THIS IS MISTRA

The Swedish Foundation for Strategic Environmental Research – Mistra – supports research of strategic importance for a good living environment and sustainable development. It seeks to promote the creation of strong research environments of the highest international class and of importance for Sweden’s future competitiveness. The research funded is intended to be of significance in finding solutions to major environmental problems and promoting the sustainable development of society. Full use is to be made of opportunities to achieve industrial applications.

MISTRA’S ROLE
Mistra is part of Sweden’s system of innovation for an environmentally sound society and globally sustainable development. It invests in strong research groups which, working with users, are able to play a part in solving key environmental problems. Mistra provides funding of some SEK 200 million a year, and is currently supporting around twenty large-scale research programmes, each extending over a period of six to eight years, and in one or two cases even longer.

Alongside its funding for major programmes, the Foundation has over the last seven years awarded a number of Idea Support Grants each year to projects with an emphasis on boldness, originality and creativity.

In addition, it is co-funding, with the Swedish Foundation for Strategic Research (SSF), the research programme ProEnviro, aimed at small and medium-sized enterprises working with universities or research institutes to develop environmentally sounder products and become more competitive.

Mistra’s overall aim is that research at the highest scientific level should find practical applications in industry, public administration and non-governmental organizations. In this way, the investments it makes in research can help to solve environmental problems. The Foundation’s strategy is to secure a threefold return on its capital – strong research environments that create value for users, management of its own assets in support of sustainable development, and active communication and collaboration with selected groups in society to bring about change.

PRIORITIES
Mistra gives priority to five areas of environmental research: A Reduced Human Influence on Climate, A Non-Toxic Environment, Zero Eutrophication (with a focus on the marine environment), Sustainable Use of Renewable Natural Resources, and Sustainable Urban Development.

TARGET GROUPS
Mistra supports and works in partnership with:
- Researchers wishing to find solutions that can be of use in securing environmentally sustainable development.
- Swedish companies wanting to be world leaders in the development of environmentally sound products, services or production processes.
- Public agencies and legislators seeking to impose more stringent requirements on activities that could harm the environment.
- International negotiators working to achieve progress in international environmental cooperation.
- Non-governmental organizations and others seeking to promote environmentally sustainable development.

MISTRA’S VISION
Our vision is that, by 2020, Mistra will have had a clear impact, in the following ways:
- Important environmental problems will be solved by means of research collaboration between the higher education sector and Swedish industry, public administration, policymakers and non-governmental organizations.
- Sweden will have several internationally competitive, cross-boundary research environments, working in dialogue with users to bring about a sustainable society.
- The competitiveness of Swedish industry will have been enhanced as a result of a number of new, environmentally sound products and services securing significant market share.
EQUIPPING THE WORLD WITH NEW KNOWLEDGE

Research results are the property of society, and must contribute to its development. Mistra therefore remains committed to investing in research programmes that will make a difference to society.

Mistra’s role, as set out in its Statutes, is to support research that will help to solve environmental problems and yield benefits for society. And those benefits are something the Foundation’s Executive Director Ola Engelmark is keen to underline:

‘The results of research are not the property of the researchers alone, but of the whole of society. Consequently, we remain committed to supporting innovative research capable of generating everything from ideas to commercial products, from new decision-support data to resource management models. In that sense I feel that research still has huge untapped potential. We also intend to work hard at improving our communication and collaboration – to make sure the results achieved really do make a positive difference.’

Dr Engelmark welcomes the efforts of so many programme communications officers and researchers during the past year to develop a broader dialogue with stakeholders in society.

‘The key challenge,’ he says, ‘is to equip the world with more of the knowledge it needs to manage major change. We’re doing this by bringing people together in different ways, and that’s something we’ll be putting even more emphasis on in future.’

HOLISTIC APPROACH NECESSARY

‘The world needs new solutions to known problems,’ Ola Engelmark continues. ‘To deliver them, we must build new interdisciplinary platforms and networks that will foster an holistic approach, enabling decision makers to reach well-founded decisions.’

A good example of this is the Stockholm Resilience Centre, a Mistra initiative launched in 2007. Under its roof, social and natural scientists from several organizations are working in partnership to build a shared body of knowledge and values relating to sustainable global use of natural resources.

‘Such cooperation is necessary because of the great complexity of the links between environment and society, which means that no discipline on its own can take in the whole picture.’

Spurred by the international attention which its research programmes attract, Mistra intends to be even bolder in the years ahead. There is no lack of ideas, but the challenge is to get to grips with the big issues. Future Forests, Homes for Tomorrow, and Food and Bioenergy in a Water-Scarce World are three areas of research for which Mistra has awarded planning grants in the past year. Two new programmes that got under way in 2007 tackle the questions of pharmaceuticals in the environment and adapting to climate change.

‘What researchers need to do is develop new knowledge that will provide a basis for decisions which don’t just mitigate, but actually prevent, future world problems.’

STRONG AND INDEPENDENT RESEARCH

There is a growing need, too, to establish research environments that are unfettered by trends and political decisions.

‘At present, climate research is very much in demand, for example, but we also have to look to the future – what will come next? Researchers should be studying not only fuels and vehicles, but also, and just as importantly, forms of urban development that manage without cars, but offer equally good access to goods and services. That’s essential if we’re to promote the development of our society.’

Part of Mistra’s job is to create strong research environments with international perspectives and international networks. And it is important to communicate what that entails.

‘What we need is research settings that encourage a high degree of creativity, free and independent, but with a clear sense of social responsibility,’ says Ola Engelmark. ‘And following Mistra’s current review of its strategy, we intend to make them even stronger.’
There are some events that stick particularly clearly in your mind. For me, one was the occasion when the then Minister for the Environment, Kjell Larsson, telephoned me during a meeting at a Strasbourg restaurant. He wanted to know if I could consider chairing the Board of Mistra, and I have to admit that I didn’t take much persuading. The chance to get involved in environmental research – and in a context where I would be surrounded by highly competent people at that – felt like a great privilege.

And that is precisely what my time with Mistra has been: privileged, instructive and inspiring. The biggest challenge has been to keep the Foundation’s Statutes alive. The twin objective expressed there – strategic environmental research that leaves an imprint on society and industry – has been at the heart of just about every meeting and discussion we have had.

A great deal has happened, both at Mistra and in the wider public debate, during my years as chairman. We have progressed from a situation where environmental issues were all but absent from public discussion to what appears to be a growing awareness that our way of life is putting too much of a strain on our planet.

Many of the programmes Mistra has helped to fund have made a difference. One area of work that I would especially like to mention is sustainable asset management, which has become one of the Foundation’s flagship projects. What began as a tentative attempt to clean up our own backyard, by ensuring that our capital was managed as ethically as possible, has now grown into something much bigger, an internationally accepted way of thinking.

There is a time for everything – including a chairmanship. The time has now come for me to express my gratitude for my years at Mistra. And to wish the new Board and Lena Treschow Torell, Mistra’s new chairman, all the very best. I am convinced that, between you, you will do a great job of work.

Anneli Hulthén
Outgoing Chairman of the Mistra Board
NEEDS-DRIVEN IDEAS FOR RESEARCH

The areas of research in which Mistra invests are defined through a process of idea generation based on analyses and feasibility studies. The resulting programmes are intended both to find usable solutions and to meet global needs.

“We want to have a dialogue with users, politicians and other decision makers, to make sure that action to adapt to climate change is based on a solid foundation of facts,” says Markku Rummukainen, programme manager of Mistra-SWECIA.
A MISTRA RESEARCH PROGRAMME ARISES OUT OF AN ENCOUNTER BETWEEN USERS AND RESEARCHERS. THE AIM IS TO FIND SOLUTIONS BEYOND THE ENVIRONMENTAL PROBLEMS OF TOMORROW. TO BE A STEP AHEAD.

Accordingly, Mistra maintains a watching brief both on existing areas of environmental research around the world and the design of projects undertaken, and on future global challenges for sustainable development. It monitors world trends such as climate change, increasing urbanization and globalization.

‘When these different perspectives are superimposed, we see that there are gaps. We’re looking for the kinds of work that no one else is doing, the areas where we, with our unique mission, can contribute most,’ says Olof Olsson, who heads Mistra’s idea generation process.

Once an idea has taken shape, it is presented to the Board, whose members test it against the Foundation’s criteria. Mistra’s overall programme portfolio is intended, among other things, to address major environmental problems, enhance Sweden’s competitiveness, create strong research environments and achieve the highest international standards of scientific quality.

‘Mistra often funds large-scale, integrated programmes of an interdisciplinary character, with a focus on end-users. A type of research few others are currently undertaking in Sweden,’ Dr Olsson explains.

FEASIBILITY STUDY POINTS THE WAY
When an interesting idea has been identified, the next step is often to commission a feasibility study by outside experts. Its aims include assessing the nature and scope of the field of research, identifying potential partners and considering what role Mistra could play. If this initial study proves favourable, the Foundation may issue a call for proposals aimed at universities and research institutes in Sweden, with interdisciplinary, and usually international, collaboration as a key requirement. The different research proposals then compete for programme funding from Mistra.

Last year, three feasibility studies were carried out. The first looked at how biotechnology could contribute to sustainable development. It was a kind of ‘pre-feasibility study’ or ‘environment scan’, to establish whether further investments in this field could be of interest to Mistra.

The second study was concerned with carbon capture and storage (CCS), an approach that could in future enable coal-fired power stations, for instance, to store carbon dioxide and thus emit less of it to the atmosphere. For many countries around the world, coal still represents a huge and readily accessible energy reserve. It is cheap to mine, and an option which large developing nations such as China and India find very attractive. In China the number of coal-burning power plants is now rising steadily, further boosting carbon dioxide emissions, which are already having a significant impact on climate.

‘Coal is probably going to be used whatever the rest of the world says, as many developing countries have few alternatives at present. If catastrophic climate change is to be avoided, something has to be done, and CCS could be part of the solution,’ Olof Olsson suggests.

Carbon capture and storage involves removing the carbon dioxide before it reaches the atmosphere and pumping it into geological reservoirs thousands of metres below the earth’s surface. Many see CCS as one of the key answers to the problem of climate change, and both the EU and European energy companies are investing heavily in its development. Mistra’s feasibility study, however, had a somewhat different focus.

‘We wanted to see if we could establish ourselves as a neutral arena for knowledge relating to CCS, as most other players in this field have vested interests,’ says Dr Olsson. ‘Very little is known about the consequences of the method. We need to minimize the risk of large quantities of stored carbon dioxide ending up as an environmental time bomb.’

The study’s recommendation to Mistra was to create such an arena, with a perspective that is not confined to the natural sciences. If CCS becomes an established method, there will for example be a need for international legislation and certification. The question then will be what agreements need to be reached, and which bodies should oversee the negotiations.

‘In the case of CCS, we won’t be inviting proposals in the usual way. The present research capability in Sweden is so limited and fragmented that we don’t feel a competitive approach would be appropriate here,’ Dr Olsson explains. ‘Instead, we plan to hand-pick Swedish researchers in this area and – working with an international group – undertake a more in-depth review of existing knowledge that will identify the issues we need to take a closer look at. This will involve a short initial phase of two to three years.’
Sustainable urban development is about the future challenges to our cities. It has to do with things like greenhouse gas emissions, security, transport networks, technical systems, organization and leadership.

HENRIK NOLMARK

SYSTEMS APPROACH TO CITIES

The third feasibility study, on sustainable urban development, was conducted by Henrik Nolmark, a man with many years’ experience in that field. To assist him, he put together an international group of researchers and experts. The study’s aims were to determine whether this would be an appropriate area for Mistra funding, how a programme could most effectively be delivered, and what relevant expertise already exists around the world.

‘Sustainable urban development is about the future challenges to our cities,’ Mr Nolmark explains.

‘It has to do with things like greenhouse gas emissions, security, transport networks, technical systems, organization and leadership. A lot of people have looked at these areas one by one, but no one has studied them from an overall systems point of view – that’s to say, in terms of how they affect each other. That is where Mistra could come in.’

He and his group interviewed numerous experts from over 20 countries, on almost every continent, and were able to identify a number of priority themes. A future research programme, if launched, should for example study what tangible action cities can take to adapt to climate change and reduce their own impacts on climate. That action could include improving public transport, while discouraging private car use.

‘When global climate change is reduced to a concrete, day-to-day level, cities become very important. They are where much of the process of change has to take place. Lower charges for things that are better for our climate and higher charges for things that do more harm, for instance, can be one way of influencing people’s behaviour,’ Henrik Nolmark continues.

ADAPTABLE CITIES

Another important question for a future programme will be how to create stable cities that can withstand pressures of different kinds, such as social and cultural change triggered by large movements of refugees. People living in a highly stable community are less afraid of new lifestyles and cultures and better able to adapt.

‘We might for example ask ourselves why it is that xenophobia is rife in one city but not in another, even though both have the same proportion of immigrants,’ Mr Nolmark points out.

A third suggested area of research is urban metabolism, i.e. an urban population’s consumption of materials and energy in relation to the city’s technical systems, such as sewer networks. Researchers often talk about a city’s ecological footprint, by which they mean how much of a burden it places on the surrounding area.

‘A self-sufficient town or city where a high proportion of food is produced locally, for instance, is better for the environment than one that lives on imported produce from the other side of the globe.’

The feasibility study’s conclusion is that Mistra should fund a major interdisciplinary research programme on sustainable urban development. To bring researchers and users closer together, the call for proposals should require the university hosting the programme to work with both the local authority of the area and local businesses. The emphasis, the study suggests, should be on establishing an interdisciplinary research centre. Another recommendation is that, in parallel with this, Mistra should fund similar partnerships in other countries, thus creating a Swedish-led research network linking cities around the world.

