceptions of what hearing actually is,* she explains. One activity was a game in which participants had to indicate when a hearing impairment was a problem.

We haven't invented a new type of hearing aid, but we are systematising our observations and describing a methodology for involving pre-users in product development. Part of the aim of the project is to achieve a close collaboration between anthropology and design whereby the different disciplines will not be passing on their expertise, but developing the products in a continuous collaboration, says Ditte Nissen Storgaard.

Innovation within many types of enterprises

The SPIRE centre in Sønderborg in Jutland is not only working in association with large firms such as Novo Nordisk and Oticon, but has also formed links with a number of small, local enterprises. The large centre grant from the Danish Council for Strategic Research has made it possible to involve 12-14 industrial firms instead of the three or four originally envisaged.

The advantage of working with firms with between 5 and 50 employees is that they can adapt far more rapidly than the large firms. Equally, the small enterprises tend to have far more tangible expectations of our concepts – is it going to pay off for them? says Professor Buur. Happily, it would appear so. *They've certainly been back for more.*

Pre–users

The term pre-users refers to persons who are likely to need a hearing aid at some point in time but yet do not wear one. Interviewing pre-users holds an especially promising potential for innovation as their understanding of hearing aid is not influenced by a specific product. At the same time, pre-users can help answer why some people chose to not wear a hearing aid even though they have a hearing impairment.

"We want to get away from industry's misapprehension that innovation is down to the individual engineer's ingenuity, and that the only route to new inventions is to get the engineer working harder. Instead, by involving several different parties, you can gain new perspectives on what you're developing."

Professor Jacob Buur
University of Southern Denmark

Foto:
Ditte Nielsen Storgaard and Janet Kelly have designed a game that challenges pre-users's understanding of hearing

The
Danish Council for
Strategic Research

The Danish Council for Strategic Research - an important element in the Danish research council system

The different cases in the annual report illustrate a wide array of the basic and applied research that received funding from the Danish Council for Strategic Research.

Danish strategic research represents a crucial link between the basic research of the universities and the Danish Councils for Independent Research on the one hand and, on the other hand, the innovation and development activities within the Danish Council for Technology and Innovation, the Advanced Technology Foundation and the demonstration and market programmes.

The new logo of the Danish Council for Strategic Research symbolises strategic research as a dynamic element within the research council system but also as a catalyst for research in interaction, in a broad sense, with the surrounding Danish and global societies.

Funding recipients 2011

The Danish Council for Strategic Research funds research within those areas in which the Danish Parliament makes annual allocations. The Council is guided by its basic principle of assessing the quality of applications on the basis of three equivalent criteria: the relevance of the research, the potential impact of the research and the quality of the research.

In 2011, the Council awarded funding worth a total of DKK 900m.

Programme Commission on **Sustainable Energy and Environment**

In 2011, the Programme Commission on Sustainable Energy and Environment awarded approx. DKK 280m for strategic research under the themes of "Energy and environment – energy systems of the future", "Competitive environmental technologies" and "Climate and climate adaptation". An additional DKK 15m was awarded for three Danish-Chinese energy projects and DKK 5m for the Danish component of six projects under the European transnational ERA-NET+Electromobility programme.

Significant societal challenges in this research area

Denmark is to be future-proofed by creating a sustainable growth economy and switching to energy and transport systems wholly based on renewable energy by 2050, in which the reliability of energy supply, climate and environmental con-siderations and cost-efficiency are the main pillars. The challenge consists of developing energy-efficient, intelligent and climate-friendly technologies capable of reducing greenhouse gas emissions and other forms of pollution, and of reducing dependence on fossil fuels, and, in so doing, also improving reliability of supply.

The research shall promote improvements in which economic growth does not result in increasing negative environmental impacts, and where the focus is on a renewable, intelligent and environmentally sustainable energy system. Research efforts must also support the capacity for business and industry to capitalise on the major future market potentials in the field of climate, energy and environment.

