



# Danish solutions to global environmental challenges

The government's action plan for promoting eco-efficient technology

- Focusing on the global market
- Focusing on trends and new opportunities
- Focusing on enterprises and entrepreneurs

July 2007

The Danish Government



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In this report 'billion' and the abbreviation 'bn.' mean  
1,000,000,000 (10<sup>9</sup>).

# Contents

## Preface

## 1. Introduction and objectives

- 1.1 Eco-efficient technologies are the solution
- 1.2 The government's objectives
- 1.3 The action plan in brief
- 1.4 Evaluation points
- 1.5 Division of responsibilities
- 1.6 Financing

## 2. The nine initiatives

- 2.1 Partnerships for innovation
- 2.2 Targeted and enhanced export promotion
- 2.3 Research
- 2.4 Consultancy, information and knowledge building
- 2.5 Targeted promotion of eco-efficient technology in the EU
- 2.6 Climate and energy technology
- 2.7 Eco-efficient agricultural technologies
- 2.8 A clean and unspoiled aquatic environment
- 2.9 A healthy environments





## Preface

Denmark is a front-runner in eco-efficient technology. We have contributed to advancing the agenda - through relentless political pressure; through the power of example; and not least through adopting new types of environmental regulations that incorporate environmental technology as an integral aspect of development, for example, as in the new agricultural regulations. There are measures that purposefully push forward new technologies from research and development environments, and this is vital if we are to decouple environmental impact from economic growth. We have been successful in several areas in Denmark, and amongst other things this has provided us with an excellent window for Danish products and experience.

The government is now making public Denmark's first collective plan for technological development and innovation for the environment and resources. The plan will help ensure that Denmark continues to be a leader in this area, by establishing clear goals, targeted investments and new regulations that combined make it attractive for Danish enterprises to take the lead. For the benefit of the environment; and for the benefit of the Danish business community.

Unquestionably, the active participation of businesses is a decisive factor for innovation and renewal of the effort in Denmark, including participation in partnerships, activities and the evaluation of market opportunities. Partnerships where enterprises, researchers and the authorities set common goals and create funding to accelerate technological innovation are necessary to maintain our lead in numerous areas. Development must be supported and perhaps 'kick-started' by the public authorities, but on the other hand value is created in enterprises, among researchers and by people at home.

There is no doubt that climate change is an enormous challenge. The problem can only be solved through an ambitious, global mixture of remedies. Global political agreements and massive investments are necessary. We need new approaches and innovative thinking. New technologies that are less resource-demanding must be developed and adopted. Otherwise, the challenge becomes unmanageable.

Climate change is typical of the vast environmental challenges of our time, including, for example, reducing air pollution, ensuring clean drinking water, reducing the amount of chemicals used daily, halting the loss of biodiversity and developing cleaner livestock production. Common for each of these challenges is that efficient solutions are those that implement eco-efficient technology and that accelerate the development and demand for new technologies.

Connie Hedegaard, Minister for the Environment





# 1. Introduction and objectives



## 1.1 Eco-efficient technologies are the solution

**Climate change. A shortage of clean water. Harmful air pollution. The world is facing numerous environmental challenges that it will be difficult to overcome without the aid of new eco-efficient technologies. With this action plan, the government will contribute to further developing Danish strongholds within eco-efficient technology. The aim is for environmental, development and economic growth to go hand in hand.**

Technology already plays a decisive role in our efforts to protect the environment and its resources. In our daily lives, there is technology everywhere that limits pollution from production, transport and consumption; from the catalytic converters in automobiles to energy and water-saving enzymes for sewage treatment. Without the targeted application of eco-efficient technology, environmental problems would be much more serious than they are today.

The need for new smarter technologies will increase. The pressure put on water resources is rising. The amount of chemicals used daily remains high. Air pollution in cities is a severe problem in most of the world. Energy efficient and renewable energy resources are of high priority everywhere for the sake of the economy, security of supply and climate change.

Water, chemicals, particle pollution and climate change are just a few of the obvious examples of environmental problems that will be difficult to solve without halting development, unless there is focus on the continued development of eco-efficient technologies. Moreover, our growing knowledge and technological abilities give us new opportunities for sustainable production and consumption as well to improve health and safety at work; opportunities that we must fully exploit.

Denmark and Danish enterprises are leading the way in the development and application of eco-efficient technology. At least 60,000 Danes currently work in the nation's more than 420 environmental enterprises, i.e. enterprises that provide environmental solutions as a significant part of their business. Denmark currently exports more than

DKK 45 bn. in eco-efficient technology, of which DKK 39 bn. is in the energy sector. In other words, Denmark has been very successful at promoting eco-efficient technology and has a position that provides a good basis for the Danish business community in a market where there is a growing need for new technological solutions.

Denmark's position did not just happen by itself. It is the result of many years of dedicated effort. Implementing environmental controls, incorporating environmental considerations in, for example, the energy, industrial, transport and agricultural sectors as well as targeting public investment in research and development are crucial. Even though public authorities and institutions play an important role in the environmental effort, enterprises are the primary creators of technological solutions.

Today, environmentally driven innovation is a feature of the daily activities of many enterprises. Accomplishing this has required investment, new ways of thinking and actively involving and upgrading the skills of employees. The environment has also become good business for many Danish enterprises that produce technology where reduced environmental impact is an important sales parameter.

#### **What is eco-efficient technology?**

Eco-efficient technology is any technology that either directly or indirectly improves the environment. It is about technologies for limiting pollution with the help of cleaning, about more environmentally friendly products and production processes, about more efficient energy and resource management and about technological systems that reduce the environmental impact. This interpretation is in accordance with the EU's and OECD's 2004 definition of environmental technology.

Eco-efficient technology includes, for example, wind turbines, flue gas cleaning, water treatment, enzymes for animal feed and washing powder, biofuel production, energy-efficient pumps, environmentally friendly replacements for phthalates, LED traffic lights, efficient ship engines, environmentally friendly salmon breeding farms and precision spraying equipment for agriculture.

## **1.2 The government's objectives**

With this action plan, the government intends to strengthen, renew and focus efforts to develop and apply eco-efficient technologies so that Denmark and Danish enterprises can continue their central role in solving the world's most pressing environmental problems through technological innovation.

The government is of the opinion that efforts to promote eco-efficient technology are enhanced when planning is done coherently. Coherent efforts also provide a better pay-off by focusing more sharply on the areas in which the global environmental impacts of the future are expected to require new solutions. The government will renew efforts in line with the renewed and modernised Danish research and innovation policy.

This action plan is also an important part of Denmark's follow up to the EU's Environmental Technologies Action Plan (ETAP) and the EU decision supported by Denmark, that eco-efficient technology must be incorporated in the overall higher priority being rendered by the EU countries to research and innovation efforts. Eco-efficient technology is a good example of a target area where successfully reaching the desired results is only possible if EU member states and EU institutions work together.

While preparing the action plan initiatives, the government has adopted a number of milestones for the renewal represented by the action plan:

- We must focus on the global and European market and the effort must:
  - Contribute to solving the global community's environmental challenges.
  - Be focused so that it promotes Danish environmental and energy exports.
  - Create synergy between Danish and EU work with eco-efficient technology.

- We must focus more on enterprises and entrepreneurs and the effort must:
  - Be based on Danish strongholds, i.e. areas in which Danish environmental enterprises have proven that they have the prerequisites to be among the best in the world.
  - Be backed by better and more targeted advice for enterprises, entrepreneurs and inventors.
  - Be developed and operated, for example, by binding partnerships for innovation.
- We must focus on trends and new opportunities and the effort must:
  - Ensure that technological breakthroughs benefit the environment. For example, technological advances within areas like information and communications technology and biotechnology must be better incorporated in new eco-technological solutions.
  - Ensure that researchers and inventors see the need for finding new, intelligent solutions to environmental problems, for example, through consultancy from the authorities and through assistance in trying out new solutions.

The effort to promote eco-efficient technology is, to a great extent, about integrating consideration for the environment into technological development within the sectors that especially affect the environment, including energy, agriculture, transport, construction, industry and research and innovation.

The action plan will thus be implemented as collaboration between several ministries, each of which is in charge of the activities within their area of responsibility.

### 1.3 The action plan in brief

Eco-efficient technology is a Danish stronghold. The government supports enterprises that work with eco-efficient technology. The aim is to create new technologies that benefit the environment, welfare, exports, competitiveness and Denmark's brand as a country with an innovative and knowledge-intensive business environment.

On this basis, the government is launching nine initiatives:

Initiatives	Contents
<b>1. Partnerships for innovation</b>	Promotion of partnerships between businesses, knowledge environments, the authorities and consumers in five areas: <ul style="list-style-type: none"> <li>• Water.</li> <li>• Industrial biotechnology.</li> <li>• Mega wind turbines.</li> <li>• Biofuels.</li> <li>• Hydrogen/fuel cells.</li> </ul>
<b>2. Targeted and enhanced export promotion</b>	Cooperation between the Danish Trade Council, the Ministry of Transport and Energy and the Ministry of the Environment on export promotion with an emphasis on: <ul style="list-style-type: none"> <li>• Energy and eco-efficiency (building materials, district heating and power stations).</li> <li>• Wind power.</li> <li>• Biomass and waste.</li> <li>• Aquatic environment.</li> </ul>
<b>3. Research</b>	New strategic research funding to promote environmental technology, which supplements other research funding that supports eco-efficient technology.

<b>4. Consultancy, information and knowledge building</b>	<p>Establishment of a secretariat at the Environmental Protection Agency that is to:</p> <ul style="list-style-type: none"> <li>• Respond to inquiries from enterprises, entrepreneurs, researchers and authorities about eco-efficient technology.</li> <li>• Help new and small environmental enterprises to contact the relevant authorities and institutions, including regional incubators.</li> <li>• Prepare information materials.</li> <li>• Carry out dialogue with the manufacturers and consumers of eco-efficient technology about how to best promote the development of new technology.</li> <li>• Prepare analyses and surveys.</li> <li>• Ensure overall coordination and follow up to the action plan.</li> <li>• Expand and maintain the website <a href="http://www.ecoinnovation.dk">www.ecoinnovation.dk</a>.</li> </ul>
<b>5. Targeted promotion of eco-efficient technology in the EU</b>	<p>Promote prioritisation of environmental technology in the EU through work with the:</p> <ul style="list-style-type: none"> <li>• EU's 7th Framework Programme for research and technological development, FP7.</li> <li>• EU's Framework Programme for competitiveness, CIP.</li> <li>• EU's environmental regulation, including the IPPC and EUP directives.</li> <li>• EU's action plan for environmental technology, (ETAP), etc.</li> </ul>
<b>6. Climate and energy technology</b>	<p>Promotion of energy technology that simultaneously contributes to security of supply, competitiveness and a reduction in emissions of greenhouse gases:</p> <ul style="list-style-type: none"> <li>• New energy technology development and demonstration programme.</li> <li>• New ambitious Danish energy strategy up to 2025.</li> </ul>
<b>7. Eco-efficient agricultural technology</b>	<p>Promotion of technology for reducing the environmental impact of livestock production:</p> <ul style="list-style-type: none"> <li>• Implementation of a new research programme.</li> <li>• Stronger European network.</li> <li>• Establishment of development and demonstration schemes.</li> <li>• Establishment of a certification scheme.</li> <li>• Implementation of regulations that encourage the incentive to invest in environmentally friendly agricultural technology.</li> </ul>
<b>8. A clean and unspoiled aquatic environment</b>	<p>Promotion of technology that protects the aquatic environment:</p> <ul style="list-style-type: none"> <li>• Support of water partnerships, for example, with the aim of mapping technologies with an especially large potential in relation to meeting EU legislation requirements.</li> <li>• Implementation of testing and demonstration projects.</li> </ul>
<b>9. A healthy environment</b>	<p>Promotion of technology that reduces harmful pollution:</p> <ul style="list-style-type: none"> <li>• Mapping of Danish strongholds in the air and chemicals fields.</li> <li>• Implementation of testing and demonstration projects for new and promising technologies designed to limit air and noise pollution.</li> <li>• Special effort to reduce particle pollution.</li> <li>• Continuation of the effort to substitute undesired chemicals and to reduce the number of animal experiments.</li> </ul>

The content of the nine initiatives is looked at in detail in section 2 of the action plan. Development of the individual initiatives can be monitored at [www.ecoinnovation.dk](http://www.ecoinnovation.dk).

The action plan follows up on the government's "Report on the promotion of eco-efficient technology: The road to a better environment", May 2006, and the political agreement of November 2006 between the Liberal Party, the Conservative People's Party and the Danish People's Party on the allocation of an Environmental Billion fund. Under the agreement, DKK 120 million of the Environmental Billion will be used for financing initiatives from this action plan. A number of initiatives from the action plan are also associated with other agreements in the annual budget for 2007, including the agreement on allocations from the globalisation pool for research, innovation and entrepreneurship. The action plan must be seen in context with the government's proposal to strengthen Danish energy and climate policy as well as the multi-year plan for sustainable and environmentally correct livestock production, where the emphasis is also on promoting employment in rural districts.