‘At present, there is no world-leading player studying urban development at a systems level, and Mistra could build up a research centre in Sweden to do just that,’ Henrik Nolmark believes.

Mistra plans to invite proposals for a programme on this important theme during 2008.

NEW PROGRAMMES FROM OLD

A Mistra programme can also grow out of the results of earlier research. This is the case with Mistra-SWECLIM, which is making use of advanced studies of climate scenarios, impacts of climate change and costs, and of how different stakeholders adapt to a changing climate. The programme is partly based on results from the earlier Mistra initiative SWECLIM (Swedish Regional Climate Modelling Programme), which ran from 1996 to 2003. The SWECLIM team created regional climate models, using them to study regional climate scenarios and generate data to calculate changes in natural resources, impacts on biodiversity, and risks of landslides and flooding in the wake of global warming.

‘When we started out, there was no regional climate modelling going on in Sweden, and internationally, too, research groups were thin on the ground. Our results were widely used, both in Sweden and internationally. We contributed, for example, to the work of the Intergovernmental Panel on Climate Change,’ says Markku Rummukainen, for-
mer programme manager of SWECLIM, who now heads Mistra-SWECIA.

Professor Rummukainen also led the feasibility study behind Mistra-SWECIA, initiated by Mistra with the aim of creating a broader research programme involving not only climate modellers and ecologists, but also economists and other social scientists. On the basis of the regional and new global climate models refined and developed within the programme, it will be possible to estimate the impacts of climate change and the costs of adaptation.

Scientifically, it is extremely interesting to link climate models to impact and economic models, and in fact one or two similar initiatives are now under way around the world,’ he notes. ‘However, a programme like Mistra-SWECIA would hardly have come about without Mistra. It’s a major undertaking, requiring strategic funding.’

DYNAMIC RESEARCH ENVIRONMENTS
Mistra-SWECIA was launched at the beginning of 2008, with a first phase extending to 2011. Researchers will be further developing global and regional climate models, as a basis for more precise scenarios for the future. They also plan to study links and feedbacks between the economy, impacts and climate, i.e. how the impacts of a changing climate can influence economic development, and how the latter in turn can have beneficial effects on climate. One aim is to raise the level of climate research in Sweden and help push back the international frontiers of knowledge in this area. But that is not the only focus.

‘Our work has to be of the highest scientific quality,’ says Professor Rummukainen, ‘but we also want to have a dialogue with users, politicians and other decision makers, to make sure that action to adapt to climate change is based on a solid foundation of facts. Knowledge is important, but it also has to be put to use and produce benefits.’

The feasibility studies commissioned by Mistra in the past year will result in wide-ranging, high-budget research programmes, of a kind that has become increasingly common of late. This is because the Foundation wants to build up lasting research environments that become established and are able to live on even when funding comes to an end. Programmes on this scale also attract a broad spectrum of researchers willing to devote a large part of their time to them.

‘I think this is a trend that is set to continue. Large-scale programmes are a factor for success, and there are few Swedish funding bodies ready to take on the challenge of creating really strong, dynamic research environments,’ says Olof Olsson at Mistra.

‘When global climate change is reduced to a concrete, day-to-day level, cities become very important. They are where much of the process of change has to take place,’ says spatial planner and consultant Henrik Nolmark.
Mistra sets high standards for its programmes, in terms of both the conduct of the research and the end results. To make sure the work funded generates results that are of practical benefit, interdisciplinarity and an emphasis on users are key elements of the Mistra approach.

What distinguishes Mistra from many other funders of research is its unique mission, driven by a model that is constantly evolving. Every programme it supports is expected to be interdisciplinarian in design, involve research of a high scientific quality by international standards, and produce results that find practical applications. It must help to solve a major environmental problem, and the results...
must be of significance for Sweden’s competitiveness. In its strategy, Mistra identifies a number of priority areas: A Reduced Human Influence on Climate, A Non-Toxic Environment, Zero Eutrophication, Sustainable Use of Renewable Natural Resources, and Sustainable Urban Development.

Reflecting the complexity of today’s environmental problems, and the fact that they do not fit neatly within the boundaries of university disciplines, Mistra programmes are interdisciplinary in approach. Consequently, within a given programme, biologists and chemists may for example work alongside economists and political and behavioural scientists.

Another of Mistra’s criteria is that research must be of the highest scientific quality internationally. Every proposal therefore has to undergo international peer review before a decision is taken to fund it. And after a programme is completed, too, a similar, detailed evaluation is carried out (see pages 18–21).

‘Mistra aims to promote the development of strong research environments, which we want to live on after our funding comes to an end, so high scientific quality is a fundamental requirement,’ says Britt Marie Bertilsson, a programmes director at the Foundation.

**INTERDISCIPLINARITY ESSENTIAL**

Mistra’s biggest research initiative is also the one that is most clearly cross-disciplinary in character. The Stockholm Resilience Centre was launched in January 2007 and its first phase will run to 2013. Mistra is investing SEK 105 million in the centre, which brings together researchers in the natural sciences, social sciences and humanities. The research carried out there is intended to advance our understanding of complex social-ecological systems and to develop new tools for their management and governance.

‘Recent research shows that the human race has entered a new ecological era. For the first time, man is the driving force behind planetary change – as global effects such as climate change and ecosystem impoverishment make clear,’ says Johan Rockström, the centre’s executive director.

One of the key concepts in the research being undertaken is resilience, i.e. the capacity of a system, for example an ecosystem or a society, both to withstand pressures and to continue to develop afterwards. Many ecosystems are highly resilient, but when man-made stresses push them beyond a certain threshold, rapid change can follow.

‘The Baltic Sea is a good example. For decades, its ecosystem has had to buffer the effects of eutrophication, overfishing and other pressures, seemingly by making small and predictable adjustments. Now the negative trend is proving extremely difficult to reverse, despite reductions in nutrient inputs. This could be because the Baltic has crossed a threshold, or “flipped”, and become locked in an oxygen-deficient, eutrophic state with depleted stocks of cod,’ Dr Rockström explains.

NEW DISCIPLINES

A major aim of the Stockholm Resilience Centre’s work is to find new governance and management practices that will protect natural systems and cope with periods of rapid change. At present, the institutions that manage these systems are designed to handle gradual and predictable change. But, as the example of the Baltic shows, an ecosystem can shift rapidly and unpredictably – often leaving managers at a loss as to how to respond.

Research at the centre is organized on a thematic basis, with each theme encompassing a range of disciplines, such as ecology, biology, political science and economics.

‘To address the big environmental challenges, we need not just interdisciplinary, but transdisciplinary research – that’s to say, we need to create new research disciplines,’ Johan Rockström continues. ‘We’re talking here about areas such as resilience, vulnerability and adaptation, conceptual frameworks that entail a new way of thinking.’

But getting researchers from different disciplines to work together is not easy, he says. Language and basic values can differ widely, which is why the centre is seeking to build a common culture. Each research group is led by two people, for instance, one with a natural science and the other with a social science background.

The Stockholm Resilience Centre has existed for only a year, but is already well established both in Sweden and around the world. In April 2008 it will be hosting the first international science and policy conference on resilience. It will also be compiling a report on ecosystems, resilience and sustainable development for the Swedish Government’s Commission on Sustainable Development, chaired by Prime Minister Fredrik Reinfeldt.

‘We represent the biggest concentration of cross-disciplinary environmental research in Sweden,’ Dr Rockström comments, ‘and internationally the centre is a unique initiative.’

**“To address the big environmental challenges, we need not just interdisciplinary, but transdisciplinary research – that’s to say, we need to create new research disciplines.”**

**JOHAN ROCKSTRÖM**
Dialogue Crucial

The Baltic Nest system was used in the process of drafting the Helsinki Commission document. With its help, researchers studied the quantities of phosphorus and nitrogen released into the Baltic by different countries, calculated the cuts needed to achieve an acceptable marine environment, and were thus able to allocate new reduction quotas to the individual states. What remains now is to implement the reductions, and there, too, Baltic Nest has an important part to play.

‘We’ll be using the system to monitor how countries honour their commitments, and if they fail to do so we’ll be raising the alarm. It now looks likely that the Helsinki Commission’s environmental targets will be written into the EU Water Framework Directive, and then countries that don’t meet them could be taken to court. Presumably the quota system we’ve developed will also be binding,’ says Fredrik Wulff.

The success of Baltic Nest is largely due to its utility. From the start, Professor Wulff and his fellow researchers were in frequent contact with decision makers from all the Baltic Sea states, who were able to test the system and suggest improvements. Baltic Nest is also openly available on the Internet, which Professor Wulff believes has helped to allay suspicion.

‘It was important to secure support for the system at several different levels,’ he explains. ‘We held numerous meetings to build confidence between scientists and decision makers in the countries around the Baltic. The fact that decision makers feel they have a stake in our models makes an enormous difference. Scientists often act as advisers to politicians, and I don’t think we’d have had the same political acceptance if Baltic Nest had been an exclusively Swedish project.’

In September 2007 the Baltic Nest Institute doubled in size with the opening of a Danish section in Aarhus. Now the institute is working on refining the models, in collaboration with scientists who have investigated the coastal zones of the Baltic. The long-term aim is to be able to study the environmental status of specific areas of the sea.

‘We also want to look more closely at the effects of climate change on the Baltic, and are trying to work that angle in by linking up with various climate groups around its shores,’ says Fredrik Wulff.

Results for Markets

Cooperation with companies is another way of enhancing a Mistra programme’s value to users. The Greenchem programme, launched in 2003, is seeking to improve the environmental performance of the chemical industry, in terms of raw materials, production technology and products. In particular, researchers are using enzyme technology to develop ‘green’ chemicals.

‘Our goal is a paradigm shift in the industry, from petrochemical to renewable raw materials,’ programme chairman Harald Skogman explains.

Usable Results

One of the cornerstones of the Mistra model is utility. Every programme is expected to generate results that will benefit end-users, be they politicians, companies or public agencies. To ensure that this requirement is met, every proposal undergoes an evaluation of its value to users before a funding decision is taken. What is more, a Mistra programme board is made up chiefly of representatives of the user community – whether the programme is aimed at policymakers or car manufacturers.

‘In the best programmes, this makes for a very fruitful dialogue between users and researchers that gives added impetus to the work,’ says Brit Marie Bertilsson.

A Mistra programme whose results have been of decisive significance in the context of international negotiations is MARE (Marine Research on Eutrophication), which was completed in 2006. The main outcomes were a decision support system known as Baltic Nest and the Baltic Nest Institute. The system developed provides scientific support for negotiations on the Baltic Sea environment and is being used, for example, by the intergovernmental Helsinki Commission in its efforts to improve the state of this sea.

On 15 November 2007 the environment ministers of nine Baltic Sea states, including Sweden, Germany, Poland and Russia, signed a document pledging a range of action to save the Baltic. One of the problems referred to is the large quantities of phosphorus and nitrogen that are entering the sea, giving rise to eutrophication.

‘Up to now, all the countries have undertaken to achieve the same reductions in nutrient inputs, but this has not been a cost-effective approach. Sweden is way ahead of Poland, for example, in terms of protecting the environment, and further cuts in Swedish emissions would be very expensive. It therefore makes more sense to focus on bringing Polish inputs down to a reasonable level,’ says Fredrik Wulff, scientific director of the Baltic Nest Institute and former scientific coordinator of MARE.

“ The whole point of Greenchem is to bring about a change of attitude in the industry. If we hadn’t involved companies from the very outset, the programme would be worthless.”

Harald Skogman
‘We may not be able to achieve that in the eight years available to us, but we can at least set a new course.’

The programme links researchers from Lund University’s Faculty of Engineering with eight companies that produce or use chemicals, including Akzo Nobel Industrial Coatings, Perstorp, Astra Zeneca and IKEA. Industry representatives chair the ‘application management groups’ that decide what products Greenchem should be trying to develop.

The programme is looking at chemicals in a number of priority areas. The most interesting one, in Mr Skogman’s view, is surface coatings.

‘IKEA are very interested in a paint that is biodegradable and made from renewable raw materials. A paint meeting those criteria could be a useful tool in marketing their furniture.’

Greenchem has already influenced several companies. Perstorp, for example, have appointed a biotechnologist and embarked on a process to introduce biotechnology in their development and future production. The programme has also generated several products which Harald Skogman believes will make it onto the market. The challenge is to ‘sell’ the production technology to companies.

‘The whole point of our research is to bring about a change of attitude in the industry,’ he continues. ‘If we hadn’t involved companies from the very outset, the programme would be worthless.’

Another important aspect of Greenchem is commercialization. The businesses that help to develop new products and technologies have first refusal on exploiting them. The aim is to offer good examples, products that are greener than existing ones, but work just as well or even better. That way, more companies will become interested, Mr Skogman believes.

‘Mistra’s goal is only met when a less environment-friendly technology is replaced with an environmentally superior one, and for that to happen, what we develop has to be something industry is able to use.’

‘The decision support system Baltic Nest has been of crucial significance in international negotiations on the Baltic Sea environment,’ says Fredrik Wulff, scientific director of the Baltic Nest Institute.
The manager of a Mistra programme has to build bridges between research and practice, and between academic disciplines. It is an important but complex role. That is why the Foundation has developed a special leadership course for the people who head its programmes.
A research programme funded by Mistra is expected both to achieve a high level of scientific quality and to deliver results that are of practical use to different stakeholders in society. That in turn demands a great deal of its management, its programme manager and board, who have to constantly keep these two dimensions in mind.