Energy systems of the future

LowE-CEM – Low-Energy CEMents for sustainable concrete
Associate Professor Jørgen Bengaard Skibsted,
Aarhus University
Grant: DKK 12.2m (total budget: DKK 22.6m)

BIORESOURCE – Increasing the biomass resource, its quality and sustainability
Professor Jørgen Eivind Olesen,
Aarhus University
Grant: DKK 17.5m (total budget: DKK 23.5m)

RESAB – Rational engineering of cellulases for improved saccharification of biomass
Professor Peter Westh-Andersen,
Roskilde University
Grant: DKK 11.7m (total budget: DKK 25.2m)

INCAP – Inducing consumer adoption of automated reaction technology for dynamic power pricing tariffs
Professor Peder Andersen,
University of Copenhagen
Grant: DKK 17.9m (total budget: DKK 22.7m)

EDGE – Efficient Distribution of Green Energy
Professor MSO Rafael Wisniewski,
Aalborg University
Grant: DKK 17m (total budget: DKK 22.2m)

The MacroAlgae Biorefinery – sustainable production of 3G bioenergy carriers and high value aquatic fish feed from macroalgae
Engineer, PhD Anne-Belinda Bjerre,
Danish Technological Institute
Grant: DKK 20.4m (total budget: DKK 24.2m)

DKK 280m

ReLiable – Reversible Lithium-Air Batteries
Associate professor Tejs Vegge,
Technical University of Denmark
Grant: DKK 18.8m (total budget: DKK 26.6m)

SOSPO – Secure Operation of Sustainable Power Systems
Professor Jacob Østergaard,
Technical University of Denmark
Grant: DKK 20.2m (total budget: DKK 32.2m)

SET4Future – Sustainable Enzyme Technologies for Future Bioenergy
Professor Robert Madsen,
Technical University of Denmark
Grant: DKK 17.9m (total budget: DKK 28.6m)

4DH – Strategic Research Centre for 4th Generation District Heating Technologies and Systems
Professor Henrik Lund,
Aalborg University
Grant: DKK 37m (total budget: DKK 63.9m)

HyFill-Fast – Fast, efficient and high capacity hydrogen refuelling and onboard storage
Associate professor Torben Rene Jensen,
Aarhus University
Grant: DKK 21.9m (total budget: DKK 39.3m)

MycoFuelChem – MYCO-fuels and MYCO-chemicals: Consolidated bioprocessing of biomasses into advanced fuels and high value compounds in fungal cell factories
Professor Birgitte Kiær Ahring,
Aalborg University
Grant: DKK 19.8m (total budget: DKK 29.5m)

Competitive environmental technologies

HyGEM – Integrating geophysics, geology, and hydrology for improved groundwater and environmental management
Associate professor Esben Auken,
Aarhus University
Grant: DKK 15.4m (total budget: DKK 28m)

IRMAR – Integrated Resource Management & Recovery
Professor Thomas Højlund Christensen,
Technical University of Denmark
Grant: DKK 18.4m (total budget: DKK 35.6m)

Climate and climate adaptation

HydroCast – Hydrological forecasting and data assimilation
Engineer, PhD Henrik Madsen,
DHI
Grant: DKK 14.8m (total budget: DKK 24.4m)

Programme **Commission on Health, Food and Welfare**

In 2011, the Programme Commission on Health, Food and Welfare awarded approx. DKK 203m for strategic research under the themes of "Connection between Food, Health and Lifestyle" and "Sustainable and Competitive Food Production". In addition, DKK 10m was awarded for two Danish-Brazilian research projects under the last-named theme.

Significant societal challenges in this research area

Global changes in the natural environment and the climate, but also in societal and economic dimensions, are posing a mounting challenge in securing adequate supplies of food, feed, energy, materials and water for the growing world population. There is consequently a need to develop more efficient and competitive biological production that promotes health, the production of appetising quality foods, consumer protection, animal welfare and a clean environment and which in combination serve to realise the goals defined within sustainable production.

Realisation of this vision holds considerable societal and commercial potential, not least in the international arena, and will thereby be a significant driver for growth and development.

Connection between Food, Health and Lifestyle

GUT, GRAIN & GREENS (3G) – Center for Gut Microbiota, Metabolic Disorders, and Grain/ Fibre-based Diets
Professor Tine Rask Licht,
Technical University of Denmark
Grant: DKK 34.7m (total budget: DKK 55.3m)

DIPI - Diet and prevention of ischemic heart disease: a translational approach
Professor Kim Overvad,
Aarhus University
Grant: DKK 19.1m (total budget: DKK 23.9m)

HABFISH – Harmful algae and fish kills
Associate Professor Per Juel Hansen,
University of Copenhagen
Grant: DKK 17.1m (total budget: DKK 27.2m)

FiTT – Food in Turbulent Times
Professor Lotte Holm,
University of Copenhagen
Grant: DKK 6.3m (total budget: DKK 7.1m)

FFARMED – The molecular effects of food on metabolic diseases through nutrient sensing free fatty acid receptors
Associate Professor Trond Ulven,
University of Southern Denmark
Grant: DKK 17.3m (total budget: DKK 29.8m)