In the report on eco-efficient technology the government announced that it would present an action plan for eco-efficient technology with a more elaborate description of the nine initiatives as well as a detailed plan for their implementation. A number of initiatives and activities that the government presented in the report on the promotion of eco-efficient technology had already been initiated by the government before this action plan was made public. This was done to get started quickly and to ensure the best possible interaction between the many activities the initiatives in the report build upon domestically and abroad. The timetable for this action plan indicates which initiatives have been set into motion and when the other initiatives are scheduled to start.

Moreover, efforts must be developed continuously to ensure the best possible synergy with related activities in Denmark and with EU initiatives. The action plan must interact with the EU's action plan for environmental technology (ETAP) and EU environmental regulation, just as the specific initiatives in the action plan must support the development of new technology that can help contribute to cost-effective implementation of EU legislation.

## 1.4 Evaluation points

The nine initiatives in the action plan each contain a large number of activities, services and products. In this phase of the process, it is not possible to provide an exhaustive list, but Denmark would like, for instance, to be evaluated on the basis of the following:

- Before 2009 at least five partnerships have been established and with these a number of new business concepts for the development and marketing of Danish eco-efficient technology by enterprises.
- Before 2010 grants have been distributed to at least 30 enterprise-based projects from the Environmental Billion fund for eco-efficient technology. The aim is to give enterprises with new and promising eco-efficient technological solutions within water, noise and air pollution and the substitution of undesirable chemicals the opportunity to test, demonstrate and evaluate their solutions.
- In 2007-2009 strategic research projects have been set into motion that support development by enterprises of new eco-efficient technology in relation to climate/energy, water, air pollution, chemicals, soil contamination, etc.
- Continuous updating of a list of the strongholds of Danish enterprises in eco-efficient technology.
- Defining well before the UN climate conference in 2009 in Copenhagen the Danish stance on how the development and spread of eco-efficient technology can be incorporated as a feature in an international climate agreement for the period after 2012.
- In 2007 an analysis is carried out on where significant technological barriers exist for making advances in reducing harmful air pollution based on Denmark's international commitments on air quality and on emissions caps.
- From 2007 concrete initiatives and projects are implemented that promote the use of eco-efficient technology in connection with the substitution of undesirable chemicals and that promote the use of computer-based models (QSAR) that can reduce the need for animal experiments.
- By the end of 2007 a call for tender has been held on managing the establishment of a new certification scheme for eco-efficient agricultural technologies.
- By early 2008 analyses have been prepared of "Danish lessons" concerning the connection between environmental efforts and eco-efficient technology as the basis for marketing Danish eco-efficient technology on export markets.

- By the end of 2007 an environmental agreement has been entered into with China on innovation creating collaboration projects for eco-efficient technology.
- At the end of 2007, 2008 and 2009 analyses have been prepared on eco-efficient technology for enterprises, researchers and financial institutions that focus on describing the market for eco-efficient technology, mapping Danish strongholds and milestones for enterprise development of eco-efficient technological solutions.
- By the end of 2009 Denmark has been used as a display window for the environmental and energy technology related solutions of Danish enterprises in connection with the UN's international climate conference in Copenhagen.

## 1.5 Division of responsibility

Enterprises can develop solutions that work and that can be sold on markets. Researchers can create new knowledge and communicate this to enterprises, the authorities, etc. And consumers are the first to tell about new trends and needs and they hold a key position when technologies have to be tested.

The authorities, of course, play a role when it comes to the economy, knowledge and regulation. The government sees the effort as an interface between a number of different political areas, including environmental policy, research and innovation policy, energy policy, agricultural policy, transport policy, foreign policy and industrial policy – just to mention the most significant.

The division of responsibility in the central government is shown below.

Initiative	Responsibility
<b>1. Partnerships for innovation</b>	The Ministry of the Environment (water and biotechnology) and the Ministry of Transport and Energy (mega wind turbines, fuel cells and biofuels) given that the board of directors for the Energy Technology Development and Demonstration Programme (EUDP) coordinates the further development of partnerships focused on energy.
<b>2. Targeted and enhanced export promotion</b>	The Danish Trade Council in co-operation with the Ministry of Transport and Energy and the Ministry of the Environment.
<b>3. Research</b>	The Ministry of Science, Technology and Innovation and the Danish Council for Strategic Research with input from, for example, the Ministry of the Environment.
<b>4. Consultancy, information and knowledge building</b>	The Ministry of the Environment.
<b>5. Targeted promotion of eco-efficient technology in the EU</b>	The Ministry of the Environment.
<b>6. Climate and energy technology</b>	The board of directors of the Energy Technology Development and Demonstration Programme (EUDP), the Ministry of Transport and Energy, the Ministry of the Environment, the Ministry of Science, Technology and Innovation and the Danish Council for Strategic Research.
<b>7. Eco-efficient agricultural technology</b>	The Ministry of Food, Agriculture and Fisheries and the Ministry of the Environment.
<b>8. A clean and unspoiled aquatic environment</b>	The Ministry of the Environment.
<b>9. A healthy environment</b>	The Ministry of the Environment.

## 1.6 Financing

The action plan's initiatives for promoting eco-efficient technology are financed by the following new funding:

- The Environmental Billion fund: A political agreement has been entered into between the government and the Danish People's Party to set aside DKK 120 million from 2007-2009 for the promotion of eco-efficient technology.
- The Environmental Billion fund: A political agreement has been entered into between the same political parties concerning efforts against particle pollution as well as citizen-oriented environmental initiatives, with DKK 63.5 million being set aside for efforts to curb particle emissions (including funding for the development, testing and demonstration of technologies to reduce pollution from burning wood).
- The Ministry of Food, Agriculture and Fisheries, the Ministry of the Environment, the agricultural industry and the EU's rural districts funding: An agreement has been entered into to allocate DKK 255 million to the effort to promote eco-efficient agricultural technologies (including DKK 45 million from funds for eco-efficient technology from the Environmental Billion fund, see above).
- The globalisation pool: In connection with the 2007 annual Finance Act agreement, an agreement has been entered into between the government, the Danish People's Party, the Danish Social Liberal Party and the Social Democrats about allocation of the globalisation pool. The agreement means that DKK 671 million has been earmarked for strategic research and development that supports renewable energy, environment and transport from 2007-2010. Of this, DKK 144 million has been earmarked for a new strategic research programme for environmental technology and DKK 477 million has been earmarked for a new Energy Technology Development and Demonstration Programme (EUDP). The remaining DKK 50 million is for strategic transport research and marine environment research. Finally, in its new long-term energy strategy, the government proposes that public investment in the research, development and demonstration of energy technology should be doubled up to 2010, so that it reaches DKK 1 bn. a year. The government would like to maintain this level from 2010 and onward.

Funding will also be added to this from a number of existing grants, for example:

- Allocation of research funding from the 2005 and 2006 annual budgets for focus areas: "environment and energy", "water" and "renewable energy systematised" under the Danish Council for Strategic Research – a total of DKK 249 million for 2007-2008.
- The EU's budgets for 2007-13.

The initiatives build upon a substantial existing effort. For example, the environment is estimated to be a significant element in 5-10 per cent of the funding that is granted every year for research and development.

In 2006, public funding for research and development was DKK 12.6 bn. while private funding was approx. DKK 26 bn. The activities connected to the partnerships and the testing and demonstration of different eco-efficient technologies also require active financing from enterprises.

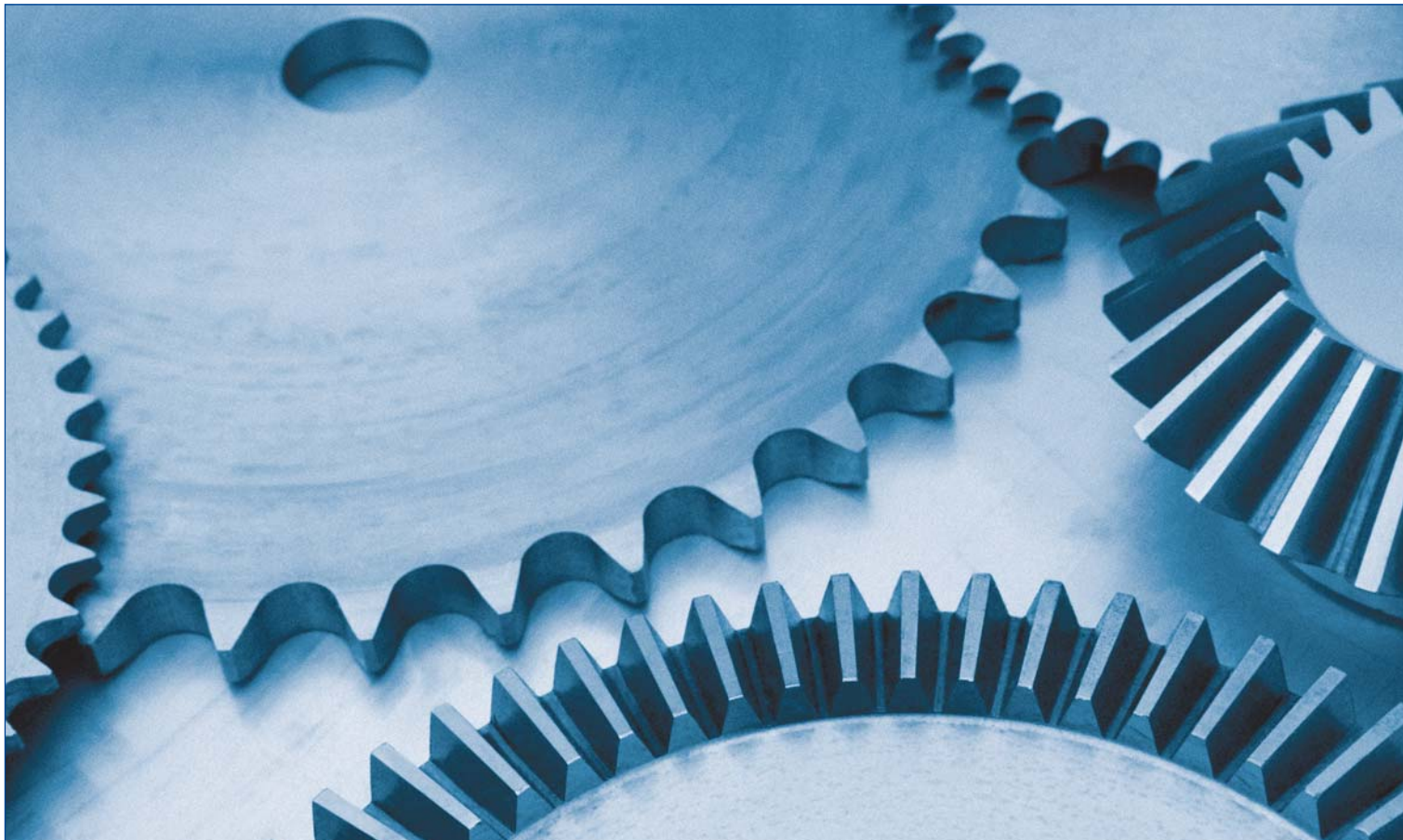


## The new funds broken down between the nine initiative areas

Initiative	Environmental Billion fund	Other new funding
1. Partnership for innovation	DKK 7 mill. for the establishment of partnerships.	Funding from the Ministry of Transport and Energy and significant financing from participating enterprises.
2. Targeted and enhanced export promotion	DKK 6 mill. for efforts by the Ministry of the Environment.	
3. Research		DKK 144 mill. from the globalisation pool for strategic research in environmental technology in 2007-2009.
4. Consultancy, information and knowledge building	DKK 13 mill. to strengthen efforts by the Ministry of the Environment.	
5. Targeted promotion of eco-efficient technology in the EU		<p>EUR 50.5 bn. has been earmarked in the EU 2007-2013 budget for FP7 and EUR 3.65 bn. for CIP, of which a portion has been earmarked for environmental innovation.</p> <p>In addition, DKK 511 mill. annually from 2007-2013 has been earmarked for Denmark to promote regional competitiveness and employment and DKK 104 mill. annually has been earmarked for Danish participation in cross-border programmes where the environment and environmental technology are a general priority.</p>
6. Climate and energy technology		DKK 477 mill. from the globalisation pool earmarked for an energy technology development and demonstration programme, of which a total of DKK 200 mill. is for the development of second generation biofuels for 2007-2010. Up to 2010, the government proposes that total public spending on research, development and demonstration of energy technology be raised so that it amounts to DKK 1 bn. a year.
7. Eco-efficient agricultural technologies	DKK 45 mill. earmarked for eco-efficient agricultural technologies.	DKK 45 mill. from the Ministry of Food, Agriculture and Fisheries, DKK 90 mill. from the agricultural industry and DKK 75 mill. from the EU rural districts funding.
8. A clean and unspoiled aquatic environment	DKK 23 mill. for testing, demonstration and assessment of eco-efficient technology.	Up to DKK 20 mill. annually from the water sector's technology development fund, cf. the political agreement concerning the future organisation of the water sector.
9. A healthy environment	DKK 26 mill. for testing, demonstration and assessment of eco-efficient technology.	DKK 63.5 mill. for efforts against particle emissions, also financed by the Environmental Billion fund.