‘Our programme managers are extremely important in keeping everything together. They need to be able to lead and inspire their fellow researchers, maintain a focus on programme goals over several years, and work with future users,’ says Britt Marie Bertilsson, a programme director at Mistra.

To support this key role, the Foundation has organized a special leadership development programme, which involves managers meeting five times in the course of a year to discuss, under professional guidance, the challenges and issues that can arise in the management of a Mistra programme.

‘We want to clarify what the role entails, because it differs from that of a traditional manager. It involves managing researchers who belong to other organizations, with other superiors. Many of them are participating part-time, so you need to be able to motivate them to work for the common goal of the programme,’ says Anna-Karin Engvall, Mistra’s Communications Manager.

As well as its leadership course, Mistra arranges meetings every year for all its programme managers and programme boards, giving them the chance to share their experiences. These initiatives are much appreciated. Although the programmes are all different, there are still similarities when it comes to leading them.

LEADERSHIP TRAINING A MUST

Björn Dahlbäck is the programme manager of Marine Paint, which is seeking to develop alternative, environmentally sound anti-fouling paints for ship and boat hulls. He has attended the leadership course, and sees it as an indispensable part of Mistra’s work.

‘Leadership training is a must in the context of a Mistra programme,’ he says. ‘One way of making the most of the Foundation’s investments is to be constantly on the lookout for better ways of leading and managing. Better management means better research, and better research means a greater chance of improving the environment.’

Marine Paint is now entering its second phase. Its scientists have been able to deliver an environmentally acceptable substance that prevents barnacles settling on hulls, and which can thus help to reduce the use of harmful paints and cut fuel consumption. At this juncture, a company is taking over to produce a paint incorporating the new substance, which will then have to be approved by the Swedish Chemicals Agency. Meanwhile, programme researchers are continuing the search for a recipe to control other fouling organisms, such as algae, mussels and sea squirts. The long-term goal is to replace existing hull paints, which cause widespread damage to the marine environment.

For Dr Dahlbäck, the challenges of leading the programme will continue into the next phase. He has to bridge the gaps between five departments at two universities.

‘As a programme manager, you’re exposed to winds from every direction. You constantly have to ask yourself: “How do I get people from different disciplines to understand each other’s point of view?”

In an interdisciplinary research undertaking, leadership is especially important. The programme manager has to ‘create arenas for genuine interpersonal encounters’.

There, the leadership course has been a great help to me, by stressing the importance of knowing myself. If I do, I can more easily interact with other people, and then I can get the right things to happen on the programme, the things that will get us most quickly to our destination.’

SUPPORT FROM OTHER MANAGERS

For Björn Dahlbäck, one of the big challenges has been to narrow the gap between research and industry. As a PhD graduate and former industrial manager, he has experience of both worlds, and can often act as an interpreter between theoreticians and practitioners. But he has still come up against awkward problems which Mistra’s leadership training has helped to solve:

‘I got a lot of support from other programme managers. I thought my own difficulties were unique, but realized that the same kind of conflict – the sort that arises when researchers are brought face to face with industry – also existed in other programmes. That gave me the peace of mind to get on and tackle the problems.

Mistra’s manual Sustained Leadership, produced as a guide to programme managers, underlines the importance of keeping in sight the shared goal of solving specific environmental problems for the benefit of society. Dr Dahlbäck has worked hard to impress the same vision on all the researchers involved in his programme:

‘We presented a picture of a ship treated with anti-fouling paint that doesn’t harm the marine...’
environment. That vision is shared by everyone on the programme, and as manager it’s my job to create conditions for achieving it.’

Heije Westberg, meanwhile, manages E4 Mistra, which aims to develop energy-efficient exhaust treatment systems for combustion engines. The goal is to clean up car and truck exhausts without adding to fuel consumption. At present, basically all forms of exhaust gas treatment increase fuel use and hence carbon dioxide emissions.

The programme involves four research teams at Uppsala University, Chalmers University of Technology in Göteborg and Stockholm’s Royal Institute of Technology, along with Volvo and two other industrial companies.

On a day-to-day basis, Heije Westberg is a group manager in the Energy Conversion and Physics Department of Volvo Technology AB, and she has yet to take Mistra’s leadership development course. She finds her background in a manufacturing industry invaluable when it comes to securing practical results in the programme she is now involved in, but feels that the Mistra course would also be useful.

**MONEY AN IMPORTANT LEVER**

‘I’m good at delivering results, but when I manage something there isn’t so much room for fancy reports, and maybe they’re not ideal anyway – E4 Mistra is after all a research programme,’ she says. ‘But I would like to have Mistra’s angle on leadership, as it would probably make me a more visionary manager. As it is, I have more of a practical approach.’

Dr Westberg sees funding as an important lever when it comes to getting everyone to do what they are supposed to be doing. Mistra in fact advises its programme managers to keep back some of the money awarded, as a strategic reserve within the programme. ‘The programme managers who have had most difficulty in attaining their objectives are those who, right from the start, have divided and allocated most of the money to the participating departments and research environments – leaving inadequate resources for joint inputs,’ it notes in *Sustained Leadership*.

‘With some of the budget set aside, there’s an incentive for researchers who perform well and produce good results. They can apply for more money,’ says Dr Westberg. ‘Consequently, I have no problem with not being the formal boss who sets their salaries. They know that if they work hard, they’ll be rewarded.’

**STAYING FOCUSED ON ULTIMATE GOAL**

E4 Mistra will also be entering a new phase in 2008. Up to now, each research group has worked on its own, producing and testing results. The Royal Institute of Technology team are trying to find the best method of converting diesel fuel into hydrogen, one use of which would be to reduce harmful components in exhausts. The researchers at Chalmers are refining catalysts to make them even more efficient, as well as working on a method to recover energy from exhaust gases and reuse it in the exhaust treatment system. The Uppsala group are looking for a way of using a plasma to burn off harmful particulates in exhaust gases.

The aim of the next phase is to begin testing the different parts of the programme in a more realistic environment at Volvo. Ultimately, Heije Westberg hopes to be able to incorporate some of the component solutions in a real vehicle. She has to keep the researchers constantly focused on this final goal, and has therefore organized the programme to include an integration and validation element that cuts across the other projects.

‘When the different subcomponents they’ve de-
veloped are in place, I’ll have done my job, and I’m helped in that respect by the fact that the integration project has the same objective,’ she says. ‘The integration team need hardware from each of the other projects, to be able to carry out tests, so they’re as keen to see it delivered as I am.’

This cross-cutting approach is something Björn Dahlbäck of the Marine Paint programme also stresses is important:

‘As a researcher, you can’t shut yourself away in your own little laboratory. I often say that you can’t just put up separate rainwater pipes – you need to have gutters, too, to join them all together.’

COMMUNICATION ESSENTIAL

For both Björn Dahlbäck and Heije Westberg, communication is a crucial part of the programme. Mistra insists on all its programmes having a communication strategy and a communication plan. It is important to create arenas where researchers from different disciplines can meet, and also to involve the more practically oriented end-users.

Ej Mistra holds telephone conferences for its entire management group once a fortnight, giving the different projects an opportunity to report on what they have done, what they are going to do, any problems encountered and how they intend to tackle them. Every ten weeks the group spend a whole day together reviewing progress, and every six months there is a meeting for everyone involved in the programme, at which the different subprojects present their results to the programme board.

‘Ours is a programme in which many of the people involved are dependent on each other, so if one component lags behind, the whole programme is affected. That’s why it’s important to maintain headway in all of them, and we do that by keeping in frequent contact,’ Dr Westberg explains. Björn Dahlbäck also emphasizes the importance of communicating the results of your programme to the outside world. In the case of Marine Paint, that can involve contact with companies and authorities, writing articles for scientific journals, and talking to pressure groups, such as recreational boat owners.

‘How else are you going to have an impact and improve the environment?’ he asks. ‘If you don’t tell people what you’ve been doing, no one can use your results.’

PERSONAL MENTORS A WAY FORWARD

Mistra attaches a great deal of weight to the personal qualities of the people it chooses as programme managers. Experience of managing major projects and an ability to engage in a dialogue with researchers and users are important. Above all, though, Mistra looks at the personal commitment of potential candidates.

‘A programme manager has to want something. Often the individuals we select will have been involved in initiating the programme proposal, and this will count in their favour, as it demonstrates a passion for the work to be done,’ says Britt Marie Bertilsson.

But Mistra is aware that the manager’s role is a demanding one, even for someone with the right qualities. So, looking ahead, additional forms of support could be developed.

‘Some of our programme managers have a personal coach, outside the programme,’ Ms Bertilsson points out. ‘We’ve thought about the possibility of older and more experienced managers mentoring new ones, and hope that such a system might arise spontaneously in the future, if we see to it that they meet more often than they do now. Otherwise there is always the option of using outside people as mentors and sounding boards.’

QUICK FACTS

Mistra’s guide Sustained Leadership contains advice on how programme managers can organize their programmes to achieve both value to users and high scientific quality. It is based on interviews with a number of leaders from different Mistra programmes, and puts a particular emphasis on internal and external communication, an ability to inspire programme participants, and seeing a programme through to a successful conclusion.

In an interdisciplinary research undertaking, leadership is especially important. The programme manager has to ‘create arenas for genuine interpersonal encounters’.

“As a programme manager, you’re exposed to winds from every direction. You constantly have to ask yourself: ‘How do I get people from different disciplines to understand each other’s point of view?’”
According to its Statutes, the research which Mistra invests in is to be of the highest scientific quality and to produce results that are of practical use in solving environmental problems. Evaluations from these two angles are therefore carried out on an ongoing basis, to ensure that both goals are met.
Quality, programme organization and environmental completion of programmes. The focus was on scientific achievement. They then get together for an intense few days in Stockholm to discuss their findings and reach a consensus view, during which time they also have an opportunity to meet and put questions to the programme’s management.

They are given at least a month to read up on what has been achieved. They then get together for an intense few days in Stockholm to discuss their findings and reach a consensus view, during which time they also have an opportunity to meet and put questions to the programme’s management.

We believe it’s useful for panel members to have a chance to meet and discuss the questions we want the evaluation to answer,’ says Marie Uhrwing. ‘Panels need to have not only the relevant scientific expertise, but also experience of integrating different academic disciplines and crossing the boundaries between research and practice.’

Some of the experts will have been involved from the outset, in the pre-funding assessment. Others will have taken part in the review carried out between the first and second phases of a programme, while yet others may only participate in the final evaluation. That ensures a panel offering both continuity and fresh perspectives.

Last year, Lennart Arvedson undertook a review of the scientific evaluations of seven of Mistra’s programmes:

‘In general, they showed most of the programmes to be of a high scientific quality, with some emerging as really top-notch.’

ORGANIZATION A CRUCIAL FACTOR

Another aim of the evaluations carried out was to look at how research can best be organized to achieve programme goals. Lennart Arvedson has performed several studies focusing on how well the organizational structure has worked during the life of a programme.

‘In purely organizational terms, programme evaluations clearly show that one key factor in attaining the objectives of a programme is ensuring that there is close interaction between scientists and users,’ he says.

Enrico Deiaco, managing director of the Swedish Institute for Studies in Education and Research (SIS-TER), has performed an ‘impact analysis’ of three of Mistra’s programmes, focusing on the environmental benefits arising from them. He stresses the importance of organizing research in such a way as to produce usable results.

‘Crucially, there needs to be a shared view of the problem to be addressed – in other words, agreement on what it is you are trying to solve and how you plan to go about it. But then the work has to be organized so as to maintain that common view. Programme participants should meet frequently to compare notes, and the different component projects should preferably be integrated with one another. And that’s

AMBITIOUS EVALUATIONS

According to Lennart Arvedson, a consultant who has produced several reports on and evaluations of Mistra’s activities, the assessments commissioned by the Foundation have been ambitious and broad-based, taking in the scientific quality of the research, its relevance, and the benefits flowing from the results:

‘Through them, Mistra keeps regular tabs on the scientific quality of the work it supports, set in context and viewed in the light of its specific criteria.’

The evaluations performed can therefore have several aims. One may be to create legitimacy in the research community, another to check that people are doing what they are supposed to and that funds have been used for the intended purpose. Yet another might be to make sure that programmes are optimally organized.

‘You may also want to verify whether goals and objectives have been achieved, to establish a basis for corrective action during the life of a programme, or to learn from what has been done so as to become better at creating conditions for research. All these angles are important for the work Mistra supports,’ Mr Arvedson continues.

In 2007 Mistra evaluated a large number of completed programmes. The focus was on scientific quality, programme organization and environmental benefits.

The scientific panels appointed to review programmes when they come to an end have access to the programmes’ final reports and other publications. They are given at least a month to read up on what has been achieved. They then get together for an intense few days in Stockholm to discuss their findings and reach a consensus view, during which time they also have an opportunity to meet and put questions to the programme’s management.

‘We believe it’s useful for panel members to have a chance to meet and discuss the questions we want

“ Evaluation of a programme can confirm that our requirements are met, which is something we need to know.”

MARIE UHRWING
something you need to think about in the initial planning phase.'

**BENEFITS IN A BROAD SENSE**
Compared with an evaluation of scientific quality, for which the peer review system is fully accepted, assessing the benefits, or utility, of a programme is more difficult. But Enrico Deiaco believes that it is perfectly possible to combine high scientific standards with achieving results that will find practical applications. However, the concept of benefits needs to be better defined, to make it more useful and amenable to evaluation.