D-tecting disease – from exposure to vitamin D during critical periods of life
Professor Berit Lilienthal Heitman,
Bispebjerg Hospital
Grant: DKK 10.9m (total budget: DKK 16.9m)

Sustainable and Competitive Food Production

MASPot – Moving potato breeding into the post genome era
Professor Kåre Lehmann,
Aalborg University
Grant: DKK 11.9m (total budget: DKK 17.2m)

PigIT – Improving welfare and productivity in growing pigs using advanced ICT methods
Professor Anders Ringgaard Kristensen,
University of Copenhagen
Grant: DKK 20m (total budget: DKK 30.9m)

NEXIM – New X-ray Imaging Modalities for Safe and High Quality Food
Professor Robert Krarup Feidenhansl,
University of Copenhagen
Grant: DKK 19.2m (total budget: DKK 28.9m)

RUSTFIGHT
Professor Mogens Støvring Hovmøller,
Aarhus University
Grant: DKK 19.8m (total budget: DKK 26.2m)

REPROLAC Extended lactation in dairy production in favor of climate, animal welfare and productivity
Senior research fellow Troels Kristensen,
Aarhus University
Grant: DKK 14m (total budget: DKK 18.7m)

PROFISH– Targeted disease prophylaxis in marine fish farming
Senior research fellow Niels Lorenzen,
Technical University of Denmark
Grant: DKK 12m (total budget: DKK 14.8m)

DKK 202m

Programme Commission on **Individuals, Disease and Society**

In 2011, the Programme Commission on Individuals, Disease and Society awarded a total of approx. DKK 142m for strategic research under the themes of "Clinical Research" and "Health, Prevention and Environmental Factors". In addition, DKK 9.4m was awarded for a Danish-Indian research project under the theme of "Health Science Biotechnology".

Significant societal challenges in this research area

Denmark faces a number of challenges in the health area. Disease causes great distress for the individual, and health service spending is of great economic significance. Patients must be assured of a high standard of treatment, and the organisation of the health service must guarantee patients maximum efficacy of treatment.

The challenge consists both of preventing disease and of individualising the treatment of patients. Only through individualised treatment is it possible to progress to the next stage of development and avoid the consequences of overmedication and mismedication: injury and damage, side effects and high costs for both the individual and society.

Health, Prevention and Environmental Factors

Molecular imaging with PET for non-invasive tumour characterization and tailored cancer therapy: Translational studies
Chief physician Andreas Kjær,
Rigshospitalet
Grant: DKK 13.3m (total budget: DKK 17.5m)

FEPRODI – Fetal programming of type 2 diabetes: Role of gestational diabetes, maternal and childhood nutrition, and epigenetic mechanisms
Chief physician Allan Arthur Vaag,
Rigshospitalet
Grant: DKK 11.8m (total budget: DKK 17.4m)

HUPP STUDY – Hypertension and urine protease activity in preeclampsia
Professor Boye Lagerbon Jensen,
Southern Denmark
Grant: DKK 12.3m (total budget: DKK 14.8m)

Towards Sustainable Healthy Lifestyles Interventions for Migrants
Professor Allan Krasnik,
University of Copenhagen
Grant: DKK 17.1m (total budget: DKK 22.3m)

COGNITO – Novel treatments of cognitive dysfunction
Staff specialist Jens D. Mikkelsen,
Rigshospitalet
Grant: DKK 17.9m (total DKK 43.6m)

Clinical Research

REPAIR – Remote Protection Against Ischemia Reperfusion Injury in the Heart
Professor Hans Erik Bøtker,
Aarhus University
Grant: DKK 19.5m (total budget: DKK 26.3m)

SafeBoosC: Safeguarding the brain of our smallest children – a feasibility randomised trial on near-infrared spectroscopy combined with treatment guideline in premature infants
Head of Department Gorm Greisen,
Rigshospitalet
Grant: DKK 11.1m (total budget: DKK 20.5m)

TARGET – The impact of our genomes on individual treatment response in obese children
Professor Torben Hansen,
University of Copenhagen
Grant: DKK 19.6m (total budget: DKK 22.4m)

Keto group – Keto-metabolites (leucine, hydroxymethylbutyrate and 3-hydroxybutyrate) to maintain protein and muscle mass during acute and chronic illnesses in humans
Professor, Niels Møller,
Aarhus University
Grant: DKK 19.3m (total budget: DKK 29.1m)

DKK 142m

Programme Commission on **Strategic Growth Technologies**

In 2011, the Programme Commission on Strategic Growth Technologies awarded a total of approx. DKK 113m for strategic research under the themes of "Nanotechnology, Biotechnology and Information and Communication Technology" and "Intelligent Solutions for Society". A total of eight grants were awarded.