## 2. The nine initiatives



## 2.1 Partnerships for innovation

Innovation has good conditions for growth when there is close collaboration between enterprises and between enterprises and public institutions. Strategic and committed collaboration between players in the Danish strongholds in eco-efficient technology can provide the synergy that is necessary to develop efficient, cheap and rapid solutions to environmental problems. Therefore, initially five partnerships will be established within water, industrial biotechnology, mega wind turbines, biofuels and hydrogen/fuel cells.

<b>Objective</b>	Strengthen innovation in Danish enterprises and speed up the path from development to sale of eco-efficient technological solutions.
<b>Activities</b>	Promote the establishment of five partnerships within water, industrial biotechnology, mega wind turbines, biofuels and hydrogen/fuel cells that via binding collaborations carry out a number of activities aimed specifically at the development of new business concepts and competitive eco-efficient technological solutions, including competence mapping, market analyses, testing and demonstration, analysis of consumer needs, etc.
<b>Funding</b>	DKK 7 mill. for the establishment of partnerships from 2007-2009.
<b>Responsibility</b>	The Ministry of the Environment (water and biotechnology) and the Ministry of Transport and Energy (mega wind turbines, fuel cells and biofuels), among others, with the inclusion of the Ministry of Science, Technology and Innovation and the Danish Council for Strategic Research.

### 2.1.1 Current perspectives

The expectation is that the global market of the future will demand eco-efficient technological solutions to an even greater extent than it does today. In a number of areas, Danish enterprises possess world-class competencies. This is true within water, industrial biotechnology, wind energy, biofuels and hydrogen/fuel cells. In these areas, there is considerable potential to solve significant environmental problems while Danish enterprises can achieve increased turnover on export markets:

- *Water:* There is already a great deal of pressure on water resources. According to the UN, 1.1 billion people live without access to clean drinking water. With the expected rise in temperatures in the coming decades resulting from global warming, this number could, according to the UN, rise significantly, while the risk of flooding and drought will also grow. The expansion and maintenance of sewer systems and the establishment of sewage treatment plants in Russia, India and Brazil are obvious export opportunities. Recent analyses from the Danish Export Council show that nine out of ten cities in the US are expected to undertake large capital investments in water infrastructure before 2010. Denmark has the knowledge and the resources to develop technology in the area of water protection, management and treatment. Danish exports in this area doubled from 1998 to 2002 and, according to a statement from the Danish Enterprise and Construction Authority (FORA), were approx. DKK 7 mill. in 2003.
- *Industrial biotechnology:* Industrial biotechnology has the potential to create new solutions to a number of different environmental challenges, ranging from the energy and resource efficiency enhancement of industrial processes to phasing out undesirable chemicals in consumer products. Environmental problems associated with the management of slurry is an area where industrial biotechnology in the form of new enzymes produced with the help of genetically modified micro-organisms contains new and promising opportunities to ensure better utilisation of the slurry while also reducing environmental problems, for example, odours and the leaching of nutrients to the aquatic environment. This must be seen in context of the expected significant growth in the global demand for products associated with livestock production. Denmark has a leading position in the field of biotechnology and there is great environmental and economic potential in strengthening this position.
- *Wind energy:* The International Energy Authority estimates that globally DKK 4,000 bn. must be invested annually in the energy sector up to 2030. It is expected that the global capacity for wind energy will have to expand significantly during this period. In China alone, wind turbine capacity is expected to expand to 30,000 MW by 2020. This must be compared with China's currently capacity of 1,300 MW. In the next ten to twenty years, off-shore turbines are expected to increase their importance for energy supply in Denmark and in other countries. Denmark has 35-40 per cent of the world market. Maintaining and developing Denmark's position as a leading wind power nation demands targeted research and development via public and private sector collaboration as well as the opportunity to test and demonstrate new technology.
- *Biofuels:* Biofuels are on the agenda in the EU, where in January 2007 the Commission presented an overall energy package with a proposal for a binding target of 10 per cent biofuels in liquid fuels from 2020. In Brazil, the US and China, there are high expectations regarding the potential to use bio-ethanol as a fuel in the transport sector. The expectation is that production costs for second generation biofuels will fall considerably as the technology matures so that it will become realistic to apply the technology to contribute to reducing CO<sub>2</sub> emissions from the transport sector. At the same time all industrial nations will increase their security of supply.

- *Hydrogen/fuel cells:* The increased uncertainty in the international oil market has intensified interest in hydrogen technology in many countries. In recent years, the US, Japan and Canada have invested large sums in research and development of hydrogen technology. Core competences exist in Denmark within the development and manufacture of fuel cells, and integration of hydrogen as an energy carrier in unbroken systems involves complex challenges that match general Danish core competences. Hydrogen technology can help solve, for example, some of the system challenges associated with an energy system based on wind energy. This is a prime area of focus in EU research efforts.

### 2.1.2 What we would like to achieve

The government would like to strengthen public-private collaboration on eco-efficient innovation. Enterprises face a number of challenges when it comes to developing the technological solutions of the future – challenges that can best be met if different competences are pooled together and enterprises, researchers, consumers and the authorities work together in binding collaborations in order to conquer existing barriers so that Danish enterprises can also lead the way for the next generation of eco-efficient technology.

In some areas, knowledge-based institutions and enterprises already collaborate extensively, focusing on applied research, just as a number of networks have been established to promote company competitiveness. But the path from research and innovation to competitive technologies that benefit the environment and the Danish business community must be made shorter and an important part of this endeavour is the continued development of existing networks into actual binding partnerships. The government will support the facilitation of these partnerships, which must reflect the very different backgrounds and needs of the individual partnerships. A common feature for all of them is the goal of working jointly to develop and test the technologies and business concepts of the future.

In keeping with increased internationalisation and globalisation, the trend is towards more international collaboration regarding research and development. Danish research environments and businesses should also take part in the international knowledge sharing through active collaboration with foreign knowledge-based institutions and businesses. This would constitute a solid foundation for the objective of strengthening innovation relating to environmental technology in Danish enterprises.

### 2.1.3 The action we will take

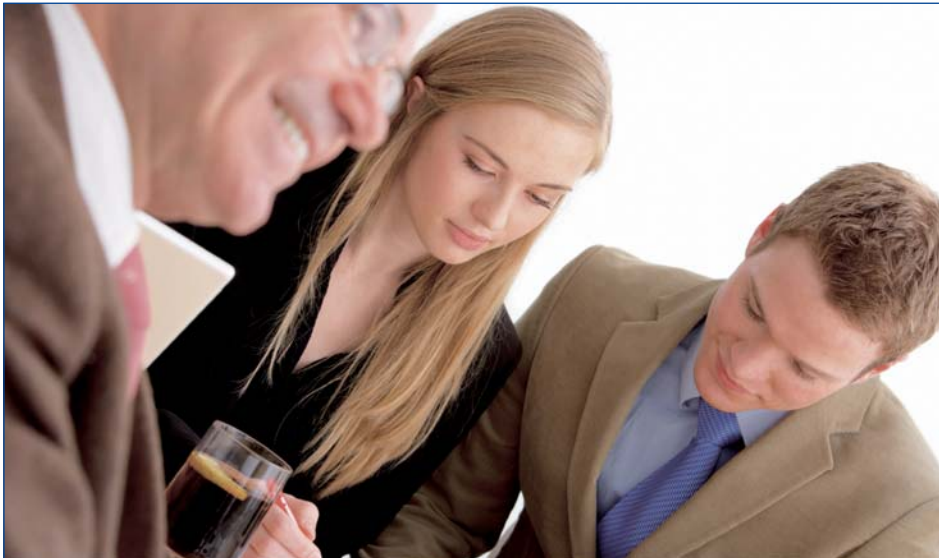
Initially, the government has taken the initiative to establish five partnerships for innovation within the areas of water, industrial biotechnology, mega wind turbines, biofuels and hydrogen/fuel cells.

The partnerships include research institutions, enterprises, the state and consumers. The partnerships must be a strategic alliance between developers, practitioners, consumers and the authorities with complete or partial responsibility for the framework conditions that have significance for business development in the area in question (see the status of the individual partnerships below).

Based on experience from these five partnerships, the government will regularly evaluate the possibility of starting up more partnerships. Initiatives have already been taken, for example, to establish a sixth partnership for innovation for environmentally friendly wood burning. This partnership aims at minimising the release of harmful particles from wood-burning stoves and boilers; the cause of approx. half of Denmark's overall particle emissions.

Enterprises and knowledge-based institutions combined are the primary driving force in the partnerships. It is their task to ensure progress that focuses on consumer needs and marketing opportunities. The government, however, is behind the initiatives and will participate actively in the partnerships.





The authorities will contribute with:

- Support for the facilitation of the partnerships
- Expert knowledge about environmental problems – causes, scope, development and effects as well as expert knowledge within, for instance, agriculture, energy, innovation and export promotion
- Knowledge about existing objectives and regulations
- Outlines of the future development of regulation in Denmark and in the EU and in relation to international agreements and conventions
- Knowledge about the expenses involved in choosing different solution methods (financial analyses)
- Technology needs assessment based on authorities' knowledge about expectations of future regulation
- Input for various public research programmes and identification of strategic research and innovation topics
- Contact with national and international decision makers in the area involved

#### Water partnership

The water partnership was established in the autumn of 2006 with a wide circle of manufacturers, civil engineering contractors, consultants, consumers and authorities, who throughout a very active introductory phase identified three thematic tracks for future work based on a combination of Danish competences, current environmental challenges and market potential. The three preliminary areas of focus are integrated solutions for water in cities, aquaculture and recreational waters. An analysis of the Danish competence profile in these areas has been completed and this will be used to further direct the work and to evaluate the need for perhaps engaging foreign partners. The partnership is now entering a new and binding phase, where business plans within the individual tracks must be prepared. The Ministry of the Environment is participating in the partnership, which consists of 24 enterprises, knowledge-based institutions and consumers.

#### Partnership for industrial biotechnology

The partnership for industrial biotechnology is currently being established. A decision has been made to concentrate efforts on new eco-efficient technologies to solve growing global environmental problems arising from ever more specialised livestock production. Thus, the partnership has been given the name "Partnership for environmentally friendly livestock", where the focus will be on slurry management in combination with bio-technological solutions.

In the first phase of the work, a combination of industrial biotechnology and a further development of mechanical technologies will be examined that can lead to new technological solutions that reduce the environmental impact from livestock production and that have interesting business potential. The Ministry of Food, Agriculture and Fisheries and the Ministry of Environment are participating in the partnership together with, currently, seven enterprises and knowledge-based institutions.

#### Partnership for mega wind turbines

The objectives of the partnership for mega wind turbines include, for example, the development of a new joint strategy for research and innovation in the field of wind power. This strategy expands on the shared vision of developing Denmark as a leading centre of competence for wind power. The partnership has a secretariat in the Danish Wind Industry Association and was established in the autumn of 2006. A steering committee has been established that is made up of representatives from the Energy Authority, RISØ, the Technical University of Denmark, Aalborg University, DONG Energy, energinet.dk, Siemens Wind Power A/S and Vestas Wind Systems A/S. The joint strategy for research and innovation has been subject to a consultation round and will be presented to the government. The strategy work will continue in the autumn of 2007 to elaborate the strategy's most important recommendations. The partnership has been given the name Megavind, and it recommends, for example, a three-stage strategy for the testing and demonstration of new technology. In close interaction with the newest research, Megavind would like to focus attention on the components, turbines and energy system. Focusing on these three elements opens up for more systematic efforts to strengthen the development of new technology.

#### Partnership for biofuels

The ambition of the partnership for biofuels is to gather a number of central players to create close interaction on the effort to develop and commercialise technologies. One element is that the partnership must create a basis for establishing a demonstration facility for the production of second generation biofuels.

The opportunities and perspectives of a partnership to promote second generation technologies for the production of biofuels are being discussed, initially by Dong Energy, Novozymes and Statoil. One central aim for a potential partnership is to realise a large-scale demonstration facility based on second generation technology. The Ministry of Transport and Energy and the Ministry of the Environment are participating in the exploratory talks concerning potential partners with regard to carrying out the government's policy of using biofuels and with regard to physical planning and environment protection in Denmark. The Danish Enterprise and Construction Authority (FORA) are assisting in the partnership by helping promote the clarification of the possibilities in this or other partnerships in the biofuel field.