‘Benefits of research can mean a lot of different things,’ he explains. ‘They may be a matter of the results of a programme being of direct use to other researchers, or to industry, politicians or other decision makers. In a broader sense, they can be about raising the level of understanding in different areas, and Mistra programmes certainly do that.’

But, Dr Deiaco emphasizes, benefits cannot always be measured in money terms. It can take time for results actually to be put to use – especially outside academia:

‘To be able to implement research results, users may have to acquire additional knowledge, or perhaps think through which individual or unit in their organization is to handle them. This generally takes time, and it occurs in stages, making it difficult to evaluate the benefits of a programme.’

From Mistra’s standpoint, ‘benefits’ is synonymous with benefits for the environment. These may be in the form of new, greener products or processes. But they may also consist in a scientific base for new regulations, or new knowledge that can be used to address a particular issue. Or, as in the case of the Stockholm Resilience Centre, the development of a new research capability that will in time produce results with direct benefits.

A basic premise in Enrico Deiaco’s report is that scientific knowledge is socially embedded in knowledge systems or networks. These consist of both researchers and users.

‘When existing knowledge is given a new use, i.e. when it yields practical benefits,’ he says, ‘it can take on a new value in a process of transformation.’

**TRANSLATOR IMPORTANT**
Mistra aims to serve as a bridge between research and the rest of society, and since it was created it has recognized the need for people to link research and practice. To some extent, that link is provided by the boards of its research programmes, which are made up largely of intended users of the results. But it is not enough to involve users early on or to include them in the programme board. That alone is no guarantee that the results will actually be used. According to Dr Deiaco, a programme also needs a ‘translator’.

To achieve the best results, he says, the link, or translator, should be someone within the programme
itself, a person who can bridge the gap between users and researchers and help create a common view which both can share. A translator is not the same thing as a knowledge broker; the person in question should be directly involved in producing knowledge, but be able, through his or her position in the programme, to serve as an important go-between in gaining acceptance for that knowledge and ensuring that it is put to use more quickly.

‘In Mistra programmes, this translator is often an industry-sponsored PhD student. Such an individual operates within both industry and academia, and is often able to create a shared view,’ Enrico Deiaco explains. ‘Obviously, it doesn’t have to be a PhD student, but the role of translator is I believe important to the success of a programme.’

And, from the outset, one of the reasons for having postgraduate students involved in programmes has in fact been to provide such a link.

‘A recent example is the doctoral studentship we intend to fund under ENTWINED,’ says Marie Uhrwing. ‘This programme is concerned with negotiations in the area of trade, and we’ve established a postgraduate studentship with a one-year placement at the Ministry for Foreign Affairs. This will give the programme a personal contact who is able to communicate between participating researchers and practitioners at the Ministry.’

LESSONS FOR NEW PROGRAMMES

The findings and recommendations that emerge from the various evaluations are taken on board by Mistra and make a difference – above all prior to the launch of new programmes.

‘Often the evaluators highlight things that are missing or need to be improved before Mistra invests in a programme,’ says Lennart Arvedson.

One difficulty which several assessments, and even programme participants themselves, have drawn attention to is that of keeping the knowledge process going after a programme has come to an end. The SISTER report, too, points to this problem.

‘One way of making sure the results actually find applications is to involve more stakeholders in funding their subsequent use. A case in point is the decision support system Baltic Nest, a product of the MARE (Marine Research on Eutrophication) programme. There, the knowledge process is now continuing. But we’ve also seen examples of other funding arrangements,’ Ms Uhrwing points out.

‘Another lesson we’ve learnt from our evaluations is that establishing constructive collaboration across academic disciplines can take time, and ways of supporting that process have now been suggested.’

Mistra intends to continue to refine and improve its approach to evaluation.

‘We want to find a way of working that helps everyone involved to develop, and which provides clear evidence that the research being undertaken is meeting the goals set for it,’ says Marie Uhrwing.

“A ‘translator’ is not the same thing as a knowledge broker; he or she should be directly involved in producing knowledge.”

ENRICO DEIAICO
BOLD IDEAS FOR THE FUTURE

Mistra’s Idea Support Grants are unique in their focus on new thinking and the considerable freedom they give researchers to explore original ideas. Under the scheme, thinking along new lines is more important than achieving predefined objectives.
Every year from 2001 to 2007, Mistra has invited applications for Idea Support Grants. The aim has been to back projects involving significant elements of boldness, originality and creativity. The research funded is expected to have a focus on discovery and innovative thinking, and can also expressly challenge or question established approaches.

Elizabeth Ness, who has a PhD in chemistry and chairs the international scientific panel that has assessed applications under the scheme in recent years, describes its design as unique:

‘Grants of this kind are unusual, and the ideas that Mistra supports would have difficulty gaining approval from any other funding body.’

HIGH RISK – HIGH POTENTIAL

Normally in the worlds of business and research, the expectation is that roughly 80 per cent of projects and investments will produce results and, in that sense, be successful. With Mistra’s Idea Support scheme, says Dr Ness, the converse is true:

‘Perhaps 20 per cent of projects are expected to cross the finishing line, but that is still money well invested, as there’s a need for research of this kind and the potential returns are high.’

Fellow panel member Chris Ryan, a professor at the University of Melbourne, agrees:

‘To respond to the challenges of sustainable development and the dramatic changes we’re facing, we need research that is bold and exploratory. We won’t find tomorrow’s solutions by trundling along in the same old ruts – that’s why it’s so important to support research that breaks new ground.’

The majority of the more than 500 applications submitted over the years have in fact been turned down precisely because their ideas were not innovative enough.

One project that did secure a grant, and which the two panel members recall particularly clearly, involved hydrogen-filled ‘table tennis balls’. The study, entitled *Macrospheres – A High-Pressure Hydrogen Storage System*, grew out of the vision of replacing all fossil fuels with hydrogen. One obstacle to achieving a hydrogen society is the difficulties involved in transporting and storing the gas. The researchers are therefore experimenting with pumping hydrogen at quite high pressure into spheres the size of ping-pong balls, which are leakproof and easy to transport. The idea was originally a by-product of a completely different project.

‘And that’s another aspect of the Idea Support scheme – it allows scientists to take a second look at what might be offshoots of other research,’ Elizabeth Ness points out.

IDEAS THAT GROW

Idea Support Grants can themselves have positive spin-off effects and give rise to new areas of research. A case in point is *Drugs in the Environment – Developing Biological Fingerprinting*, which was awarded funding of SEK 7.4 million in 2004. The project focused on two main areas: building up a research capability in ecotoxicogenomics and developing methods to assess the environmental risks of pharmaceuticals. Ecotoxicogenomics is a field that uses large-scale molecular analyses to answer ecotoxicological questions, such as whether a substance found, say, in a river poses a risk to the animals and plants living there.

‘Instead of measuring one possible effect at a time, we can now study how several thousand different genes are affected in a fish, for example, in a single analysis. This approach could be used in the future to assess exposure to and the effects of many different toxic pollutants in different organisms,’ says project leader Joakim Larsson, a researcher at the University of Gothenburg’s Institute of Neuroscience and Physiology.

The project was co-funded with Formas (the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning), providing additional finance of over SEK 3 million.

‘In practical terms, the Idea Support Grant meant that we were able to take on staff and make a

‘Idea Support Grants are quite unique compared with other research funding, and an important form of support for new and challenging ideas,’ says Elizabeth Ness, who chairs the scheme’s assessment panel.
Compared with other types of grants, the Idea Support scheme has involved a somewhat larger element of risk, and greater freedom for the researcher.”

CHRI$ RYAN

In 2007, five projects were awarded Idea Support Grants worth a total of SEK 24 million:

Carbon-based diodes
Carbon-Based Power Electronics – For Efficient Electric Power Conversion has the aim of developing carbon-based diodes that can convert energy from wind turbines, for example, to supply electricity to the grid. Compared with existing semiconductor technology, diodes of this kind are considered to have lower energy losses, making them more energy-efficient.

Decomposable electronics
The object of Decomposable Electronics for Sustainable Development is to design electronic components that can more easily be dismantled, facilitating recovery of some of the materials involved. This is to be done by attaching the subcomponents to an entirely new material, a recyclable wood fibre-based cardboard with no adverse biological effects. This cardboard should be able to be recycled just like ordinary paper, contributing to greater sustainability.

Recovery and purification of cellulose
An Energy-Efficient Process for Extraction of Hemimcullulose from Pulp-Mill Waste Streams aims to develop a low-energy process to extract, separate and purify recyclable cellulose from pulp-mill effluents. The hemimcullulose that is obtained can then be used as a substitute for non-recyclable barrier materials in food packaging. The hope is that it will be of use in developing next-generation plastics.

More efficient water treatment
Many toxic substances only occur at low concentrations in the environment, but nevertheless cause serious harm, both to organisms in different ecosystems and to humans. Their low concentrations make them difficult to detect. The aim of Environmental Separation – A New Generation in Water Treatment is to develop a water treatment technology that intercepts such substances using separation methods currently employed in the biopharmaceuticals industry.

Cyanobacteria and neurodegenerative disease
BMAA and Cyanobacteria – An Environmental Threat to Human Health? will investigate a possible link between cyanobacteria and neurodegenerative conditions such as ALS (amyotrophic lateral sclerosis), Parkinson’s disease and Alzheimer’s disease. Cyanobacteria occur worldwide, and the project’s hypothesis is that a link does exist. If that can be shown to be the case, it will hopefully also be possible to find remedies for a number of as-yet-incurable diseases.

NEW FORMS FOR NEW IDEAS
With the 2007 round of Idea Support Grants awarded, Mistra has provided total funding of SEK 163 million for 30 projects in all and is now bringing the scheme to a close. Discussions are under way on how the Foundation should support similar projects in the years to come. Elizabeth Ness sees this as a good opportunity to stop and take stock.

‘It’s a good concept, but we’d like to know how well it has worked, in terms of both research results and what the grants have meant for individual researchers.’

And the Idea Support projects themselves are also to be evaluated.

‘One difficulty, of course, is measuring what constitutes a successful project, what aspects of projects have been a success, and what impacts they have had on society,’ says Johan Edman, project manager for the scheme.

‘We need to look at how we can focus resources on larger units, so they don’t end up spread too thinly,’ he adds.

Chris Ryan believes that there is still a great need for some form of funding that will allow researchers to try out new approaches:

“We’re on the verge of an industrial revolution which, unlike earlier ones, compels us to change existing production systems and consumption patterns and move towards sustainability. We’ve never before faced such a change, so we really do need research that challenges current thinking and puts new ideas to the test.”

start, enabling us to realize the ideas we had,’ Dr Larsson recalls.

Since then, there have been several spin-offs from the project. These include two different studies funded by the Swedish International Development Cooperation Agency and the Swedish Water and Wastewater Association. What is more, eco-toxicogenomics has been designated a strategic area of research at Gothenburg University. And since 1 January this year, Joakim Larsson has been involved in the new research programme MistraPharma, the first phase of which will run to 2011.

Grants awarded under the scheme, in other words, can have a range of beneficial side effects, including the emergence of new fields of research.

QUICK FACTS: IDEA SUPPORT GRANTS 2007

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Cyanobacteria and neurodegenerative disease
BMAA and Cyanobacteria – An Environmental Threat to Human Health? will investigate a possible link between cyanobac-
INSTITUTIONAL OWNERS CAN MAKE A DIFFERENCE

Mistra seeks to promote sustainable development through both research and asset management. In 2007 the Foundation achieved its goal of managing its entire capital on the basis of sustainability criteria, and it now hopes to be a source of inspiration to other institutional owners.
Mistra first began to discuss ethically responsible asset management back in 1995. Its investment policy stipulates that the capital of the Foundation is to be managed in a way that reflects its mission of helping to solve environmental problems and promoting sustainable development. At the same time, a reasonable balance is to be struck with the requirements of limited risk and a good rate of return laid down in Mistra’s Statutes.

‘As a foundation set up with money from the former Employee Investment Funds to support strategic environmental research, we feel we have a duty, both to make sure that money generates benefits through the research we fund and to manage it according to principles of sustainability and ethical responsibility. It would be a bit hypocritical of us not to care how our capital was being invested,’ says Eva Thörnelöf, Administrative Director at Mistra.

‘It’s a matter of both credibility and morality: promoting sustainable development through all our activities, and taking responsibility for what we own.’

The operational side of managing Mistra’s capital is taken care of by a Committee for Asset Management, which establishes an investment framework representing a carefully balanced level of risk, based on the Foundation’s policy.

‘We try to put together a portfolio reflecting the risks Mistra is able to take. We then hand our policy to our investment managers, who have the job of managing our assets in line with the directives we lay down,’ says Committee chairman Märtha Josefsson.

BREAKING NEW GROUND
In Sweden, there are two institutional owners that are often mentioned for managing all their assets on the basis of sustainability criteria: the Church of Sweden and Mistra. The question is, to what extent do Mistra’s investments actually help bring about sustainable development? And does it make any real difference when a relatively small institutional owner with a capital of some SEK 3.5 billion sets specific criteria of this kind?

‘Our strategy and our idea is not just to clean up our own backyard, but to try to make this something the majority of investors do,’ Ms Thörnelöf explains.

And that is a process that is now under way. When Mistra took its first steps towards sustainable asset management, it soon discovered that there was no literature or research on the subject. This was a major factor behind the launch of the research programme Sustainable Investments.