Significant societal challenges in this research area

The development and application of new technologies such as nanotechnology, biotechnology, synthesis biology, materials technology and information and communication technology are key drivers of productivity improvements and economic growth generally. The challenge lies in developing and applying the technologies for the development of new, innovative and competitive products and processes, while instilling public confidence in the use of new technologies. At the same time, the technologies may potentially pave the way for new solutions to key challenges facing society in areas such as energy, food, environment, health and education, while they may also form the basis for commercial development. Moreover, combining technologies holds great potential in relation to the development of the biobased economy for example.

Nanotechnology, Biotechnology and Information and Communication Technology

ELECTROMED – Electrospun Biomimetic Nanofibres as Regenerative Medicines
Professor Flemming Besenbacher,
Aarhus University
Grant: DKK 9.9m (total budget: DKK 16.9m)

MUSE – Multi Sensor DVD Platform
Professor Anja Boisen,
Technical University of Denmark
Grant: DKK 17.4m (total budget: DKK 27.1m)

Imaging Dementia (iDEA) – Development of imaging agents and early-stage in vivo detection for drug development or intervention
Professor Niels Chr. Nielsen,
Aarhus University
Grant: DKK11m (total budget: DKK 16.4m)

NanoBar – Non-invasive nanoparticle delivery of nucleic acid therapeutics across biological barriers
Professor Jørgen Kjems,
Aarhus University
Grant: DKK 9.8m (total budget: DKK 13.6m)

ANaCell – High content analysis of single cells with subcellular resolution using nanowire arrays
Associate Professor Karen Laurence Martinez,
University of Copenhagen
Grant: DKK 12.3m (total budget: DKK 18.1m)

Nanoguide – Image-Guided Radiation Therapy using Nanoparticles
Associate Professor Thomas Lars Andresen,
Technical University of Denmark
Grant: DKK 17.2m (total budget: DKK 28.1m)

Intelligent Solutions for Society

EcoSense – Collective Sensing and Macroscopic Analysis Methods for Reducing Company- and Society-level Environmental Footprints
Professor Kaj Georg Grønbæk,
Aarhus University
Grant: DKK 18m (total budget: DKK 28.3m)

CoSound – A Cognitive Systems Approach to Enriched and Actionable Information from Audio Streams
Associate Professor Jan Larsen,
Technical University of Denmark
Grant: DKK 17.5m (total budget: DKK 26.6m)

DKK 113m

Programme Commission on **Transport and Infrastructure**

In 2011, the Programme Commission on Transport and Infrastructure awarded a total of approx. DKK 30m for strategic research under the theme of "Green Transport – Sustainable Transport and Infrastructure". In addition, in 2011, DKK 2.5m was earmarked for the Danish component of the European transnational ERA-NET+Electromobility programme.

Significant societal challenges in this research area

Transport systems are a vital nerve of modern society, and the transportation of people and goods by road, sea and air is increasing and is expected to continue to do so in future. The challenge consists of reducing the transport sector's negative climate and environmental impacts balanced with the commitment to ensuring economic growth and increasing mobility.

There are a number of challenges, e.g. as regards the negative environmental impacts of transportation, energy efficiency, coordination and long-term integration of urban and rural areas, and provision for more remote parts of the country. Research efforts in this area should contribute to developing and future-proofing transport and infrastructure systems designed to reduce pollution, congestion and transportation times by cost-efficient means.

Green Transport – Sustainable Transport and Infrastructure

RobustRailS – Robustness in Railway Operations
Professor David Pisinger,
Technical University of Denmark
Grant: DKK 16.7m (total budget: DKK 23m)

SUSTAIN – National transport planning – sustainability, institutions and tools
Professor Steen Leleur,
Technical University of Denmark
Grant: DKK 13.4m (total budget: DKK 15.8m)

DKK 30m

Programme Commission on **Education and Creativity**

In 2011, the Programme Commission on Education and Creativity awarded DKK 30.5 m for strategic research under the theme of "Education Research and Post-Vocational Degree Occupations".

Significant societal challenges in this research area

Education, learning and competence building are crucial in ensuring future prosperity and growth, and are also of great importance for the opportunities of the individual and for cohesion in society. A high level of education will be conducive to a sufficient supply of well-qualified labour in future. At the same time, global competition makes high demands regarding the standard of education provided.