#### Partnership for hydrogen/fuel cells

The partnership for hydrogen/fuel cells had been operating for some time before the report on promoting eco-efficient technology was launched in May 2006. The partnership has been expanded and organised as described in the national hydrogen strategy, "Hydrogen technologies: Strategy for research, development and demonstration in Denmark, June 2005".

The partnership involves enterprises with many different specialties and development traditions, large and small enterprises, a strong research and development environment, funding sources, educational systems and the national and international community in general as well as the political players herein. A board of directors has now been established for the partnership as well as a number of strategy groups that will monitor and provide advice on energy-related technological development.

Among the areas of focus for the partnership are, for example, fuel cells for combined heat and power, the integration of renewable energy, and fuel cells used in transport.



The Danish Energy Industries Federation functions as the secretariat for the partnership. A website for the partnership has been set up and this is a meeting place for the different players within the field.

Follow the partnership's work at [www.ecoinnovation.dk](http://www.ecoinnovation.dk).

#### 2.1.4 Timetable

At present, the following milestones exist for efforts:

2007

- Water partnership: A business plan has been prepared for each of the three thematic tracks.
- Industrial biotechnology: Investigating the opportunities for combining industrial biotechnology with a further development of mechanical technologies to develop new technological solutions for managing slurry.
- Mega wind turbines: Joint strategy for research and innovation, published at the end of June 2007. Development of the central recommendations of the strategy in autumn 2007.
- Biofuels: Clarify the possibilities for implementing a large-scale demonstration facility for second generation technology for the production of biofuel.
- An interdisciplinary conference will be held for the five partnerships.

2008 – 2009

In 2008, the establishment of an innovation partnership is expected for environmentally friendly wood burning. Other partnerships will be established as the need arises.





## 2.2 Targeted and enhanced export promotion

Intelligent Danish eco-efficient technological solutions must be sold on export markets. For the sake of the environment; and for the sake of businesses. There is great potential in countries like Brazil, Russia, India, China and the US. A special effort must be made to promote Danish environmental efforts in these areas.

<b>Objective</b>	Better foothold for Danish environmental enterprises in strategic markets of the future.
<b>Activities</b>	Analyses of environmental challenges and market opportunities, export offensives and conferences, establishment of networks, monitoring of developments and entry into bilateral agreements.
<b>Funding</b>	DKK 6 mill. for 2007-2009 in the Ministry of the Environment.
<b>Responsibility</b>	The Danish Trade Council (market analyses, offensives, conferences and export-related business consultancy), the Danish Energy Authority (analyses in the energy field) and the Ministry of the Environment (environmental analyses).

### 2.2.1 Current perspectives

Eco-efficient technologies are a growth area where, from a global perspective, Danish enterprises have good conditions for winning new market shares.

Approximately 8 per cent of overall Danish exports is made up of environmental and energy technology related products and consulting. In 2005, Denmark exported equipment and consulting in the environmental and energy fields for a value of at least DKK 45 bn. Of this, the wind turbine sector's share was over DKK 22 bn. The wind turbine sector is growing and exporting enterprises in particular estimate that the export potential is rising.

Up to now, Danish environmental enterprises have been most successful in nearby Nordic and EU markets. In the future, however, it is expected that there will be a great potential for Danish environmental enterprises in a number of new high-growth countries like China, India, Brazil and Russia. Here, there is a growing recognition that growth without improved environmental protection is not viable. Economic growth also provides financial latitude for larger investments in environmental protection. Finally, these countries have increased their focus on optimising their use of resources such as energy and water. In addition to environmental improvements, better resource efficiency creates increased security of supply and less economic waste.

For leading Danish environmental enterprises, the export market is a decisive prerequisite for being able to develop new eco-efficient and resource efficient technological solutions. The significance of domestic markets in today's globalised and specialised society is declining. For example, up to 99 per cent of all Danish wind turbine production is exported. Without export markets, it would not have been possible for enterprises to develop and produce the high-technology wind turbines of today.

### 2.2.2 What we would like to achieve

The government would like both to use an offensive strategy for exports and to take advantage of globalisation's new opportunities as a significant part of the overall effort to promote eco-efficient technology in Denmark.

The effort must result in:

- A stronger foothold for Danish environmental enterprises in a number of strategic markets of the future.
- Reduced environmental impact.
- Stronger branding of Denmark as a country that develops and produces modern eco-efficient solutions.

In order to achieve this, there is a need for more knowledge about the demand for environmental solutions on export markets and a need for more knowledge about the processes that drive demand for eco-efficient technology, including the future environmental challenges and the development of environmental regulations in different countries as well as the need to build up mutual confidence and collaboration with the relevant players and decision makers in export countries.

Denmark also has good experience with creating the political framework for technological development in the environmental field, just as Denmark plays an important role on the global political scene within a number of areas that have great significance for the development of eco-efficient technologies, for example, regarding the climate. The government would like to strengthen the synergy between policy formulation on the national and international scene and the strongholds and export experience of enterprises.

### 2.2.3 The action we will take

The government will make a special effort to promote Danish environmental exports in a number of countries which are deemed essential for Danish environmental enterprises to continue developing and strengthening their position in a situation where globalisation leads to increased competition. The countries the government will focus on are:

- Brazil
- Russia
- India
- China
- The US

The government will also concentrate its efforts on technologies where Danish enterprises are considered to have good opportunities for increasing their exports because Denmark already has clear strongholds and many small and large enterprises:

- Energy and eco-efficiency (building materials, district heating and power stations)
- Wind energy
- Biomass and waste
- Aquatic environment

Denmark's success with the combination of continued economic growth and prosperity with significant environmental improvements could become a good sales pitch for marketing by Danish enterprises in large growth markets. It is important that specific technological solutions are presented in a context (integration with existing technological systems, legislation, regulation, etc) that documents their effectiveness and that can provide a cost-effective contribution to the overall environmental effort. In this regard, local, regional and showcase examples can play an important role in demonstrating technologies in practice.

In close dialogue with enterprises, the government will regularly evaluate how the authorities can best support Danish export enterprises. Initially, the following activities will be launched:

- The Danish Trade Council will hire an export preparation consultant in the energy and environmental sector who is able to do 25 hours of voluntary consultancy on internationalisation for small and medium-sized energy and environmental enterprises (max. 50 employees and DKK 50 mill. turnover).
- Analysis of environmental challenges and market opportunities in the focus countries.
- Run export offensives and conferences in focus countries and host visits to Denmark.

- Communication-oriented analyses of the Danish environmental and energy policy solution strategies that can function as display windows for Danish products.
- Establishment of a network of sector experts within export promotion.
- Incorporation of company perspectives when entering into bilateral and international environmental agreements.
- Monitoring of the development of Danish environmental and energy exports.

The aim is, for example, to ensure that all relevant export offensives include the marketing of eco-efficient technologies that are closely associated with the effort to promote technological innovation in Denmark, international negotiation processes and contacts in the environmental and energy areas. The aim is also to accommodate enterprises' desire for better advice concerning eco-efficient technological opportunities and environmental policy development in the most important export markets.

To assist small and medium-sized enterprises the aim is to offer free customised consultancy and sparring from an experienced export preparation consultant with trade knowledge about energy and the environment who can help enterprises commence international activities by preparing an action plan for internationalisation.





International collaboration on research can also contribute to developing innovative eco-efficient technology.

The Ministry of Foreign Affairs and the Ministry of Science, Technology and Innovation jointly have set into motion a number of activities to promote Danish participation in international research collaboration, for example, in California, which is a leading location for research and innovation within eco-efficient technology.

In order to make the government's efforts as effective as possible, the Ministry of Foreign Affairs, the Ministry of Transport and Energy and the Ministry of the Environment entered in April 2006 into the agreement "Export promotion of efficient energy and environmental technologies".

The agreement states that responsibility for the activities is divided as follows:

Activity	Division of responsibility
Analyses of the market for environmental and energy technology	<ul style="list-style-type: none"> <li>• The Danish Trade Council in co-operation with the embassies.</li> <li>• The Energy Authority, in collaboration with the Confederation of Danish Industries (DI), will publish a statement covering Denmark's energy exports.</li> <li>• The Environmental Protection Agency will publish statements covering production and exports by Danish environmental enterprises.</li> </ul>
Running of offensives and conferences	The Danish Trade Council and embassies with support from the Energy Authority and the Environmental Protection Agency.
Communication-oriented analyses of Danish environmental efforts, mapping of Danish strongholds, etc	Environmental Protection Agency.
Communication-oriented analyses of Danish energy policy	Energy Authority.
Involvement of enterprises into international environmental agreements	Ministry of the Environment in collaboration with the Ministry of Foreign Affairs.
Export-oriented consultancy for enterprises	The Danish Trade Council with support from the Environmental Protection Agency and the Energy Authority.
Entering into an environmental agreement with China	Ministry of the Environment in collaboration with the Ministry of Foreign Affairs.



#### 2.2.4 Timetable

2006

- November: Publication of analyses of market potentials in priority countries.
- December: Dialogue with business organisations and enterprises about new activities.

2007

- January: Recruitment of an export preparation consultant in energy and the environment by the Danish Trade Council
- February: Publication of the new activities catalogue for 2007-2008
- April: Entry into bilateral environmental agreement with China focusing on eco-efficient technology
- April: Presentation of energy technology at Asia-Europe summit (ASEM) meeting in Copenhagen covering energy and the climate
- September: Entry into a bilateral environmental agreement with China focusing on eco-efficient technology
- December: Publication of the new activities catalogue for 2008-2009
- Year-end: Publication of statement covering Danish energy exports

2008

- February: Publication of the analysis of Danish environmental enterprises' exports
- April: Publication of the first communication-oriented analysis of Danish environmental efforts. The topic is the aquatic environment

2009

- November-December: Presentation of the Danish climate solutions in connection with the UN international climate conference in Copenhagen

Updated timetables and amended activities catalogues are available at [www.ecoinnovation.dk](http://www.ecoinnovation.dk).



## 2.3 Research

**Research and technological development in the environment are vital if Danish enterprises are to lead the development and sales of new competitive eco-efficient technologies. Better conditions need to be created for research and research-based collaboration between enterprises and research institutions in Denmark and internationally.**

<b>Objective</b>	Better conditions for research on eco-efficient technologies and for research-based collaboration between enterprises and research institutions.
<b>Activities</b>	Increased societal investment in eco-efficient technology.
<b>Funding</b>	<p>In the 2007 annual Finance Act, DKK 144 mill. was set aside for strategic research in environmental technology for 2007-2009.</p> <p>In preparation for tendering procedure in 2007-2008, in connection with the annual Finance Act agreements in 2005 and 2006 research funding supporting eco-efficient technology was set aside:</p> <ul style="list-style-type: none"> <li>• DKK 172 mill. for the environment and energy.</li> <li>• DKK 52 mill. for water as a resource and an element in nature's ecosystem.</li> <li>• DKK 25 mill. for renewable energy systematised.</li> </ul> <p>In addition to the above research funding, further funding in connection with the action plan for eco-efficient technology and other related political decisions has been set aside that is intended to support enterprises' development, testing and demonstration of new eco-efficient technology. These are described in more detail in sections 2.6-2.9, and focus on agriculture, energy and climate, water, and environment and health.</p>
<b>Responsibility</b>	Ministry of Science, Technology and Innovation and the Danish Council for Strategic Research.



### 2.3.1 Current perspectives

The world is full of examples of how targeted research has led to the development of new technologies that reduce environmental impacts. From more energy-efficient ship engines to chemicals less harmful to the health.

In a number of areas, new technologies are on their way to considerably changing priority environmental problems.

A few examples: Nanotechnology is used to design new and efficient catalytic converters for cleaning exhaust gases; biotechnology is used to produce feed enzymes that reduce the environmental impact of animal manure; advanced IT solutions are being used to optimize the operation of mega wind turbines; and the biological production and use of renewable resources contain great potential for more environmentally friendly production methods – plants, for example, can be used to produce high-tech products such as medicines and bioplastic.

The need for new technological breakthroughs is high. We continue to face great environmental challenges that are very difficult and costly to solve with the technologies available today. Here, there is a need for research that can create the necessary technological breakthroughs.

Danish enterprises which have specialised in developing and producing eco-efficient technology regularly have a need to collaborate with Danish research institutions on the development of next generation eco-efficient technologies.

Strategic research programmes combined with funding offered under the auspices of the Danish National Advanced Technology Foundation can create a good framework for this. Furthermore, the Ministry of Science, Technology and Innovation and the Danish Council for Strategic Research focus on international research collaboration as a means of supporting the development of innovative environmental technology.

Finally, a Danish dedicated effort regarding eco-efficient technology can be a part of the overall Danish effort to strengthen research within the natural sciences and technical sciences because eco-efficient technology involves challenges perceived by students and researchers as exciting and meaningful.