‘Actively committed as we were to making our asset management more sustainable, we soon ran into all sorts of problems and difficulties that we couldn’t find solutions to. How do you control and monitor your investment managers? And what do investors, companies and the environment actually gain from sustainable investment? These are some of the questions this research programme is now exploring,’ says Eva Thörnelöf.

The programme is also studying what obstacles exist to more institutional owners moving towards sustainable management of their assets, by studying both levels of knowledge among decision makers and behaviour within organizations. In addition, work is being done to develop better analytical tools.

BEING FIRST MAKES FOR HUMILITY
Does the fact that Mistra, as an institutional owner, is investing all its capital on the basis of sustainability criteria make a difference to the financial markets, then? Sasja Beslik, head of analysis at Banco Fonder, believes that it does:

‘It certainly affects the asset management sector. The volume involved is significant, and if an institutional owner acts in a certain manner it will be noticed. But it’s also important that the money is managed in the right way. I believe that, for there to be a real shift towards sustainable investment, we need to see more active ownership. And here I think institutional owners and investors could do much more by laying down clear requirements as to how their money is to be managed in the long term.’

Märtha Josefsson agrees that active ownership is important, but says that the challenge is to find ways of exercising it:

‘What we’re seeing now is institutions joining forces to exert an influence. Mistra is relatively small as an institutional owner, but the more of us there are making specific demands, the greater our impact will be. That’s why Mistra is involved in several collaborative initiatives with other institutional investors, such as the Carbon Disclosure Project and the Enhanced Analytics Initiative.’

According to Eva Thörnelöf, knowing that you are one of the first institutions to apply sustainability criteria in the management of all your assets makes for a certain humility: ‘We can’t tell others what to do, but we do have an obligation to explain what we are doing and how.’

Mistra’s work in this area has in fact attracted a good deal of attention, and the Foundation is increasingly often asked to talk about it in different contexts. Invitations have come, for example, from the Norwegian Ministry of Finance, Denmark’s Minister of the Environment, and Nordea Investment Management, which has recently begun to focus more actively on ethics and dialogue in its asset management business.

‘We practise what we preach, and I think that creates a certain respect in the industry,’ says Ms Thörnelöf.

NEW METHODS OF ANALYSIS
Sasja Beslik believes that traditional analyses are not enough to assess the sustainability performance of companies. Banco, which manages 10 per cent of its funds on a sustainable basis, has therefore developed its own method of analysis, which takes account not only of environmental risks and social responsibility, but of other factors as well.
‘On top of these traditional concerns, the new method looks at how adaptable businesses are, for example when it comes to making the transition to lower carbon dioxide emissions,’ Mr Beslik explains.

Allan Emanuelsson, an analyst with Carlson Investment Management, one of Mistra’s external managers, also wants to see a greater focus on openness to change:

‘A company’s ability to adapt to the new demands created by climate change needs to be considered in every analysis, as we know that businesses are going to be forced to reduce their carbon dioxide emissions. The emission levels required, now and in the years ahead, should be broken down company by company, and each business should describe what the consequences will be in its particular case.’

In addition, both Allan Emanuelsson and Sasja Beslik call for analyses that look at how firms are contributing to sustainable development through their products and services.

‘We feel we have a duty, both to make sure our money generates benefits through the research we fund and to manage it according to principles of sustainability and ethical responsibility,’ says Eva Thörnélöf, Administrative Director at Mistra.
Institutional owners and investors could do much more by laying down clear requirements as to how their money is to be managed in the long term.

SASJA BESLIK

‘Most people undertaking sustainability analyses of one kind or another make the mistake of focusing on the risks associated with companies failing to “green” their operations. Instead, they should concentrate on the benefits of promoting sustainable development – the fact that it actually pays to do so,’ says Sasja Beslik.

Allan Emanuelsson would also like to see more uniform disclosure on environmental issues, and greater openness and transparency about companies’ activities and thinking relating to sustainability.

But of course investment managers, too, have a responsibility, both to get hold of the right information and to promote standardized reporting.

‘In general, I think many managers need to cooperate with outside environmental experts,’ says Mr Emanuelsson. ‘A clear change is under way, as the investment industry gets better at taking account of environmental issues and integrating them into its analyses – particularly issues linked to climate change.’

THEORY AND PRACTICE
To build bridges between theory and practice, Mistra has invited researchers, financial analysts, asset managers and others to a series of seminars on different themes. Its Sustainable Investment Platform now brings together academics and practitioners on a regular basis.

‘We need closer links between the academic and professional worlds,’ says Allan Emanuelsson. ‘Up to now, little research has been done in this area, for example on what it means to apply sustainability criteria within a company and how it can pay in the long term. The Sustainable Investment Platform provides a forum where the academic and practitioner communities can exchange ideas and experiences and support one another so as to move forward on these issues.’

All the investments managed by Carlson are subject to a basic set of ethical criteria. Over and above those criteria, the firm then manages portfolios in accordance with more specific requirements, which apply to over 40 per cent of the assets entrusted to it.

‘In Mistra’s case, we work on the basis of their policy and attempt to translate the values set out there into tangible and measurable operational criteria,’ Mr Emanuelsson explains. ‘It’s a challenge, but it isn’t a problem.’

SUSTAINABLE INVESTMENTS PAY
The most difficult part of the process, says Märtha Josefsson, is monitoring how Mistra’s assets are actually being managed:

‘Monitoring is extremely important. It’s a way of checking that our capital is being invested in a satisfactory manner from Mistra’s point of view, and also of showing that we mean business.’

Every year, therefore, Mistra sends a questionnaire to all its investment managers, asking questions not just about financial returns, but on a range of other issues as well.

‘We’re also interested in finding out, for instance, how our sustainability criteria have affected the composition of the portfolio, and what impact this has had on the returns achieved,’ Ms Josefsson explains.

Last year was a turbulent one on the financial markets, with repercussions for Mistra’s investments. The portfolio as a whole grew by 3 per cent, 1 percentage point below the benchmark index and the targets set by the Foundation.

‘A couple of our investment managers had a slightly more difficult year than others,’ says Märtha Josefsson. ‘But we’re particularly pleased that our biggest manager, Generation Investment Management, did extremely well. Their portfolio increased in value by 7.7 per cent.’

What is more, Generation is the manager that best integrates its sustainability and financial analyses.

‘That reinforces our view that sustainability analyses add value,’ Ms Josefsson continues. ‘For us, the main concern is ethical and moral: we want to invest in companies with sound sustainability policies. But we also believe that, in the long run, such an approach in fact creates value.’

QUICK FACTS:
MANAGING MISTRA’S ASSETS

Mistra’s first step towards sustainable asset management was to apply negative screening, i.e. to refrain from investing in companies that failed to live up to defined criteria, for example regarding environmental protection and human rights. Subsequently, a decision was taken to introduce positive screening, in other words, to invest in the companies that best met criteria set by the Foundation.

Now Mistra increasingly often requires its external managers to integrate sustainability analyses with their financial analyses. Mistra’s entire capital is currently invested on the basis of a combination of these three methods. The next step will be to invest directly in as yet unlisted companies, with business ideas based on environmental technology. These may be spin-offs from research, for example a firm set up to manufacture solar cells, or other environment-oriented businesses.
RESULTS OF MISTRA’S PROGRAMMES

NEWS SHAPES DECISIONS
On 1 June the EU’s new chemicals regulation REACH came into force, legislation which the research programme NewS has helped to shape. Right from the start, researchers sought to communicate their results and recommendations to decision makers and other affected parties. The programme itself is now completed, but information efforts will continue.

URBAN WATER FLOWS ON
Existing water and wastewater systems supply Sweden’s towns and cities with clean drinking water and dispose of sewage in a hygienic manner. But they do not meet all the requirements of sustainability. Urban Water has been studying these problems for several years. The programme is now at an end, but the expertise it has built up will live on, e.g. in the form of tools for analysis and development. The researchers have also set up a consultancy firm that will undertake projects both in Sweden and abroad.

MINIMIZING GREEN RISKS PAYS
Early in 2007 the research programme Sustainable Investments held its first annual meeting. After its first year, it has figures to show that environmental risks cost money, and that companies which actively apply sustainability criteria at any rate do not lose out financially. At the same time, they are minimizing environmental risks and investing in sustainable development.

One of the subprogrammes of Sustainable Investments – the Sustainable Investment Research Platform, based at the Umeå School of Business – was nominated for a GLOBE Award.

NEW LIFE FOR CLEAN AIR POLICY
The completed Mistra programme ASTA – International and National Abatement Strategies for Transboundary Air Pollution – has had a major impact on both national and international clean air policy since its launch eight years ago. According to an evaluation, ASTA has revitalized environmental policy and the research community has managed to bring pressure to bear on decision makers. The programme is now continuing as the Swedish Clean Air Research Programme, under the auspices of the Swedish Environmental Protection Agency. Earlier in 2007 ASTA held a major international conference on air quality and climate issues. It also published a book, Transboundary Air Pollution, describing how science has become a driving force for key international policy decisions.
HOPE OF CLEANER WATER

The problem of eutrophication of our seas and fresh waters can be tackled, but it will require a joined-up approach and collaboration from the outset between relevant stakeholders. Two Mistra programmes have focused on ways of addressing this and other problems affecting aquatic environments: VASTRA, which was local and regional in approach, and MARE, which had a more international outlook.

Participants in these programmes were also involved in the Water Dialogue project, set up to get researchers and practitioners talking to each other.

ACTION PLAN FOR THE BALTIC

A ministerial meeting of the Helsinki Commission in Kraków in November agreed a new Baltic Sea Action Plan, with the overall aim of achieving good ecological status in the Baltic by 2021.

‘We’re delighted that the Mistra programme MARE, and its decision support system Baltic Nest, have provided some of the scientific input to the new plan,’ says Eva Thörnelöf, Mistra’s Administrative Director.

BALTIC NEST INSTITUTE OPENS IN DENMARK

A tool for assembling data on the Baltic Sea and the surrounding land areas and atmosphere – Baltic Nest, from the Mistra programme MARE – has formed the basis for a new independent research institute, the Baltic Nest Institute (BNI).

It had already been decided that the institute was to have a section based at Mistra’s Stockholm Resilience Centre, at Stockholm University. Now another section is opening, at the National Environmental Research Institute of the University of Aarhus in Roskilde.

PROFITS AND SOCIAL RESPONSIBILITY

At present, the links between economic profitability and environmental responsibility on the part of companies are difficult to demonstrate. The Mistra programme Sustainable Investments has therefore developed a model to clarify the connection.

‘There are both costs and benefits attached to social responsibility. The two need to be in balance to provide the motivation required to maintain CSR behaviour,’ says Tommy Lundgren, a researcher with the programme.

ENERGY TECHNOLOGY EXPORT

On the basis of the results of the programme Black Liquor Gasification and a pilot plant in Piteå, technology for the gasification of black liquor – a pulp-mill by-product – is now to be exported. The Swedish company Chemrec AB, which holds the patent for the technology, has signed a deal with US paper and pulp manufacturer NewPage. Chemrec is to carry out a feasibility study, which could result in a plant being set up in Michigan. Earlier in the year, two venture capital firms took stakes in Chemrec. The company expects to be able to offer a commercial process by 2011.
RIGHT TO GOOD SOUNDCAPES
The research programme Soundscape Support to Health is drawing to a close – but the results live on, partly in the form of an educational website. Some of the findings, moreover, have been used to transform a residential area of Partille, near Göteborg. One of the questions studied is how different sound environments affect our health. People in areas with high levels of traffic noise, for example, have a higher incidence of cardiovascular disease. In Sweden, the annual death toll attributable to this factor could be on a par with that arising from road accidents.

GREENHOUSE GASES AND FORESTRY
Measures to reduce emissions of greenhouse gases from land use could adversely affect biodiversity and have major economic impacts on forestry. In future discussions, therefore, a balance needs to be struck between how and for what purposes land is used.

In October the LUSTRA programme held a concluding seminar aimed at users of its results. The focus of its work has been on forest land, fluxes (uptake and release) of the greenhouse gases carbon dioxide, nitrous oxide and methane, and how greater knowledge could help to achieve better control of those fluxes.

CLEANING UP EMISSIONS FROM WASTE INCINERATION
Burning household waste gives rise to substances that can harm the environment, in particular nitrogen oxides, dioxins, sulphur dioxide and volatile hydrocarbons. More effective methods to remove these substances from flue gases are urgently needed. The Mistra programme PERSEA has tested new technology for this purpose at Vattenfall’s district heating plant in Uppsala. According to Hana Baránková and Ladislav Bárdos from PERSEA, the technology – known as plasma-enhanced reaction systems – holds potential as a cost-effective method of flue gas treatment.

PERSEA programme manager Hana Baránková with Thomas Trängård, analytical engineer at Vattenfall, outside the company’s incinerator in Uppsala.
MISTRA’S RESEARCH

Mistra gives priority to research in five areas: A Reduced Human Influence on Climate, A Non-Toxic Environment, Zero Eutrophication, Sustainable Use of Renewable Natural Resources, and Sustainable Urban Development. Its aim is that the results should be of benefit to users. The programmes funded are therefore grouped under four headings (see below and opposite), based on their areas of application.

In 2007 Mistra funded 20 major research programmes, the results of which are intended to find practical applications in industry, public administration and policymaking. Details of the different programmes can be found on pages 32–37.

ENVIRONMENTALLY SUSTAINABLE BUSINESS DEVELOPMENT

The largest of the four areas of application is concerned with environmentally sound products, processes and services – an area that extends from ideas to products and how those products can be sold on commercial markets. Under the heading of Environmentally Sustainable Business Development, Mistra supports a large number of programmes. Apart from broad-based research programmes, they include ProEnviro, an initiative funded jointly by Mistra and the Swedish Foundation for Strategic Research (SSF). ProEnviro’s aim is to promote innovative research ideas that will enable small and medium-sized enterprises to develop environmentally sound products and become more competitive.