The challenge consists of raising the level of education and skills in the Danish population, improving the quality of education programmes, ensuring that as many people as possible receive a vocational/professional education and ensuring that national competences develop in line with challenges as they arise in a globalised world.

Education Research and Post-Vocational Degree Occupations

SPELL– Structured Preschool Effort for Language
Professor Dorthe Bleses,
University of Southern Denmark
Grant: DKK 16.2m (total budget: DKK 23m)

PACE – Promoting A Culture of Entrepreneurship: Unleashing enterprising creativity through novel pedagogy
Professor Helle Neergaard,
Aarhus University
Grant: DKK 14.3m (total budget: DKK 19.3m)

DKK 30m

International funding

DKK 35m

In 2011, the Danish Council for Strategic Research granted approx. DKK 35m for bilateral cooperation with the BRIC countries Brazil, India and China. The funding was awarded by the programme commissions within the respective areas.

Cooperation with Brazil Health, Food and Welfare

IMBICONT: Improved biological control for IPM in fruits and berries
Professor Jørgen Eilenberg,
University of Copenhagen
Grant: DKK 6.1m (total Danish budget: DKK 6.7m)

BEAM – Bread and meat for the future
Professor Leif Horsfelt Skibsted,
University of Copenhagen
Grant: DKK 3.9m

Cooperation with India Individuals, Disease and Society

Genetics and Systems Biology of Childhood Obesity in India and Denmark
Professor Haja Kadarmideen,
University of Copenhagen
Grant: DKK 9.4m (total Danish budget: DKK 14.2m)

Cooperation with China Sustainable Energy and Environment

ENEFOX – Energy Efficient Oxygen Production for a Sustainable Energy System
Professor Peter Vang Hendriksen,
Technical University of Denmark
Grant: DKK 6.5m (total Danish budget: DKK 7.7m)

WAPART – Water-based particulate approach to organic photovoltaics with controlled morphology
Associate professor Jens Wenzel Andreasen,
Technical University of Denmark
Grant: DKK 4.7m (total Danish budget: DKK 5.3m)

SBLED – Super bright light-emitting diode using nanophotonics
Associate Professor Haiyan Ou,
Technical University of Denmark
Grant: DKK 4.2m (total Danish budget: DKK 5m)

SPIR grant

DKK 70m

In 2011, the Danish Council for Strategic Research and the Danish Council for Technology and Innovation awarded a grant of DKK 70m for a SPIR devoted to intelligent solutions for society and welfare technology.

SPIR (Strategic Platforms for Innovation and Research) is an initiative to make it more attractive for business and industry to participate in research and development activities with the Danish universities, approved technological service institutes and other enterprises and innovation stakeholders.

Patient@home – Innovative Welfare Technology for the 21st Century
Grant Recipient: University of Southern Denmark
(contact person: Professor Uffe Kock Wiil)
Grant: DKK 70m (total budget: DKK 190m)

The
Danish Council for
Strategic Research

Publisher:
The Danish Council for Strategic Research
Danish Agency for Science,
Technology and Innovation

March 2012

Design: e-Types / India
Photo: Jonas Pryner Andersen
Print: Cool Gray
Circulation: 3.000
ISSN: 2245-3172

This publication is also available on the
website of the Danish Council for
Strategic Research: **http://en.fi.dk/dcsr**

ISSN (internet): 2245-3245

The print version of this publication is supplied free
of charge, while stocks last, on application to:
Rosendahl-Schultz Grafisk
Herstedvang 10
2620 Albertslund

Telephone: +45 4363 2300
distribution@rosendahls-schultzgrafisk.dk
www.rosendahls-schultzgrafisk.dk

The remit of the Danish Council for Strategic Research

The Danish Council for Strategic Research was established on 1 January 2004. The general frameworks for the Council are laid down in the Danish Act on the Research Advisory System. The Council is responsible for awarding funding for Danish research within prioritised and thematically delimited areas determined by the Danish Parliament. The Council is also mandated to provide research-based advice to the Minister for Science, Innovation and Higher Education, the Government and Parliament.

Contact

Secretariat of the Danish Council
for Strategic Research
Danish Agency for Science,
Technology and Innovation
Bredgade 40
DK-1260 Copenhagen K

Telephone +45 3544 6200
Fax +45 3544 6201
dsf@fi.dk
http://en.fi.dk/dcsr