### 2.3.2 What we would like to achieve

The government would like to prepare Denmark as well as possible for the challenges of globalisation. If Denmark is to be able to compete with new low-wage economies like China and India, then investing in products and services containing a high level of knowledge is necessary. Enterprises must also regularly be able to renew their products so that they continue to be a more attractive choice than cheaper alternatives.

In addition, it is the government's goal to create a framework that allows Denmark to become one of the world's best at innovation and research. Danish universities must be able to measure themselves against the best in the world and Danish enterprises must be urged to invest more in research and development. The government would especially like to see Denmark become stronger in the natural sciences and the field of technology and science.

These messages come through clearly in the government's globalisation strategy, "Progress, renewal and security", which was published in April 2006.

Eco-efficient technology is an area in which the government would like to promote research and development in order to prepare Denmark for the challenges of globalisation. The government's goal is: That Denmark, Danish enterprises and Danish research institutes must lead the way when it comes to creating solutions for the world's global environmental challenges.

Danish environmental enterprises invest a great deal of money in research and development. However, the financial effort and collaboration between enterprises and universities must be intensified if Danish enterprises are to be first with competitive solutions.

The government would like to strengthen research in order to further develop Denmark's leading position in a number of eco-efficient technologies that in the future are expected to require advanced technological solutions. A stronger Danish research effort must contribute to strengthening Denmark's brand as a nation where modern technological development goes hand in hand with efforts for a better environment.

### 2.3.3 The action we will take

Entering into a welfare settlement created the financial latitude needed to increase public investment in research and development so it will comprise one percent of GNP by 2010, which represents a boost from more than DKK 12 bn. to almost DKK 18 bn. in 2010.

Entering into an agreement about the globalisation pool set in motion the allocation of this funding. Funding was earmarked, for example, for strategic research in eco-efficient technology, just as funding was set aside for the testing and demonstration of new energy technologies that, aside from contributing to security of supply and the ability to compete, will also contribute to creating a better technological basis for efforts against human-induced climate changes.

The government has simultaneously launched a number of initiatives designed to create better framework conditions for enterprises to invest in research and development. Enterprises already currently form the nucleus for the application-oriented R & D effort in Denmark as they represent two-thirds of the Danish investment in research and development, corresponding to DKK 26 bn. in 2005. Furthermore, the general rule is that enterprises can create commercial solutions that work, that can be put into practice and that can be patented so the development investment can become profitable.

The research effort made by enterprises, however, can be strengthened by good collaboration with universities on R & D projects because the enterprises' eco-efficient solutions are often based on the application of new technological discoveries created and tested at universities.

Meanwhile, university researchers, approved technological service institutes (GTS institutes) and other public research institutions also have responsibility for incorporating new discoveries in the design of the eco-efficient technology of the future. With respect to eco-efficient technology, the government will also increase its efforts to give enterprises greater incentives to invest in R & D while providing a better knowledge base for focusing on and targeting their development efforts. In keeping with this objective, for example, increased funding will be set aside to support company testing and demonstration of new eco-efficient technologies in a number of areas of application, including energy, agriculture, protection of the aquatic environment and combating air pollution. These schemes are described in more detail in sections 2.6-2.9.

The environment authorities will regularly prepare analyses and evaluations of the need for new and more effective eco-efficient technological solutions. The environment authorities will also continuously work to prevent environmental regulations from becoming unnecessary obstacles to experiments by researchers on new solutions.

In order to support high-quality research, technological development, and collaboration between knowledge-based institutions and enterprises, the government will increase public investment in research and eco-efficient technological solutions. This will partly be within the framework of existing research programmes, such as the Danish National Advanced Technology Foundation and partly from unassigned research funding and by setting aside funding aimed specifically at strategic research.

- DKK 270 mill. was set aside in the 2005 annual Finance Act for environmental and energy research, of which DKK 172 mill. will be open for tendering procedures in 2007-2008.
- DKK 78 mill. was set aside in the 2006 annual Finance Act for research on “water as a resource and element in nature’s ecosystem” and DKK 35.5 mill. for research on “renewable energy systematised”, of which DKK 77 mill. will be open for tendering procedures in 2007-2008.
- In connection with the 2007 annual Finance Act, an agreement has been entered into between the government, the Danish People’s Party, the Danish Social Liberal Party and the Social Democrats concerning the allocation of the globalisation pool. The agreement means, for example, that DKK 144 mill. will be set aside for a new research topic covering environmental technology under the Danish Council for Strategic Research that will be allocated in 2007-2009.
- Environmental technology will also be a topic that can be relevant for allocation from the globalisation pool in future years.

Responsibility for distributing the funding, co-ordination and continued work to strengthen research and technology development on the environment is divided as follows:

Task	Responsibility
Preparing tendering procedures for research on environmental technology	Danish Council for Strategic Research with, for example, input from the Ministry of the Environment, the Ministry of Transport and Energy, and the Ministry of Food, Agriculture and Fisheries.
Tendering procedure for research on environmental technology	Danish Council for Strategic Research.
Tendering procedure for strategic research funding for water, the environment and energy, and renewable energy systematised	Danish Council for Strategic Research.
Tendering procedure funds allocated to the future Energy Technology Development and Demonstration Programme (EUDP)	The board of directors of EUDP and the Ministry of Transport and Energy, see section 2.6.
Tendering procedure for funds for testing and demonstration of new eco-efficient agricultural technologies	Ministry of Food, Agriculture and Fisheries in co-operation with the Ministry of the Environment. The division of responsibility is described in more detail in connection with the initiative on eco-efficient agricultural technology, see section 2.7.



### 2.3.4 Timetable

2007

- Tendering procedure for the DKK 32 mill. for research on environmental technology that focuses on soil contamination and chemicals
- Tendering procedure for the DKK 26 mill. for research on water as a resource and element in nature's ecosystem.
- Tendering procedure for the DKK 12.5 mill. for research on renewable energy systematised .
- Tendering procedure for the DKK 92.1 mill. for research on the environment and energy.

2008

- Tendering procedure for the DKK 56 mill. for research on environmental technology focused on water, the climate and air pollution.
- Tendering procedure for the DKK 26 mill. for research on water as a resource and element in nature's ecosystem (funds must be applied for in 2007).
- Tendering procedure for the DKK 12.5 mill. for research on renewable energy systematised.
- Tendering procedure for the DKK 79.9 mill. for research on the environment and energy.

2009

- Tendering procedure for the DKK 56 mill. for research on environmental technology.

The timetable for tendering for the test and demonstration funding for energy, agriculture, water and the environment and health is in sections 2.6-2.9.





## 2.4 Consultancy, information and knowledge building

It is a big challenge for many enterprises to target their technological development and to evaluate whether their new ideas are viable. Many enterprises could also be better at taking advantage of research and development programmes. Thus, the Ministry of the Environment is establishing a secretariat designed to support enterprises and entrepreneurs in building a better basis for developing and marketing eco-efficient technology.

<b>Objectives</b>	For enterprises to become better at targeting their development of eco-efficient technology to future needs for new solutions.
<b>Activities</b>	<ul style="list-style-type: none"> <li>• Respond to inquiries from enterprises, entrepreneurs, researchers and the authorities about eco-efficient technology.</li> <li>• Help small and new enterprises in contacting the relevant authorities and institutions, including referring them to the relevant regional incubators.</li> <li>• Prepare information materials.</li> <li>• Dialogue with manufacturers and consumers of eco-efficient technology about how best to promote the development of new technology.</li> <li>• Carry out analyses and surveys.</li> <li>• Expand and maintain the website: <a href="http://www.ecoinnovation.dk">www.ecoinnovation.dk</a>.</li> </ul>
<b>Funding</b>	DKK 13 mill. for 2007-2009 as a supplement to the existing business service effort.
<b>Responsibility</b>	Ministry of the Environment and the Environmental Protection Agency.

### 2.4.1 Current perspectives

Many Danish enterprises, entrepreneurs, researchers, etc are innovative and have good, close contact with those who use their products.

With support from the authorities they can become even better at judging the environmental and marketing value of new ideas and at finding funding in the right places for the development of their ideas.

Better knowledge gives enterprises and entrepreneurs a better basis for making decisions and thus better opportunities for utilising the commercial potentials provided by the growing global market for eco-efficient technology.

Through better access to information and consultancy, especially inventors, entrepreneurs and small and medium-sized enterprises will have better opportunities to assess their ideas, just as they will have better opportunities for participating in research and development programmes in Denmark and internationally. It is often new players on the market that create the new solutions of the future.

### 2.4.2 What we would like to achieve

The government would like to strengthen the consultancy available to Danish enterprises, entrepreneurs, researchers, etc, in relation to eco-efficient technology, so that enterprises become better at targeting the development of new technologies.

It must be easy for enterprises to obtain information about:

- The technological needs arising as a consequence of environmental challenges, new environmental regulations, etc.
- Trends on the global market for eco-efficient technology.
- State-of-the-art eco-efficient technology in specific areas.
- Existing knowledge environments and the opportunities available for finding collaborators.
- Existing opportunities for obtaining financial support for research, development, and testing and demonstration of new technologies in Denmark, the Nordic countries and the EU.
- Existing opportunities for obtaining financing, including from the Business Finance Development Corporation (Vækstfonden).
- "Danish lessons" on the connection between environmental efforts and eco-efficient technology.

### 2.4.3 The action we will take

The Ministry of the Environment will establish a secretariat to handle tasks dealing with information, dialogue and creating networks on eco-efficient technology. To provide the best possible consultancy, the effort will be coordinated with relevant institutions, including especially regional incubators that function as a one-stop access to all consultancy activities for new and small enterprises with growth ambitions. This will be established through an ambassador scheme in the regional incubators for the secretariat.

The secretariat will assist in evaluating the environmental relevance of new development projects with information about opportunities for marketing eco-efficient technologies as well as the opportunities available for obtaining support for projects, etc. Thus, the secretariat will:

- Answer inquiries from enterprises, inventors, researchers, etc about eco-efficient technology.
- Ensure that new and small enterprises are referred, for example, to the regional incubators.
- Prepare information material about, for example, financing opportunities and the competences that knowledge-based institutions have, including the Business Finance Development Corporation's (Vækstfonden) services for entrepreneurs within eco-efficient technology (clean tech).
- Assist in the preparation of applications to research and innovation programmes in Denmark, the Nordic countries and, where relevant within areas prioritised by the EU.
- Assist with the effort to find collaborators and establish consortia that can apply for support to finance development projects that focus on eco-efficient technology.

In order to give advice about future regulation, the secretariat will carry out an analysis of future environment regulation in Denmark and the EU. The analysis will also identify areas in which Denmark should work to incorporate effective incentives for using and developing eco-efficient technologies.

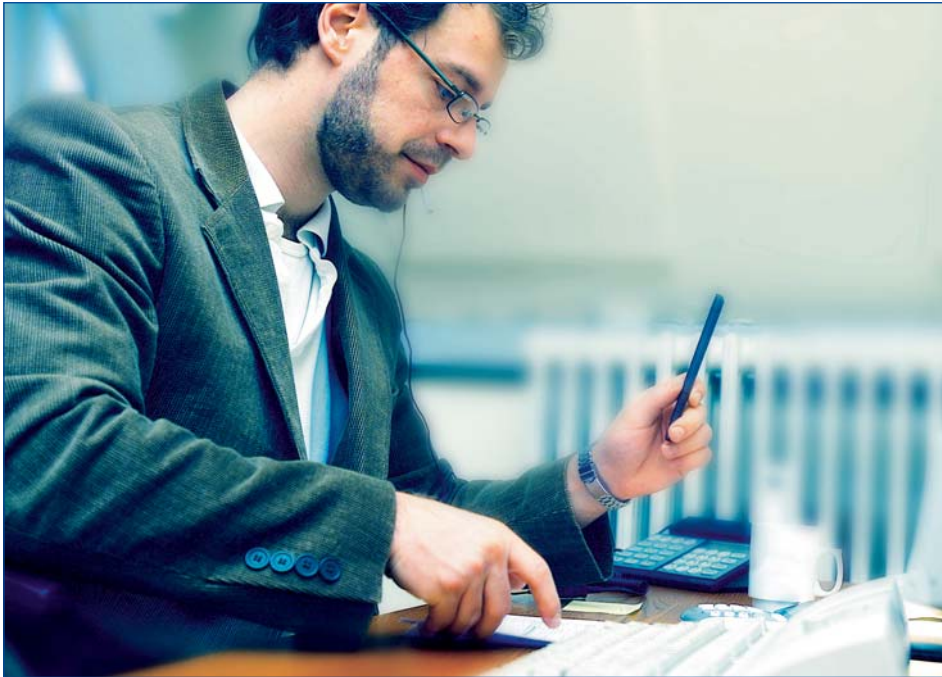
Knowledge building by the secretariat will be in dialogue with users, established partnerships (see section 2.1), knowledge-based institutions, specialist groups, regions and municipalities as well as with the other ministries, etc.