PROGRAMMES:

Black Liquor Gasification
DOM – Domestication of Micro-Organisms for Non-Conventional Applications
E4 Mistra – Energy-Efficient Reduction of Exhaust Emissions from Vehicles
Greenchem – Speciality Chemicals from Renewable Resources
Marine Paint
MASE – Microbial Activity for a Sound Environment
The Mistra Fuel Cell Programme
MistraPharma (approved 2007, launched 2008)
PERSEA – Plasma-Enhanced Reaction Systems for Environmental Applications
PlantComMistra
Towards a Closed Steel Eco Cycle

INTERNATIONAL ENVIRONMENTAL NEGOTIATIONS

Environmental negotiations these days are highly complex. Many countries and stakeholders are involved, and both political and economic factors have a major part to play. One aim of Mistra’s research in the area of International Environmental Negotiations is to provide data, based on social science research, in support of the global dialogue on climate. The work undertaken includes studies of different policy instruments and negotiating arrangements. Through its research, Mistra also wishes to establish and maintain a dialogue between researchers and negotiating experts.

PROGRAMMES:

ASTA – International and National Abatement Strategies for Transboundastry Air Pollution
CLIPORE – Mistra’s Climate Policy Research Programme
ENTWINED – Environment and Trade in a World of Interdependence
LUSTRA – Land Use Strategies to Reduce Greenhouse Gas Emissions
Mistra-SWECIA – Mistra SWEdish research programme on Climate, Impacts and Adaptation (approved 2007, launched 2008)

MANAGEMENT AND USE OF NATURAL RESOURCES

Many different interests – often conflicting – can arise regarding the way we manage resources. The programmes funded in this area aim to provide knowledge on how these can be managed in a sustainable way.

PROGRAMMES:

– Land Use Strategies to Reduce Greenhouse Gas Emissions
– Mistra’s Climate Policy Research Programme
– International and National Abatement Strategies for Transboundary Air Pollution

ASTA

Problem: Despite successful international efforts, air pollution continues to have significant effects on health (due especially to particulates) and to cause acidification of sensitive ecosystems.

Benefits: Over the eight years of its existence, ASTA has provided significant input to international agreements and helped to develop national strategies for achieving environmental goals. The programme has focused on long-range transport of particulates, acidification, ecosystem impacts of nitrogen and effects of ground-level ozone, and on developing a scientific base for international negotiations.

Users: The results have been used in support of international negotiations on transboundary air pollution, the EU’s thematic strategy on air pollution, and efforts to achieve Sweden’s environmental objectives.

Duration: 1999–2007
Mistra funding: SEK 59 million
Website: asta.ivl.se

BLACK LIQUOR GASIFICATION

Problem: Roughly half of Sweden’s bioenergy is to be found in black liquor, a valuable by-product of paper pulp manufacturing which is currently burnt in recovery boilers to generate steam for use at the pulp mill. Gasification of this by-product would improve efficiency, as well as making possible cost-effective production of transport fuels or electricity.

Benefits: A commercialized process would provide a major additional supply of renewable energy. The programme aims to speed progress towards that goal by addressing key scientific questions and problems currently standing in the way of large-scale gasification of black liquor.

Users: Beneficiaries range from the forest products industry, which could become a supplier of transport fuels or electricity, to energy consumers, who will gain access to green electricity and green fuels. For society as a whole, there will be the benefit of reduced dependence on energy from abroad.

Duration: 2004–2009
Mistra funding: SEK 43 million
Website: etcpitea.se/blg
and use natural resources. One goal of Mistra’s research programmes in this area has therefore been to bridge the gaps between different interest groups and to start a dialogue – both to foster mutual understanding and to find common ground on how best to manage resources.

**PROGRAMMES:**
- Heureka – Environmental Decision Support

**DOM**

**Problem:** Nowadays, micro-organisms can be used to solve a range of environmental problems: they offer potential substitutes, for example, for chemical pesticides. To achieve progress in this area, however, we need to know more about the safety assessment, cultivation and stabilization of new micro-organisms.

**Benefit:** DOM’s research, symposium and course activities are filling gaps in current knowledge and building bridges between research, government agencies and industry. This will make possible new applications for micro-organisms with biological effects that offer benefits for the environment.

**Users:** DOM is a centre of excellence, to which companies can turn for development support and safety evaluations. It also provides support and information to collaborating authorities, and helps researchers with assessments of new micro-organisms.

**Duration:** 2002–2010

**Mistra funding:** SEK 62.5 million

**Website:** www.mistra.org/dom

**ENTWINED**

**Problem:** International exchange of products, services, capital, technology, information and, to a certain extent, labour has created a growing interdependence between countries. This programme is therefore focusing on how economic globalization and its governing institutions are affecting human welfare and the environment, locally, nationally and globally.

**Benefits:** ENTWINED is expected to enhance our understanding of how integration of markets across national frontiers can be achieved without upsetting the balance of the environment. Often, therefore, research in the social sciences is involved.

**Programmes:**
- Soundscape Support to Health
- Sustainable Investments
- TransportMistra

**Problem:** The need to reduce CO₂ emissions from the transport sector, while also curbing releases of other environmentally harmful substances, including particulates.

**Benefits:** The programme’s aims are to provide the knowledge needed to develop new, energy-efficient exhaust treatment systems for combustion engines, and to achieve emission levels below existing statutory requirements.

**Users:** The results will be of use to several sectors of Swedish industry, to decision makers and to environmental NGOs. They will also benefit the individual and society as a whole by improving ambient air, i.e. reducing local air pollutant levels, and curbing greenhouse gas emissions. Finally, there will be benefits for vehicle owners, in the form of lower fuel consumption.

**Duration:** 2006–2010

**Mistra funding:** SEK 20 million

**Website:** www.kck.chalmers.se/e4mistra

**CLIPORE**

**Problem:** The threat of climate change is one of the most important and complex challenges the world faces. Defining the shape and scope of international cooperation beyond the first commitment period of the Kyoto Protocol will be a decisive factor in ensuring timely action to address that challenge.

**Benefits:** CLIPORE is supporting research and seeking to encourage dialogue that will secure progress in the international negotiations on climate.

**Users:** Most of the results are intended to be of direct use to political decision makers, in Sweden and in other countries. Industry also has an important part to play, both by providing an input to the research and as a user of the results.

**Duration:** 2004–2010

**Mistra funding:** SEK 107.3 million

**Website:** www.clipore.org

**E4-MISTRA**

**Problem:** The need to reduce CO₂ emissions from the transport sector, while also curbing releases of other environmentally harmful substances, including particulates.

**Benefits:** The programme’s aims are to provide the knowledge needed to develop new, energy-efficient exhaust treatment systems for combustion engines, and to achieve emission levels below existing statutory requirements.

**Users:** The results will be of use to several sectors of Swedish industry, to decision makers and to environmental NGOs. They will also benefit the individual and society as a whole by improving ambient air, i.e. reducing local air pollutant levels, and curbing greenhouse gas emissions. Finally, there will be benefits for vehicle owners, in the form of lower fuel consumption.

**Duration:** 2006–2010

**Mistra funding:** SEK 20 million

**Website:** www.kck.chalmers.se/e4mistra

**MISTRA ANNUAL REVIEW 2007**

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**Problem:** The chemical industry’s dependence on fossil raw materials, supplies of which are dwindling, and which adversely affect health and the environment.

**Benefits:** Greenchem aims to bring about a paradigm shift in the industry, from fossil oil to renewable raw materials for the production of ‘green’ chemicals. Using modern biotechnology and green chemistry, both cleaner products and cleaner processes can be achieved.

**Users:** The key beneficiaries will be industries that produce and use chemicals, as well as suppliers of renewable raw materials. The knowledge gained will also be of use to other scientists, to decision makers and to society at large.

**Duration:** 2003–2010

**Mistra funding:** SEK 71.4 million

**Website:** www.greenchem.lu.se

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**Problem:** With more and more agricultural land being taken out of production, the area of meadows and pastures is dwindling. As a result, many species associated with the farmed landscape are now threatened to varying degrees.

**Benefits:** This programme aims to provide a scientific basis for successful and profitable management of meadow and pasture land. There are no other programmes with a similar focus, so HagmarksMistra could also be an important source of inspiration at the international level.

**Users:** Wide-ranging, from individual farmers, via advisers working for local authorities and county administrative boards, to central government agencies and, not least, the people involved in reforming EU agricultural policy.

**Duration:** 2001–2008

**Mistra funding:** SEK 47 million

**Website:** www-hagmarksmistra.slu.se

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**Problem:** Forests are used not only for commercial timber production, but also, for example, as a source of biofuels, for recreation, and as a carbon sink. Because different stakeholders have differing visions, tensions can arise.

**Benefits:** Heureka is developing computer-based tools that will provide broad support for decision-making, taking account of as many factors as possible. These tools will describe how the values and functions of forests are affected, depending on how they are used.

**Users:** The Heureka system will be of use both to forest enterprises, large and small, and in regional and national analyses. Users thus range from individual landowners, via forest companies, local authorities and county administrative boards, to the Swedish Environmental Protection Agency.

**Duration:** 2002–2009

**Mistra funding:** SEK 21.2 million

**Website:** www.mistra.org/heureka

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**Problem:** Can soil and vegetation be used to mitigate the impacts of greenhouse gases? If so, how and to what extent? These issues are a stumbling block in the international negotiations on climate change.

**Benefits:** LUSTRA has assessed the role of land use in reducing the climate effects of greenhouse gases in the atmosphere – chiefly carbon dioxide, but also nitrous oxide and methane. By locking up carbon dioxide in forests, humus and peat, and managing land in appropriate ways, it is possible to minimize net emissions of these gases.

**Users:** Potential users of the results include negotiators in the framework of the Convention on Climate Change, the forestry sector, and agencies responsible for the environment, energy and land use planning.

**Duration:** 1999–2007

**Mistra funding:** SEK 60 million

**Website:** www.mistra.org/lustra
Problem: Over a hundred active pharmaceutical ingredients have been detected in the aquatic environment. Their very presence there is undesirable, but are the levels at which they occur hazardous to aquatic animals and plants? We know that synthetic oestrogen from oral contraceptives affects fish, but for the great majority of drugs the potential environmental impacts are very poorly understood.

Benefits: This programme will identify pharmaceutical ingredients that pose a significant risk to aquatic organisms; recommend technologies to improve wastewater treatment; improve strategies and indicators for the early identification of drug substances that could have undesirable environmental effects; and strengthen links and communication within the network of Swedish and international researchers and users.

Users: Authorities; companies and organizations that treat and use water; public-sector health care providers; and the pharmaceutical industry.

Duration: 2008–2011

Mistra funding: SEK 44.2 million

Website: www.mistrapharma.se
**MISTRA-SWECIA**

**Problem:** Our climate is changing. Ultimately, how much it changes will depend on the emission reductions that are achieved. Some climate change is inevitable, however, as are various impacts. Integrated research is needed to determine the best ways of adapting to changing conditions in terms of weather and water resources. On the basis of advanced climate, economic and impact models, this programme will be studying adaptation processes.

**Benefits:** The programme will create a capacity for integrated analysis and generate knowledge about climate, impacts and economics. It will examine both risks and opportunities.

**Users:** The focus is on stakeholders responsible for adapting to climate change, such as authorities, local, regional and national decision makers and politicians, organizations and companies. Other researchers and the general public are also target groups.

**Duration:** 2008–2011

**Mistra funding:** SEK 40 million

**Website:** www.mistra-swecia.se

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**PLANTCOMMISTRA**

**Problem:** Aphids cause problems for crop producers, and the use of appreciable quantities of pesticides over large areas puts significant environmental pressure on the farmed landscape.

**Benefits:** The aim of this programme is to exploit the crop plants’ own ability, through communication based on volatile chemicals, to develop greater resistance to aphids and attract aphids’ natural enemies, such as ladybirds.

**Users:** Farmers, companies, authorities and the general public.

**Duration:** 2006–2008

**Mistra funding:** SEK 24 million

**Website:** www.plantcommistra.com

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**PERSEA**

**Problem:** More efficient methods are needed to clean up flue and exhaust gases from combustion plants and vehicles, preferably methods that will deal with several pollutants at once without giving rise to other harmful substances.

**Benefits:** The aim of this programme is to develop plasma technology that will cost-effectively reduce emissions, chiefly of nitrogen oxides and volatile hydrocarbons. The technology should be capable of eliminating several pollutants at the same time.

**Users:** Several industries with significant air pollutant emissions. The main focus is on the power and automobile sectors, but the research has applications in other contexts as well: printing, painting and varnishing, pressure treatment, and certain processes used in the manufacture of paper, electronics and plastics.

**Duration:** 2000–2009

**Mistra funding:** SEK 35 million

**Website:** www.engineering.uu.se/plasma

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**SOUNDSCAPE SUPPORT TO HEALTH**

**Problem:** Noise is a significant and growing environmental problem, with impacts on human health. There is a wide gap between existing noise environments and official long-term targets.

**Benefits:** This programme is advancing a new way of thinking in this area. Noise is not just a matter of decibels, but also of how we perceive sounds and are affected by them. The knowledge gained is to be used in planning housing and traffic environments, to achieve the best possible ‘soundscapes’.