The secretariat will also carry out a number of coordination tasks in relation to the other initiatives in the action plan, including contributing to the effort to promote exports and partnerships; continuing completed surveys of Danish strongholds within eco-efficient technology; providing input for research priorities; and establishing a testing and demonstration programme for technologies in the areas of the aquatic environment and noise and air pollution.

The secretariat will also help ensure that the funding set aside for the testing and demonstration of eco-efficient technology in Denmark and the EU supports efficient implementation of environmental legislation. The secretariat will regularly provide information on the implementation of initiatives from the action plan on its website [www.ecoinnovation.dk](http://www.ecoinnovation.dk).

To promote the development of energy technology, the government will establish an Energy Technology Development and Demonstration Programme (EUDP), see section 2.6. In addition to providing grants, EUDP will actively promote public-private collaboration, including the formation of project consortia that can carry out more extensive projects. EUDP will also promote opportunities for Danish enterprises to receive a portion of the funding available, including, for example, in the EU's 7th Framework Programme.





Access to financing plays an important role in strengthening growth conditions for entrepreneurial enterprises in the environmental field. The Business Finance Development Corporation has carried out a number of analyses on venture capital perspectives in so-called clean tech in Denmark. The Corporation has also invested in a venture company with focus on the area, BankInvest New Energy Solutions, as well as directly in enterprises in the field. In future years, the Business Finance Development Corporation will contribute to expanding the Danish market for venture capital for clean tech, including investing in promising enterprises within clean tech. In order to encourage more entrepreneurialism, the Business Finance Development Corporation has also launched a clean tech prize of half a million Danish kroner, which will be awarded in November 2007 to the company that has the most promising business plan within clean tech.

#### 2.4.4 Timetable

2007

The secretariat will:

- Publish an analysis of Denmark's strongholds in relation to combating air pollution
- Publish a catalogue on research and development programmes in Denmark and internationally. The catalogue, which will be updated regularly, will be available at [www.ecoinnovation.dk](http://www.ecoinnovation.dk)
- Initiate the first tendering procedures for testing and demonstration projects in the areas of water, air and noise
- Publish the first analysis of future EU regulations

Each year, the secretariat will prepare a work programme that will be available at [www.ecoinnovation.dk](http://www.ecoinnovation.dk)



## 2.5 Targeted promotion of eco-efficient technology in the EU

There are good opportunities to promote the supply and demand of eco-efficient technology through EU cooperation. Danish enterprises and research institutes can receive funding for the development of eco-efficient technology from the EU's research, technology and innovation programmes and the demand for new environmental technology is to a large degree determined by common environmental regulation in the EU member states.

<b>Objectives</b>	Promote Danish views on how to prioritise environmental technology in EU environmental and innovation policy; and Denmark and Danish enterprises must benefit as much as possible from EU cooperation in this area.
<b>Activities</b>	Support for knowledge building and consultancy on EU programmes that relate to environmental technology and active participation in negotiations about implementing the EU's 7th Framework Programme for research and development (FP7), the EU's framework programme for competitiveness and innovation (CIP), the EU's environmental regulation, the EU's action plan for environmental technology (ETAP) and for the preparation of Danish proposals for creating better synergy between EU environmental regulation and the development of environmental technology.
<b>Funding</b>	The EU's research and innovation programmes and regional support will be financed via the EU's budget. Knowledge building and consultancy in Denmark will be financed by the ministries responsible.
<b>Responsibility</b>	The Ministry of the Environment (the EU's action plan for environmental technology), the Environmental Protection Agency (IPPC, BAT notes, the NEC directive and REACH), the Ministry of Science, Technology and Innovation (FP7), the Ministry of Economic and Business Affairs (CIP and the EU's regional funds) and the Danish Energy Authority (EUP).

### 2.5.1 Current perspectives

With the Lisbon Strategy, the EU heads of state and government set the goal that the EU must be the most dynamic and competitive knowledge economy by 2010. The aim is to increase economic growth and reduce unemployment. One of the means to promote this goal is to increase investments in R & D, an area where the EU lags behind countries such as the US and Japan. The goal is for EU member states to spend at least 3 per cent of their GNP on R & D up to and including 2010.

Economic growth must continue while simultaneously showing consideration for the environment. According to the Lisbon Strategy, this will be ensured, for example, by promoting eco-efficient technology for the benefit of both the environment and the economy.

Based on this, in 2004, the European Commission launched an action plan for environmental technology (ETAP). ETAP has been designed to strengthen, prioritise, coordinate and evaluate efforts for environmental technology in the EU, while also creating synergy between efforts by the EU and member states.

Eco-efficient technology must be one of the areas under special consideration as more funding is set aside for research and development both in the EU budget and the individual budgets of member states.

The significance of the EU's environmental policy stretches far beyond the EU's borders. The EU is an important player in the world economy and the EU has chosen to put itself at the forefront for solutions to a number of global environmental challenges, for example, climate change and the spread of chemicals harmful to the environment and the health.

The EU is a key player on the global market for eco-efficient technology and the EU's efforts regarding eco-efficient technology are globally oriented.

### 2.5.2 What we would like to achieve

The government will promote Danish views on the prioritisation of eco-efficient technology in EU environmental and innovation policy. In this regard, the government will ensure that Denmark and Danish enterprises benefit as much as possible from EU co-operation in this area.

The government will work toward:

- Regular adjustment of the EU's environmental regulations so that the greatest possible environmental improvements are harvested from the opportunities that technological development creates.
- Targeting EU research, technology and innovation policy toward removing the technological barriers preventing realisation of the EU's long-term environmental objectives.
- Danish enterprises and research institutions becoming better at taking advantage of the opportunities provided by EU environmental policy for increased Danish environmental exports.
- Encouraging Danish enterprises and research institutions to participate in EU research, technology and innovation programmes within priority areas where there is a need to develop new eco-efficient technological solutions.



### 2.5.3 The action we will take

The EU 7th Framework Programme for research and technological development

In relation to future implementation of the EU 7th Framework Programme for research and technological development (FP7), the government will:

- Prepare Danish proposals for future work programmes for the implementation of FP7.
- Participate in programmes launched by the European Commission to promote the coordination of member states' research programmes for eco-efficient technology. Also in this regard, a position will be taken as to whether Denmark can advantageously participate in a binding co-operation with other EU member states on a joint tendering procedure for funding for R & D. The same potential will be evaluated in relation to the Nordic Council of Ministers.
- Support Danish participation in the EU technology platforms for sustainable chemistry, for water, for sustainable construction and in a number of technology platforms that focus on the development of future renewable energy technology.
- Provide information about the possibilities for Danish participation in the EU 7th Framework Programme. From 2007, the effort regarding information and consultancy has been strengthened in that EuroCenter (Denmark's National Contact Point (NCP) for the EU 7th Framework Programme) has become an integral part of the Danish Agency for Science, Technology and Innovation. The centre's resources have also been increased.
- Support EU pilot projects and support the preparation of applications for Danish participation in EU efforts using network and basic funding, and through the EuroCenter assist Danish applicants in writing applications.
- Work to make eco-efficient technology and environmental innovation a focus area in the future "European Institute of Technology" (EIT). This could be, for example, by establishing a "Knowledge and Innovation Community" (KICs) in connection with the future EIT.



#### Programme for sustainable production

Over the last three years, the Environmental Protection Agency has been a partner in a project under the EU's 6th Framework Programme for research and technological development. The project is designed to create the framework for a future joint research and technology programme for sustainable production. The consortium consists of more than 13 institutions administrating R & D programmes in eight EU countries.

In the first six months of 2007, the consortium must decide how future collaboration is to continue. It would be natural to look into the possibility of internationalising Danish partnership activities through this collaboration, and it should be examined whether Danish research funding for eco-efficient technology in the Danish Council for Strategic Research could be incorporated in the project.

#### The EU's framework programme for competitiveness and innovation

Regarding the future implementation of the EU's framework programme for competitiveness and innovation (CIP), in connection with Danish participation in CIP's administrative committees, the government will work toward ensuring eco-efficient technology remains a focus area.

The Commission has earmarked a portion of the CIP budget for environmental innovation.

#### The European Regional Fund and the European Social Fund

The Regional Growth Forum's strategies form the basis for prioritising the annual approx. DKK 511 mill. received from EU funds to promote regional competitiveness and employment in Denmark. The environment, including environmental technology, is a priority for all of the funds.

Similarly, Danish participation in cross-boarder environmental projects can be applied for from programmes for European territorial collaboration. From 2007-2013 the EU will make available an annual DKK 104 mill. for Danish participation in this type of project. The administrative/supervision committees for each programme determine how the funding will be applied.

#### EU environmental regulation

In order to contribute to improving interaction between the EU's environmental regulations and Danish investments in eco-efficient technology, the government will work toward the following:

- *Cross-disciplinary knowledge building*: An analysis of future EU regulations dealing with the environment will be completed in order to:
  - Clarify the areas in which Denmark should promote incorporation of efficient incentives for the development and application of eco-efficient technologies.
  - Ensure that Danish enterprises are notified promptly of forthcoming requirements.
  - Improve enterprises' basis for initiating technological development.
- *The IPPC Directive* (EU directive on integrated pollution prevention and control in industry): To prepare the Danish position on the forthcoming update of the list of the least polluting production technologies (BAT notes), the Ministry of the Environment will:
  - Complete a survey of where Danish environmental enterprises can supply production technology to industry that makes it possible to raise the standard of next generation BAT notes. Relevant areas of focus are increased utilisation of enzyme-based processes to replace undesirable chemical processes and new technologies that make it possible to increase the recycling of industrial water.
  - Prepare the Danish contribution to a revision of the five to ten BAT notes that will lead to less pollution and an increase in demand for eco-efficient technology.

- *EuP Directive* (the EU's Framework Directive on the environmentally friendly design of energy using products): The government will:
  - Work for ambitious energy requirements in the implementation rules in the Framework Directive.
  - Complete regular evaluations of how to best create synergy between the EuP directive and other parallel environmental regulations, including EU chemical legislation, the EU directive on waste from electric and electronic equipment (WEEE) and the directive on limiting the utilisation of certain dangerous materials in electric and electronic equipment (RoHS).
- *Other EU directives*: A broad effort will be made to promote a number of other EU directives where there are opportunities for establishing incentives to promote eco-efficient technologies. This applies, e.g. to:
  - The NEC Directive (a directive on national emissions ceilings for certain air pollutants).
  - REACH Regulation (EU regulation on the registration, evaluation, authorisation and restriction of chemicals).

#### EU action plan for environmental technology

In relation to the further development of the EU's environmental technologies action plan (ETAP) Denmark will:

- Prepare a proposal for how the Commission can ensure that ETAP will be better integrated into EU environmental regulation in the future.
- Encourage the Commission to survey the technological barriers that exist to realising the Commission's long-term environmental goals.
- Prepare an analysis of how Danish enterprises can benefit from participating in the implementation of initiatives in ETAP, including participating in the design of a future joint European test and verification system for environmental technology.

The Commission's website on ETAP provides an overview of how the Commission and EU member states follow up the action plan for environmental technology:  
<http://ec.europa.eu/environment/etap/>.

Responsibility for representing Danish interests and positions in the EU:

Task	Responsibility
7th Framework Programme for research, technological development and demonstration	Ministry of Science, Technology and Innovation with input from relevant ministries and institutions.
The EU Framework Programme on competitiveness and innovation	Ministry of Economic and Business Affairs with input from relevant ministries and institutions.
EU structure funding (the Regional Fund and the Social Fund)	Ministry of Economic and Business Affairs upon recommendations from the regional growth fora.
EU environmental regulation	Ministry of the Environment, but relevant sector ministries are responsible for sector-specific environmental regulation.



#### 2.5.4 Timetable

For a number of EU initiatives, planning is dependent of the pace of the political decision-making process in the EU. As a result, it can be necessary to adjust the timetable. The current timetable is:

2007:

- Publication of analysis of EU environmental regulation
- Preparation of Danish proposals for work programmes for programme committees under FP7 for 2008
- Preparation of Danish proposals for tendering procedures for funding under CIP for 2008
- Danish input for the benchmarking of member states' contributions to the implementation of ETAP
- Conference on the EU's future strategy for environmental innovation
- Preparation of the Danish position on the introduction of a European test and verification system for environmental technology

2008:

- Danish input for the priority BAT notes
- Preparation of Danish proposals for work programmes and programme committees under FP7 for 2009
- Preparation of Danish proposals for tendering procedures for funding under CIP for 2009



## 2.6 Climate and energy technology

Climate change is one of our greatest environmental challenges. It is expected that both large CO<sub>2</sub> reductions and adapting to climate change will be necessary. In Denmark and internationally, there is a need for technology that reduces energy consumption and uses new energy sources. The nature of the challenge should be seen in light of the fact that a secure and cost-efficient energy supply has great significance for growth and development in Denmark and globally. The global energy system and transport sector are predominantly based on fossil energy sources. As a result, the government is launching an intensive effort for the research, development and demonstration of climate and energy technologies of the future in order to contribute to increased security of supply, more competitive energy production and a significant reduction in emissions of greenhouse gases.

<b>Objectives</b>	Promote research, development and demonstration within climate and energy technologies that support the government's climate and energy objectives in the short and long term, including security of supply, competitiveness and a reduction in greenhouse gas emissions.
<b>Activities</b>	Establish EUDP (Energy Technology Development and Demonstration Programme), including further development of partnerships on hydrogen/fuel cells, mega wind turbines and biofuels. Strategic research in energy and the environment, cf. the description in section 2.3.
<b>Funding</b>	DKK 477 mill. from 2007-2010 from the globalisation pool for EUDP. Funding from the former Energy Research Programme (EFP) will be transferred to EUDP, which means the programme will have a total of DKK 712 mill. available in 2007-2010. The Danish Council for Strategic Research will provide DKK 172 mill. in 2007-2008 for the priority area "environment and energy" as well as DKK 25 mill. for the priority area "renewable energy systematised", see the annual Finance Acts for 2005 and 2006. Funding will also come from public service obligations (PSO) paid via the price of electricity, the Danish National Advanced Technology Foundation and Denmark's contribution to the EU research programmes for non-nuclear energy. The overall public funding for research, development and demonstration in the area of energy is thus more than DKK ½ bn. a year.
<b>Responsibility</b>	The EUDP board of directors, the Ministry of Transport and Energy, the Ministry of the Environment, the Ministry of Science, Technology and Innovation and the Danish Council for Strategic Research.



### 2.6.1 Current perspectives

Climate change is a global challenge that requires global action and political leadership both nationally and from the international community. In order to live up to the UN's objective to avoid serious climate change, the EU is working on the basis of the goal that global temperature rises must not exceed 2°C. The EU estimates that this will require the reduction in global emissions by up to 50 per cent by 2050 and that industrialised countries should reduce emissions by 30 per cent by 2020 and 60-80 per cent by 2050 compared to emissions in 1990. The EU has decided to take the lead in the international effort to reduce emissions of climate gases. In March 2007, EU heads of state and government approved a number of ambitious climate objectives for 2020, including:

- Working for a new global agreement in which the EU commits to reducing emissions of greenhouse gases by 30 per cent in comparison to 1990, other industrialised countries commit to comparable reductions and the most economically developed developing countries commit to a suitable contribution.
- As a first step, taken even before the global agreement, the EU has committed to reducing greenhouse gas emissions by at least 20 per cent by 2020.
- Implementation by member states of energy savings equivalent to 20 per cent of expected energy consumption by 2020.
- A binding agreement to have renewable energy make up 20 per cent of the EU's energy consumption by 2020.
- A binding minimum agreement to have biofuel account for at least 10 per cent of the transport sector's energy consumption by 2020.

Today, EU member states are obligated to reduce the EU's overall greenhouse gas emissions by 8 per cent from 2008-2012 in comparison to 1990.

Less pollution from the energy system, the transport sector and agriculture is a critical prerequisite for a better environment. We have come far in Denmark in reducing most types of pollution from energy production, except CO<sub>2</sub> emissions because the existing energy system is still primarily based on the utilisation of fossil fuels such as coal, oil and gas.

Internationally and in Denmark, CO<sub>2</sub> emissions from fossil energy consumption make up the majority of human-induced greenhouse gas emissions. According to the International Energy Agency's "World Energy Outlook 2006", the world's CO<sub>2</sub> emissions in 2030 will be 55 per cent higher than they are today if no significant steps are taken to promote more efficient utilisation and production of energy; to switch to CO<sub>2</sub>-neutral energy sources; and to reduce emissions from the transport sector.

Stable and adequate energy supply is a precondition for development and prosperity. Apart from environmental considerations, security of supply is also an important aspect of the government's efforts to change energy consumption.

The oil and gas production of EU countries is expected to peak within the next twenty years. In 25 years, Europe is expected to import 94 per cent of its oil needs and 81 per cent of its gas consumption.

Switching to renewable energy sources is thus necessary in the coming years to ensure increased security of supply and a significant reduction in the emission of greenhouse gases. This is widely recognised – also outside of Europe. China, for example, aims to increase renewable energy to 15 per cent of total energy consumption by 2020. The International Energy Agency also expects the global capacity for wind energy to multiply in the period up to 2030. Denmark's share of the global market for wind energy is currently 35-40 per cent, which means there is significant export potential in the global market for Danish enterprises working with climate and energy technologies.

### 2.6.2 What we would like to achieve

To reduce global climate change, the government would like Denmark and the EU to continue to play a central role in international climate negotiations. Technology development and the transfer are essential aspects of this effort.

Denmark is currently already a world leader in using energy efficiently and in increasing its use of renewable energy.

Danish exports of energy technology amounted to about DKK 39 bn. in 2005, of which technology related to renewable energy was approx. 70 per cent. The government will work to continue to develop this position, and the government supports the increased focus on energy policy in the EU.

In January 2007, the government presented an ambitious long-term Danish energy strategy with the overall objectives of reducing the utilisation of fossil fuels, increasing the share of renewable energy and boosting energy-saving efforts up to 2025. In this regard, the government has proposed that funding for energy research be increased to DKK 1 bn. annually from 2010.

This energy strategy thus contributes positively to meeting the objectives presented in the government's climate plan, which will ensure that Denmark lives up to probably the most ambitious reduction commitment in the world, namely 21 per cent by 2012.

In Denmark, as in the rest of the world, there is especially a need for new technologies that can minimise energy consumption and reduce dependence on fossil energy. A number of Danish energy technologies are already among the best in the world. This is the case, for example, for wind power, fuel cells and second-generation biofuels.

In fact, for wind power, many examples exist of foreign enterprises who seek out Denmark to become a part of the Danish knowledge and competence environment, which is of international quality and includes, for instance, well-functioning public-private collaboration. The government will ensure that this strong position is developed and expanded so that Danish enterprises come to play a central role in the global market for climate and energy technologies.

### 2.6.3 The action we will take

In order to meet Danish energy and climate objectives, the government will intensify its focus on the research and development of climate-friendly technologies. This effort includes, for example, the following:

- Internationally, the government is working toward an ambitious climate agreement for reducing global emissions of greenhouse gases from 2012 and onwards. Technological development and the transfer of technology will be important aspects of the agreement. Technological development will be supported by further developing the EU's energy policy and by revising the EU's greenhouse gas emissions trading scheme.



- Regarding the EU's future energy policy, Denmark will work toward, for example:
  - having the EU continue to set ambitious objectives for renewable energy.
  - having the EU be the most energy efficient economy in the world.
  - having the EU ensure binding minimum requirements for energy efficiency for new passenger cars and delivery vans with the aim of reducing fuel consumption in new cars.
  - having the EU double funding for the research and development of renewable energy and energy efficiency improvements in connection with the mid-term review of the budget for 2007-2013 and the subsequent budget period.
- The government has presented an ambitious long-term Danish energy strategy with the overall objective of reducing the utilisation of fossil fuels, increasing the share of renewable energy and increasing energy-saving efforts in the period up to 2025. In this regard, the government has proposed, for example:
  - that the utilisation of fossil fuels be reduced by at least 15 per cent.
  - that renewable energy make up at least 30 per cent of all energy consumption by 2025.
  - that biofuels for transport make up 10 per cent of all energy consumption by 2020 and that in the coming years significantly more resources will be put into further developing second generation biofuels.
  - that efforts to save energy be strengthened in order to reduce overall energy consumption.
  - to continuously increase public investments in the research, development and demonstration of energy technologies so that from 2010 they equal DKK 1 bn. annually, representing a twofold increase.

- The government will establish a new Energy Technology Development and Demonstration Programme (EUDP), which will especially focus on ensuring that new research results and technological innovations are transformed into commercially accessible competitive energy technologies. This can be realised, for example, by focusing to a higher degree than previously on the demonstration (testing) of new technologies. The EUDP will also contribute to establishing and developing innovation-oriented partnerships between enterprises, public institutions and universities. For example, this will apply for mega wind turbines, biofuels and hydrogen and fuel cells.

Foreign climate projects under the Kyoto Protocol's "Joint Implementation" (JI) and "Clean Development Mechanism" (CDM) are also important elements in the government's climate policy. Purchasing CO<sub>2</sub> credits is mainly a task for private enterprises covered by the rules in the EU's ETS directive. The government contributes by purchasing climate credits and with a number of other initiatives in order to 'kick-start' the market more quickly than otherwise would have been the case. The framework for the national JI and CDM efforts is set out in the new strategy for the area from the Ministry of the Environment and the Ministry of Foreign Affairs, which was launched in March 2007. Among the objectives of the strategy is the promotion of transfer of eco-efficient technology to Eastern Europe and developing countries. In this regard, the government will intensify efforts to identify and develop JI and CDM projects matching the Danish technology suppliers' strongholds. The Ministry of the Environment and the Ministry of Foreign Affairs will also provide advice and arrange contacts for Danish technology suppliers.

Responsibility for implementing the tasks is as follows:

Task	Responsibility
International climate agreement	Ministry of the Environment.
National energy strategy and EU energy strategy	Ministry of Transport and Energy.
JI and CDM projects	Ministry of the Environment and the Ministry of Foreign Affairs.
Strategic energy and climate research	Ministry of Science, Technology and Innovation and the Danish Council for Strategic Research with input from relevant sector ministries.
Development and demonstration of energy technology	The EUDP board of directors and the Ministry of Transport and Energy. A secretariat for EUDP will be located at the Danish Energy Authority and this will involve the relevant authorities as agreed later, including the Ministry of the Environment (especially regarding climate and environmental technology questions) and the Ministry of Science, Technology and Innovation.
Other climate technologies	Ministry of the Environment, because relevant sector ministries are mainly responsible for sector-specific environmental regulation.



#### 2.6.4 Timetable

2007

- Allocation of funding to the Energy Technology Development and Demonstration Programme (EUDP):
  - DKK 50 mill. for second generation biofuels
  - DKK 60 mill. for other energy technology

2008

- Allocation of funds to EUDP:
  - DKK 50 mill. for second generation biofuels
  - DKK 82 mill. for other energy technology

2009

- Allocation of funds to EUDP:
  - DKK 50 mill. for second generation biofuels
  - DKK 83 mill. for other energy technology

2010

- Allocation of funds to EUDP:
  - DKK 50 mill. for second generation biofuels
  - DKK 52 mill. for other energy technology

A number of energy and environmentally oriented research funding will also be made available under the auspices of the Danish Council for Strategic Research, as described in section 2.





## 2.7 Eco-efficient agricultural technologies

In many places in the world the environment is under pressure from ever more intensive farming. This development will continue in step with globalisation and population growth. The challenge is to accommodate the increased demand for food without harming the environment and nature. Thus, there is a growing demand for eco-efficient agricultural technologies. Denmark stands strong in this area. With the government's multi-year plan for sustainable and environmentally correct livestock production and a report for the Danish Parliament about eco-efficient technologies, the government has decided to target efforts on research, innovation and certification that ensure improved development of eco-efficient agricultural technologies from idea to market for the benefit of the environment, agriculture and exports.

<b>Objectives</b>	Strengthen a coherent innovation chain from idea to market for eco-efficient agricultural technologies.
<b>Activities</b>	Promote eco-efficient agricultural technologies through a new research programme, an enhanced European network, better innovation, funding for development and demonstration programmes, establishment of a certification scheme, and enhanced international standardisation efforts.
<b>Funding</b>	DKK 255 mill. for 2007-2009. In addition research into eco-efficient livestock technologies is included in the DKK 144 mill. set aside for strategic research in environmental technology for 2007-2009 (described in section 2.3).
<b>Responsibility</b>	Ministry of Food Agriculture and Fisheries and the Ministry of the Environment with input from the Ministry of Science, Technology and Innovation and the Danish Council for Strategic Research.

### 2.7.1 Current perspectives

We are dependent on the food produced by agriculture. Agriculture also plays a central role for the environment and nature in Denmark. Today, 65 per cent of Denmark is covered by agricultural land. For Denmark, a central environmental and business policy challenge is ensuring that growth and the dynamics of agriculture go hand in hand with consideration for the environment and nature. A number of countries are facing the same challenge. With increased global competition and an increasingly greater demand for food products, the market for eco-efficient technologies in agriculture will grow.

Eco-efficient technologies will play a central role in farming in the future in the industrialised world. Eco-efficient technologies can contribute to ensuring that modern agriculture can exist together with the surrounding nature and neighbours. Enzymes in feedstuff that limit ammonia evaporation from livestock manure, new technologies for limiting stall odours, new methods for application of livestock manure on farmland and effective technologies for slurry separation are all examples of technologies that are being developed and that will make it possible to decouple the connection between the volume of production and the environmental impact.