**Users:** The programme’s aim is to get everyone concerned – the construction industry, housing providers, planning authorities and residents – to think in terms of soundscapes, an approach that will benefit human health and well-being.

**Duration:** 2000–2008

**Mistra funding:** SEK 40 million

**Website:** www.soundscape.nu
**STOCKHOLM RESILIENCE CENTRE**

**Problem:** Humans are exerting a growing influence on the dynamics of ecosystems. Many such systems have shifted to less productive states, in terms of their capacity to generate ecosystem services such as food, purification of water and regulation of climate. There is a considerable risk of threshold effects. New principles that serve to build resilience are needed for the management of natural resources and the environment.

**Benefits:** The centre's aims are to promote a better understanding of complex social-ecological systems, and to provide new insights and tools to improve their management and governance.

**Users:** The centre will generate knowledge and offer advice of use to decision makers at the national, European and international levels. A joint undertaking between Stockholm University, the Royal Swedish Academy of Sciences and the Stockholm Environment Institute, it will be seeking to develop broad partnerships.

**Duration:** 2007–2013

**Mistra funding:** SEK 105 million

**Website:** www.stockholmsgility.su.se

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**TOWARDS A CLOSED STEEL ECOCYCLE**

**Problem:** Steelmaking processes need to be changed so as to use metals more efficiently and less resource-intensively. More recycling-friendly designs must be developed to optimize the use of new varieties of steel.

**Benefits:** This programme is helping to develop, first, improved production processes and better use of steel in designs; and second, environmental evaluation methods for process and product development that describe benefits for the environment from a broad, societal point of view. Interdisciplinarity and cross-learning are key components.

**Users:** The results will help to improve manufacturing processes in industry – steelworks, the scrap trade and engineering – and will benefit society by providing new methods of environmental evaluation for use in research, industry and education.

**Duration:** 2004–2008

**Mistra funding:** SEK 42 million

**Website:** www.stalkretsloppet.se

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**SUSTAINABLE INVESTMENTS**

**Problem:** Institutional investors, through their investment decisions, can encourage companies to move towards greater sustainability. Many obstacles may have to be overcome, however, before such an investment strategy is widely adopted.

**Benefits:** This programme involves applied research into the value chain of financial markets, covering such areas as equity valuation, the behaviour of financial analysts and others, and portfolio selection based on sustainability criteria.

**Users:** The results are intended to be of use to institutional investors, analysts and other players on financial markets.

**Duration:** 2006–2008

**Mistra funding:** SEK 42 million

**Website:** www.sustainableinvestments.se

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**TRANSPORTMISTRA**

**Problem:** Of the various goals of today's society, sustainable mobility is one of the hardest to achieve. Apart from when it comes to integrating transport systems with natural and cultural features of the environment, there is no lack of proposals for policies, instruments and measures to improve the situation. The problem is that very few of the good ideas advanced are being put into practice.

**Benefits:** TransportMistra's aim is to develop strategies, models and tools for decision-making in support of sustainable transport systems.

**Users:** The work is built around three identified user groups: policymakers, practitioners in the public sector, and the international scientific community.

**Duration:** 2006–2008

**Mistra funding:** SEK 30 million

**Website:** www.transportmistra.org
MANAGEMENT REPORT

The Board of the Foundation for Strategic Environmental Research (Mistra) hereby submits its annual report and financial statements for 2007, the fourteenth year of the Foundation’s existence. The figures in brackets are for 2006.

ACHIEVEMENT OF OBJECTS
The objects of Mistra, as set out in Article 1 of its Statutes, are as follows:

The purpose of the Foundation, whose name shall be the Foundation for Strategic Environmental Research, is to fund research of strategic importance for a good living environment.

The Foundation is to promote the development of strong research environments of the highest international class and of importance for Sweden’s future competitiveness. The research support should be of significance in finding solutions to important environmental problems and promoting the sustainable development of society. Full use is to be made of opportunities to achieve industrial applications.

BOARD
During the financial year, the Board of Mistra comprised the following members: Anneli Hultén, Chairman; Johan Trouvé, Deputy Chairman; Svante Axelson; Charlotte Brogren; Mikael Damberg; Sigbrit Franke; Björn Hägglund; Birgitta Johansson Hedberg; Lars Magnusson; Maria Strömme; Cynthia de Wit.

All the members apart from Anneli Hultén, Mikael Damberg, Sigbrit Franke and Birgitta Johansson Hedberg were reappointed by the Government on 19 December 2007 for the period 1 January 2008–31 December 2009. At the same time, the Government appointed Lena Treschow Torell (Chairman), Christina Lindbäck, Stefan Nyström and Mathilda Tham as new members of the Mistra Board.

The Board held four meetings during 2007.

MISTRA PROGRAMMES
Since it was founded and up to the end of 2007, Mistra has awarded funding for a total of 40 (38) major research programmes, including two new ones approved in 2007. The new programmes, MistraPharma and Mistra-SWECIA (Swedish programme on Climate, Impacts and Adaptation), are the result of calls for proposals issued in 2006. They were awarded a total of SEK 84 million for a period of up to four years.

During the year Mistra also made available financial support for a further phase of research in the framework of the MASE (Microbial Antagonism against Fungi) programme, worth a total of up to SEK 15 million over three years.

One programme, Soundscape Support to Health, received its final tranche of research funding during 2007, but was extended to permit concluding activities in 2008. In addition, a scientific evaluation of the programme is currently being undertaken by an international panel.

During the year, Mistra issued its first open call for proposals, with no specified theme. In all, 32 pre-proposals were received, and for two of them – Homes for Tomorrow and Food and Bioenergy in a Water-Scarce World – planning grants were awarded to enable full applications to be prepared by 1 April 2008.

Another call, under the heading of Future Forests, was announced in 2007, resulting in one of three applicants being awarded a planning grant to submit a full proposal.

Mistra also decided during the year to prepare, in 2008, a call for proposals in the area of Sustainable Urban Development and a commitment of resources relating to Carbon Capture and Storage (CCS).

IDEA SUPPORT GRANTS
Since the scheme was introduced in 2001, Mistra has awarded a total of 24 (19) Idea Support Grants. In 2007 five such grants, worth a total of SEK 23 (22) million over a period of four years, were approved on the basis of the 2006 announcement.

During 2007, for the seventh year in succession, Mistra invited further applications for Idea Support Grants. The maximum award for an Idea Support project is SEK 6 million, payable over four years. Mistra received 70 (103) pre-proposals, 13 (15) of which resulted in invitations to submit full proposals. An international assessment panel has been appointed, and a decision on this round of applications will be reached in April 2008.

OTHER FORMS OF SUPPORT
During the year, in addition to actual research funding, Mistra mainly provided support in the form of planning grants to enable applicants to develop full programme proposals.

Five-year summary (SEK million)

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ASSET MANAGEMENT
Mistra’s Statutes contain two provisions relating to the management of the Foundation’s assets:

The board of trustees is responsible for ensuring that the Foundation’s assets are managed satisfactorily with limited risk and a good rate of return.

The activities of the Foundation may eventually entail that the Foundation’s endowment is used up.

Since 1 July 2004 Mistra’s Committee for Asset Management has included the following external members: Märtha Josefsson (Chairman), Peter Norman and Erik Sjöberg, who were reappointed on 27 June 2006. Under the rules of procedure adopted by the Board on 4 April 2005, the Committee now also includes the Executive Director of Mistra.

When it was established in 1994, Mistra had a capital of SEK 2,500 million. At the end of 2007, the market value of its assets was SEK 3,529 (3,607) million. In all, research funding of SEK 2,390 million has been paid out, SEK 170 million of it in 2007.

Mistra’s assets are managed under ten mandates, entrusted to eight investment managers. In June 2007 the Foundation invested in a new fixed-income fund offered by BankInvest: Global Emerging Market Debt SRI.

The return on Mistra’s capital, for the portfolio as a whole, was 2.9 per cent, which was 1.4 percentage points below the weighted benchmark index. This was primarily due to one of Mistra’s managers, Hotchkis & Wiley, having underperformed their benchmark by 15.8 percentage points. Most of the Foundation’s other investment managers also had a poor year, the only one performing above benchmark being Generation IM.

The return on the equity portfolio was 2.5 per cent, 1.5 points below Mistra’s benchmark index for shares. The fixed-income portfolio delivered a return of 2.7 per cent, 0.1 points below the benchmark. Rates of return are calculated by measuring the change in the market value of each portfolio after management fees and transaction costs and adjusted for capital invested and withdrawn (i.e. a time-weighted return is used).

Since 1 April 2007, the whole of Mistra’s portfolio has been managed on the basis of sustainability criteria of one kind or another. The sustainability profile of the Foundation’s investments was monitored for the third year running by means of a questionnaire survey, followed up by telephone calls. The aim was to ensure that Mistra’s assets were being managed as agreed, and to learn lessons for the future. It is too early yet to analyse the return generated under these mandates, compared with a conventional portfolio.

At year-end, Swedish fixed-income investments, including liquid assets, made up 40.7 (35.8) per cent of the overall portfolio.

ORGANIZATION AND STAFF
At the end of the year, Mistra had a permanent staff of six and two full-time employees appointed on a project basis.

To assess proposals for research programmes, to review existing programmes prior to continued funding, and to evaluate completed programmes with a view to learning from the experience gained, Mistra engages the services of scientific experts, chiefly from outside Sweden. The Foundation also uses outside experts to assess the relevance and utility of its research programmes.

Mistra engages consultants and external experts in specialized areas such as IT, law, finance etc. Accounting services, including the preparation of annual accounts, are provided by Inredo Företagsservice AB. Securities administration and monthly monitoring of the management of Mistra’s assets are outsourced to Wahlstedt Sageby.

LOOKING AHEAD
It is Mistra’s intention to disburse, over the long term, research grants totalling SEK 200 million per year (in real terms at 2003 prices). With total assets of SEK 3.5 billion, this level of funding is so high that there is a considerable likelihood of the Foundation’s capital being exhausted. Mistra is, though, expected to be able to continue to operate until at least 2020. An annual assessment is made of the risk of not being able to remain in operation until that date, taking into account the capital remaining, its allocation between fixed-income assets and equities, and the annual level of disbursement.

The surplus for the year and overall financial position of the Foundation are set out in the following income and expenditure account, balance sheet and accompanying supplementary information.
## INCOME AND EXPENDITURE ACCOUNT

<table>
<thead>
<tr>
<th>Foundation income</th>
<th>Note</th>
<th>2007 (SEK)</th>
<th>2006 (SEK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dividends</td>
<td></td>
<td>25,023,177</td>
<td>40,145,272</td>
</tr>
<tr>
<td>Interest, bonds</td>
<td></td>
<td>51,709,943</td>
<td>42,739,500</td>
</tr>
<tr>
<td>Interest, short-term investments</td>
<td></td>
<td>69,320</td>
<td>1,820,350</td>
</tr>
<tr>
<td>Interest, bank</td>
<td></td>
<td>6,041,609</td>
<td>1,947,029</td>
</tr>
<tr>
<td>Other income</td>
<td></td>
<td>2,126,936</td>
<td>336,357</td>
</tr>
<tr>
<td><strong>TOTAL INCOME</strong></td>
<td></td>
<td><strong>84,970,985</strong></td>
<td><strong>86,988,508</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Foundation expenditure</th>
<th>Note</th>
<th>2007 (SEK)</th>
<th>2006 (SEK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management costs</td>
<td></td>
<td>–4,915,651</td>
<td>–9,670,305</td>
</tr>
<tr>
<td>Other external costs</td>
<td>1,2,3</td>
<td>–11,694,983</td>
<td>–14,107,121</td>
</tr>
<tr>
<td>Staff costs</td>
<td>4</td>
<td>–9,199,771</td>
<td>–10,376,614</td>
</tr>
<tr>
<td>Depreciation of tangible and intangible fixed assets</td>
<td></td>
<td>–252,878</td>
<td>–276,905</td>
</tr>
<tr>
<td><strong>TOTAL EXPENDITURE</strong></td>
<td></td>
<td><strong>–26,063,283</strong></td>
<td><strong>–34,430,945</strong></td>
</tr>
</tbody>
</table>

| Surplus before financial items | | 58,907,702 | 52,557,563 |

<table>
<thead>
<tr>
<th>Net income from financial items</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Net income from securities and receivables constituting fixed assets</td>
<td></td>
<td>105,059,725</td>
<td>209,735,586</td>
</tr>
<tr>
<td>Interest expense and similar income/expenditure items</td>
<td></td>
<td>–3,206</td>
<td>–2,684</td>
</tr>
</tbody>
</table>

| Surplus after financial items | | 163,964,221 | 262,290,465 |

**SURPLUS FOR THE YEAR**

| 163,964,221 | 262,290,465 |
### BALANCE SHEET

<table>
<thead>
<tr>
<th>Note</th>
<th>31 Dec 2007 (SEK)</th>
<th>31 Dec 2006 (SEK)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASSETS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fixed assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intangible assets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of improvements to leased property</td>
<td>5</td>
<td>173,406</td>
</tr>
<tr>
<td><strong>Tangible assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>6</td>
<td>161,395</td>
</tr>
<tr>
<td><strong>Financial assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Securities held as fixed assets</td>
<td>7</td>
<td>3,129,457,520</td>
</tr>
<tr>
<td><strong>Total fixed assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Current assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current receivables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current prepaid taxes</td>
<td></td>
<td>141,728</td>
</tr>
<tr>
<td>Other receivables</td>
<td>8</td>
<td>1,242,392</td>
</tr>
<tr>
<td>Prepayments and accrued income</td>
<td>9</td>
<td>14,106,495</td>
</tr>
<tr>
<td><strong>Total current receivables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-term investments</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Other short-term investments</td>
<td></td>
<td>74,124,166</td>
</tr>
<tr>
<td>Cash and bank deposits</td>
<td>10</td>
<td>56,057,470</td>
</tr>
<tr>
<td><strong>Total short-term investments</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total current assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL ASSETS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EQUITY AND LIABILITIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restricted equity</td>
<td>10</td>
<td>2,500,000,000</td>
</tr>
<tr>
<td>Unrestricted equity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net surplus/deficit brought forward</td>
<td></td>
<td>65,994,852</td>
</tr>
<tr>
<td>Surplus for the year</td>
<td></td>
<td>163,964,221</td>
</tr>
<tr>
<td><strong>Total unrestricted equity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL EQUITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Current liabilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts payable</td>
<td></td>
<td>886,630</td>
</tr>
<tr>
<td>Other liabilities</td>
<td></td>
<td>4,510,429</td>
</tr>
<tr>
<td>Grants awarded but not yet paid</td>
<td></td>
<td>539,155,716</td>
</tr>
<tr>
<td>Accrued expenses and deferred income</td>
<td>11</td>
<td>952,724</td>
</tr>
<tr>
<td><strong>Total current liabilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL EQUITY AND LIABILITIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assets pledged</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Contingent liabilities</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
CASH FLOW STATEMENT

<table>
<thead>
<tr>
<th>Operating activities</th>
<th>2007 (SEK)</th>
<th>2006 (SEK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surplus after financial items</td>
<td>163,964,221</td>
<td>262,290,465</td>
</tr>
<tr>
<td>Depreciation</td>
<td>252,879</td>
<td>276,905</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cash flow from operating activities before changes in working capital</th>
<th>164,217,100</th>
<th>262,567,370</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in current receivables</td>
<td>–18,080,014</td>
<td>–19,378,851</td>
</tr>
<tr>
<td>Change in other current liabilities</td>
<td>–5,950,276</td>
<td>6,373,713</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cash flow from operating activities</th>
<th>140,186,810</th>
<th>249,562,232</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investing activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investments in tangible fixed assets</td>
<td>–62,614</td>
<td>–179,594</td>
</tr>
<tr>
<td>Investments in financial fixed assets</td>
<td>40,802,450</td>
<td>–259,098,919</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cash flow from investing activities</th>
<th>40,739,836</th>
<th>–259,278,513</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash flow from grant awarding activities</td>
<td>–169,879,441</td>
<td>–184,796,242</td>
</tr>
<tr>
<td>Cash flow for the year</td>
<td>11,047,205</td>
<td>–194,512,523</td>
</tr>
<tr>
<td>Liquid assets at the beginning of the year</td>
<td>45,010,265</td>
<td>239,522,788</td>
</tr>
<tr>
<td>Liquid assets at the end of the year</td>
<td>56,057,470</td>
<td>45,010,265</td>
</tr>
</tbody>
</table>

SUPPLEMENTARY INFORMATION

ACCOUNTING AND VALUATION PRINCIPLES
The annual report and financial statements have been prepared in accordance with the Swedish Annual Accounts Act and the general recommendations of the Swedish Accounting Standards Board. Where no general recommendation exists, or a deviation from such a recommendation has occurred, the accounting and valuation principles applied are as described below.

VALUATION PRINCIPLES
Unless otherwise stated, assets and liabilities have been valued at cost. Short-term investments are valued at the lower of cost and fair value. Accrued interest on these investments is recorded as accrued income on the balance sheet. Securities held as fixed assets are valued collectively at the lower of cost and fair value, since the purpose of these investments is to spread risk. The fair value of a security is determined by its most recent trade price. The value of receivables and liabilities in foreign currencies has been calculated using the quoted buying rate for each currency at the balance sheet date.

DEPRECIATION PRINCIPLES FOR FIXED ASSETS
Depreciation according to plan is based on original cost and estimated useful life. Where there is a lasting decline in value, assets are written down. From 2006, the depreciation period applied has been changed: for equipment purchased in 2006 the period is 5 years, while for equipment purchased prior to 2006 it is 3 years.

RECEIVABLES
Receivables are recorded at the amounts expected to be received, based on an individual appraisal.

GRANTS AWARDED
Grants awarded are booked directly against unrestricted equity (unappropriated funds). Grants are entered as liabilities at the time they are awarded.

RECOGNITION OF INCOME
For purchases and sales of securities, trade date accounting is applied. Premiums and discounts on bonds in relation to their par values have been accounted for according to the accruals concept over the remaining term. Accrued interest on investments is recorded as accrued income on the balance sheet.
NOTES

1 Leasing agreements
Leasing expenses during the year totalled SEK 79,621 (39,486).

2 Fees and expenses
‘Audit work’ comprises auditing of the annual report and financial statements and the accounting records and of the management undertaken by the Board and the Executive Director, other duties incumbent on an auditor of the Foundation, and advice or other assistance occasioned by observations made in the course of such auditing or the undertaking of such other duties. Any other undertakings are referred to as ‘other work’.

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audit work, KPMG Bohlins AB, Swedish National Audit Office</td>
<td>251,125</td>
<td>460,563</td>
</tr>
</tbody>
</table>

3 Other external costs

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultancy costs</td>
<td>5,160,274</td>
<td>5,912,760</td>
</tr>
<tr>
<td>Travel expenses and subsistence allowances</td>
<td>1,120,541</td>
<td>1,965,006</td>
</tr>
<tr>
<td>Accounting fees</td>
<td>370,063</td>
<td>455,883</td>
</tr>
<tr>
<td>Accommodation costs</td>
<td>1,509,171</td>
<td>1,277,992</td>
</tr>
<tr>
<td>Office costs</td>
<td>2,459,459</td>
<td>1,809,328</td>
</tr>
<tr>
<td>Other external costs</td>
<td>1,075,475</td>
<td>2,686,152</td>
</tr>
<tr>
<td><strong>Total other external costs</strong></td>
<td>11,694,983</td>
<td>14,107,121</td>
</tr>
</tbody>
</table>

4 Staff and staff costs

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average number of employees</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Men</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries and other emoluments, Board members and Executive Director</td>
<td>1,523,308</td>
<td>1,659,865</td>
</tr>
<tr>
<td>Salaries and other emoluments, other employees</td>
<td>4,252,049</td>
<td>4,496,105</td>
</tr>
<tr>
<td>Pension costs</td>
<td>1,354,793</td>
<td>1,459,936</td>
</tr>
<tr>
<td>Other social security costs</td>
<td>1,753,264</td>
<td>2,018,971</td>
</tr>
<tr>
<td>Other staff costs</td>
<td>316,557</td>
<td>741,737</td>
</tr>
<tr>
<td><strong>Total salaries, other emoluments and social security costs</strong></td>
<td>9,199,771</td>
<td>10,376,614</td>
</tr>
</tbody>
</table>

The remuneration paid to members of the Board totalled SEK 459,420 (442,828), while the members of Mistra’s Committee for Asset Management received remuneration totalling SEK 204,288 (199,025).

The Executive Director received a salary of SEK 859,600 (1,018,012). His contract of employment may be terminated on six months’ notice by either party. Following termination of the contract, the Executive Director will be entitled to a further six months’ salary if notice is given by Mistra. From this monthly severance payment, a deduction is to be made corresponding to any monthly salary the Executive Director receives from another employer. Mistra pays a monthly sum corresponding to 30 per cent of the Executive Director’s agreed monthly salary towards his individual pension and permanent health insurance scheme. In 2007 the total paid for this purpose was SEK 234,850 (482,776).
### 5 Cost of improvements to leased property

<table>
<thead>
<tr>
<th></th>
<th>31 Dec 2007</th>
<th>31 Dec 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accumulated cost</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening cost</td>
<td>303,459</td>
<td>303,459</td>
</tr>
<tr>
<td>Acquisitions</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Closing accumulated cost</strong></td>
<td>303,459</td>
<td>303,459</td>
</tr>
</tbody>
</table>

|                      |             |             |
| **Accumulated depreciation** |             |             |
| Opening depreciation   | –86,702     | –43,351     |
| Depreciation for the year | –43,351     | –43,351     |
| **Closing accumulated depreciation** | –130,053 | –86,702 |

|                      |             |             |
| **Closing book value** | 173,406 | 216,757 |

### 6 Equipment

<table>
<thead>
<tr>
<th></th>
<th>31 Dec 2007</th>
<th>31 Dec 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accumulated cost</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening cost</td>
<td>4,450,810</td>
<td>4,283,049</td>
</tr>
<tr>
<td>Acquisitions</td>
<td>62,614</td>
<td>185,511</td>
</tr>
<tr>
<td>Sales/retirements</td>
<td>–3,785,597</td>
<td>–17,750</td>
</tr>
<tr>
<td><strong>Closing accumulated cost</strong></td>
<td>727,827</td>
<td>4,450,810</td>
</tr>
</tbody>
</table>

|                      |             |             |
| **Accumulated depreciation** |             |             |
| Opening depreciation   | –4,142,502  | –3,920,782  |
| Retirements            | 3,785,597   | –           |
| Depreciation for the year | –209,527    | –221,720    |
| **Closing accumulated depreciation** | –566,432 | –4,142,502 |

|                      |             |             |
| **Closing book value** | 161,395 | 308,308 |

### 7 Securities held as fixed assets

<table>
<thead>
<tr>
<th></th>
<th>31 Dec 2007</th>
<th>31 Dec 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital gains, excluding exchange gains</td>
<td>160,375,365</td>
<td>245,704,224</td>
</tr>
<tr>
<td>Capital losses, excluding exchange losses</td>
<td>–51,958,199</td>
<td>–19,247,914</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Book value</th>
<th>Market value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equities, Swedish</td>
<td>281,216,585</td>
<td>334,804,051</td>
</tr>
<tr>
<td>Equities, foreign</td>
<td>321,971,187</td>
<td>265,004,986</td>
</tr>
<tr>
<td>Mutual fund units, foreign</td>
<td>1,199,818,930</td>
<td>1,480,329,563</td>
</tr>
<tr>
<td>Bonds, Swedish</td>
<td>1,250,861,615</td>
<td>1,256,274,909</td>
</tr>
<tr>
<td>Other foreign securities</td>
<td>75,589,203</td>
<td>71,713,986</td>
</tr>
<tr>
<td><strong>Total securities</strong></td>
<td>3,129,457,520</td>
<td>3,408,127,495</td>
</tr>
</tbody>
</table>

### 8 Other receivables

<table>
<thead>
<tr>
<th></th>
<th>31 Dec 2007</th>
<th>31 Dec 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refunds, withholding tax</td>
<td>687,595</td>
<td>687,595</td>
</tr>
<tr>
<td>Premium refund, Skandia</td>
<td>459,802</td>
<td>560,436</td>
</tr>
<tr>
<td>Other receivables</td>
<td>94,995</td>
<td>184,597</td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>–</td>
<td>3,023,827</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,242,392</td>
<td>4,456,455</td>
</tr>
</tbody>
</table>
### 9 Short-term investments
<table>
<thead>
<tr>
<th></th>
<th>Book value</th>
<th>Market value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money market instruments</td>
<td>74,124,166</td>
<td>74,519,385</td>
</tr>
</tbody>
</table>

### 10 Equity

<table>
<thead>
<tr>
<th></th>
<th>31 Dec 2007</th>
<th>31 Dec 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original capital of the Foundation</td>
<td>2,500,000,000</td>
<td>2,500,000,000</td>
</tr>
<tr>
<td>Change previous years</td>
<td>172,280,796</td>
<td>326,598,330</td>
</tr>
<tr>
<td>Grants awarded during the year</td>
<td>−119,881,250</td>
<td>−415,955,097</td>
</tr>
<tr>
<td>Grants cancelled</td>
<td>13,595,306</td>
<td>8,000,000</td>
</tr>
<tr>
<td>Surplus for the year</td>
<td>163,964,221</td>
<td>262,290,465</td>
</tr>
<tr>
<td>Total equity</td>
<td>2,729,959,073</td>
<td>2,680,933,698</td>
</tr>
</tbody>
</table>

### 11 Accrued expenses

<table>
<thead>
<tr>
<th></th>
<th>31 Dec 2007</th>
<th>31 Dec 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accrued management costs</td>
<td>−320,011</td>
<td>−5,455,577</td>
</tr>
<tr>
<td>Statutory social security contributions, special payroll tax/health insurance</td>
<td>−378,475</td>
<td>−597,986</td>
</tr>
<tr>
<td>Other accrued expenses</td>
<td>−254,238</td>
<td>−422,514</td>
</tr>
<tr>
<td><strong>Total accrued expenses</strong></td>
<td><strong>−952,724</strong></td>
<td><strong>−6,476,077</strong></td>
</tr>
</tbody>
</table>

---

Stockholm, 2 April 2008

Lena Treschow Torell, Chairman
Mathilda Tham
Björn Hägglund
Lars Magnusson
Maria Strömme
Charlotte Brogren

Stefan Nyström
Christina Lindbäck
Svante Axelsson
Cynthia de Wit
Johan Trouvé

Our audit report was presented on 2 April 2008

Henrik Söderhielm
Authorized Public Accountant
Appointed by the Swedish National Audit Office

Anders Bäckström
Håkan Östebo
Authorized Public Accountant
Authorized Public Accountant
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PhD (Forestry)

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Analytical Environmental Chemistry Unit

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