In recent decades, farms have changed. Production has become more and more specialised and concentrated in increasingly fewer production units. This creates a better capital and competence base that allows individual farmers to use investments in new environmental technologies to overcome their environmental problems.

From a global perspective, the market for advanced eco-efficient technologies for the agricultural sector is very large and is expected to grow. There is great potential in ensuring that Denmark takes advantage of and strengthens important competence strongholds in this area. This will contribute to ensuring that the agricultural and food products sector continues to be a part of the basis for Danish prosperity and continues to participate actively in working toward developing new technologies.

Technology development also means that the role of agriculture will be redefined. Agriculture will develop from solely supplying food products to also supplying, for example, raw materials for energy production and new materials. Biomass, bioethanol and biodiesel are known examples of energy sources. The development of new slurry management technologies has the potential for both improved fertilisers and for energy production. Biotechnology has great potential in such diverse new areas as medicine, packaging, buildings and biopesticides.

### 2.7.2 What we would like to achieve

The government would like to create a coherent effort, from idea to market, within the entire development chain for eco-efficient agricultural technologies. The aim is that through a focused and joint effort that promotes eco-efficient technological solutions in agriculture, we can contribute to meeting a number of environment policy objectives while simultaneously strengthening the competitiveness and export opportunities of agriculture and associated sectors on the global market.

The government believes incentives must exist to invest in eco-efficient technologies in agriculture's primary production. With new legislation on the environmental approval of livestock farms, Denmark has taken an important step to ensure that in the future farming will have less environmental impact. The new environmental approval means that expanding or establishing new livestock farms alone cannot be the reason for significantly impacting neighbours and the environment with odours or nutrients. The legislation's tough new environmental requirements provide an incentive to introduce new technological solutions in an area where both Danish industry and research have throughout the years built up extensive competences. The government would also like to remove barriers to applying eco-efficient technologies in farming and to examine the possibility of introducing incentives to invest in the development, documentation and demonstration of eco-efficient technologies.





### 2.7.3 The action we will take

With the government's "Multi-year plan for sustainable and environmentally correct livestock production" and with a report for the Danish Parliament on eco-efficient technology, the government has launched a three-year package in collaboration with the industry to promote eco-efficient technology in the agricultural sector. The initiatives in the package are in the following areas:

#### Research

- Enhancing research and development within advanced feed, breeding and information technologies (DKK 45 mill.): The Advisory Committee for Food Research (RUFF) has been requested to prepare a programme proposal on holistic animal husbandry research based on the environment and animal welfare. This effort is to be seen, for example, in connection with the Committee's biotechnological research strategies for food, non-foods and feed.
- Enhancing Danish participation in and influence on the European technology and research collaboration (ERA) by establishing a network to be supported by DKK 9 mill. from the Ministry of the Environment. This effort occurs in collaboration between the Ministry of the Environment and the Ministry of Food, Agriculture and Fisheries.

#### Development and demonstration of technologies

- Innovation topic under the Ministry of Food, Agriculture and Fisheries Innovation Act: innovation subsidies for environmental technologies that contribute to dynamic and sustainable livestock production (DKK 30 mill.).
- Subsidies for the development and demonstration of eco-efficient agricultural technologies and subsidies for marketing environmentally and climate friendly technologies that facilitate the market (DKK 150 mill.).

### Certification and standardisation

- A dynamic and impartial certification scheme will be established that provides users with a guarantee for the performance of the new technology. Efforts will also be made to strengthen technical standardisation work. The Ministry of the Environment has prepared terms of reference and a timetable. EU tendering procedures for the certification scheme, including strengthening standardisation work, will be initiated at the beginning of 2007 (DKK 21 mill.).

Implementation of initiatives in the three-year package will be co-ordinated in a contact forum established with participation from the Ministry of Food, Agriculture and Fisheries, the Environmental Protection Agency and Danish Agriculture.

In connection with this package of initiatives, the partnership on industrial biotechnology focuses on the development of technological concepts that, for example, with the help of biotechnology projects, can remedy environmental problems stemming from handling livestock manure.

Responsibility for implementing of these tasks is as follows:

Task	Responsibility
Research	Ministry of Food, Agriculture and Fisheries, the Ministry of Science, Technology and Innovation and the Danish Council for Strategic Research.
Development and demonstration	Ministry of Food, Agriculture and Fisheries.
Certification and standardisation	Ministry of the Environment (the Environmental Protection Agency).

## 2.7.4 Timetable

### 2007

- Mid-year: Research: Expected start of round of applications for the three-year programme for strengthening R & D within advanced eco-efficient feed, breeding and information technologies.
- Mid-year: Research: Expected implementation of funding for enhancing participation in European technology and research collaboration.
- Mid-year: Certification: Establishment of a dynamic and impartial certification system, enhancement of technical standardisation work and improved preparation of data sheets on the best available techniques.
- Mid-year: Innovation: Expected start of round of applications for subsidies for the environment innovation topic under the Ministry of Food, Agriculture and Fisheries Innovation Act.
- Year-end: Innovation and demonstration: Expected start of round of applications for subsidies for development and demonstration of eco-efficient agricultural technologies, including the development of marketable residue-products and market facilitating subsidies for environmental and climate friendly technologies.

### 2008-2009

- On-going implementation and administration of the schemes established in 2007.

Developments can be followed on [www.ecoinnovation.dk](http://www.ecoinnovation.dk) and [www.skovognatur.dk/Emne/Landbrug](http://www.skovognatur.dk/Emne/Landbrug).



## 2.8 A clean and unspoiled aquatic environment

Water is a life-giving resource. We use water in incredibly many situations – as drinking water, bathing water, process water, hot water for domestic use, hydropower, aqua-culture water and more. The way we use water has a direct impact on the quality of the water and the amount of water available, just as it can indirectly influence both the surrounding nature and human health. Eco-efficient technology is an indispensable tool for ensuring clean water, creating a better aquatic environment and decoupling economic growth from further impacts on the aquatic environment.

<b>Objectives</b>	Strengthen the development and marketing of new technological solutions for water that contribute to solving significant environmental problems and that ensure the efficient implementation of EU environment regulation.
<b>Activities</b>	Support the water partnership, for example, by mapping technologies with especially high potential for meeting EU legislation, by establishing a testing and demonstration scheme for technology and with strategic research on water as a resource and element of nature's ecosystem (described in section 2.3).
<b>Funding</b>	DKK 23 mill. for 2007-2009 from the Environmental Billion fund. Approx. DKK 20 mill. annually from 2008-2010 from the water sector's technology development fund. Under the Danish Council for Strategic Research a total of DKK 52 mill. will be offered in 2007-2008 for research and development within the priority area of "water as a resource and an element in nature's ecosystem".
<b>Responsibility</b>	The Ministry of the Environment (general), the Ministry of Food, Agriculture and Fisheries (agriculture and fisheries), the water sector's technology development fund (allocation of the fund's resources), the Ministry of Science, Technology and Innovation and the Danish Council for Strategic Research.

### 2.8.1 Current perspectives

Water is a common central environmental policy topic. The nutrients and hazardous substances from pesticides and other chemicals from agriculture, cities, industry and scattered buildings in rural areas end in the aquatic environment, which is also subject to a number of physical influences such as straightening watercourses and laying pipes, just as water abstraction alone can effect the quality of the water and the entire water cycle with the subsequent consequences for the surrounding nature.

In Denmark, we make an effort to protect the groundwater so that we can continue to have clean, untreated water directly from the tap – out of consideration for the public and for the many enterprises that are dependent on access to ample amounts of clean water. Water is an essential element in nature and in many leisure activities. Globally, a lack of water is a growing problem. Today, it is technically possible to clean and desalinate water for all uses, including for drinking water. It is, however, still much more costly and energy-consuming compared to having access to unpolluted freshwater resources.

The UN estimates that over 1.1 billion people live without access to clean drinking water and that 2.6 billion people live without access to proper sanitary conditions. The WHO estimates that 3,900 children die every day due to waterborne disease. Danish environmental technology can contribute to correcting this situation.

Water is a multi-million-dollar Danish industry. Globally, the water sector is expanding rapidly. In the US alone, the market potential for investments in drinking water and waste water over the next twenty years is USD 1,000 billion. Based on figures from Statistics Denmark, the Danish Enterprise and Construction Authority (FORA) estimates that in 2003 Danish enterprises dealing with water had a turnover of DKK 16 bn. of which DKK 7 bn. came from exports. From 1998-2002 exports doubled.

In the future, the market is expected to grow explosively, especially for supply optimisation and for efficient treatment and recycling technology. The Danish Board of Technology estimates that global investments in the water sector are expected to be DKK 1,140 bn. by 2025. Denmark has some of the best conditions in the world to supply knowledge and resources for future water solutions.

### 2.8.2 What we would like to achieve

Denmark is one of the world's leading nations in a number of central areas, for example, in water treatment, systems for management, the regulation and monitoring of water resources and qualities, environmentally correct sewerage, water-saving sanitary appliances, fish farming technologies, non-toxic control technologies and technologies for, e.g. separating slurry.

The government will ensure that world-class Danish solutions continue to be developed in these areas for the benefit of the global environment and to solve domestic problems. With regard to fish farming, an important prerequisite for meeting the tighter discharge requirements for medicine and additive substances, for example, is that the newest recirculation technology undergoes final testing and demonstration.

Earlier this year, a broad political agreement was entered into for a more efficient water sector. Effectivisation of the sector must be used to benefit consumers and the environment. In combination with the environmental technology action plan, the agreement will contribute to a more innovative water sector while simultaneously strengthening Danish exports of eco-efficient water technology.

The Danish effort to promote environmental technology for the protection of the aquatic environment must also ensure the efficient implementation of EU legislation on water, including especially the Water Framework Directive. Denmark must also become better at taking advantage of the commercial potential of its strongholds.



From a global perspective, the effort must contribute to the UN's goal of halving the number of people in the world who do not have access to clean drinking water and sanitary conditions before 2015.

The water partnership is a commercial innovation platform that gathers Danish enterprises, knowledge-based institutions, organisations and public authorities with cutting-edge competence in water supply, including security of supply, treatment and recycling water. The overall objectives of the water partnership are:

- To identify and develop new business opportunities in the security of supply, treatment, recycling and management of water in Denmark and internationally.
- To contribute to the establishment of development and commercial water partnerships between Danish players.
- To gain environmental advantages from the concepts developed.

### 2.8.3 The action we will take

The government has already taken the initiative to set up a partnership for innovation in the water area: the water partnership - a new Danish multi-million-dollar industry. With financial support from the Ministry of the Environment, a secretariat has been established comprised of the think tank Huset Mandag Morgen AS, the Confederation of Danish Industries and the Danish Hydraulics Institute (DHI). The partnership operates in close co-operation with the Danish Water Forum and the Water Research Platform. The Ministry of the Environment participates in the partnership and will contribute with knowledge and analyses in relation to national and international regulations, important environmental challenges that require technological development etc. Within, or as a supplement to the activities in the water partnership, the government will take the following initiatives:

- A mapping of which technologies have especially high potential in relation to ensuring the cost-effective implementation of EU legislation on water.
- Offer subsidies for the testing and demonstration of promising technology by enterprises for protecting the aquatic environment.
- Restructuring of the Danish water sector to support innovation and technological development as much as possible.
- Develop aquaculture so that it can more offensively be a part of the overall effort to protect the aquatic environment, including the promotion of newly developed aquaculture technologies. This will be done partially by ensuring the existence of an administrative basis for experimental testing and partially by continuing to ensure the possibility of subsidies for full-scale testing and demonstration projects through the fisheries scheme development funding.
- Following the implementation of the Water Framework Directive further development of water treatment facilities in sparsely built-up areas is expected.
- Implement development and demonstration projects that can contribute to making sure that investments made by municipalities in a better aquatic environment in areas close to towns will be supported.
- Implement development and demonstration projects that can contribute to the renovation and modernisation of water infrastructure (sewers, overflow facilities, etc).
- Establish a technological development fund based on voluntary payments from the industry which will be doubled by a contribution from the state (though a maximum of DKK 10 mill. annually for a three-year period).

The Ministry of the Environment is responsible for implementing the above activities.  
The Danish Council for Strategic

Research will conduct a tendering procedure for the research funding in the area.

#### 2.8.4 Timetable

2006

- Autumn: The water partnership is established.

2007

- Political agreement for a more efficient water sector.
- March: The water partnership's specific priority areas (thematic track) are presented.
- Analysis of possible new treatment technology that can primarily be applied to waste water to meet future water quality targets.
- Analysis of technological potential in relation to the cost-effective implementation of EU regulations is presented.
- The development, testing and demonstration programme is established.
- First tendering procedure for funding for development and testing.

2008

- Second tendering procedure for funding for development, testing and demonstration.

2009

- Third tendering procedure for funding for development, testing and demonstration.

Developments can be followed at [www.ecoinnovation.dk](http://www.ecoinnovation.dk).





## 2.9 A healthy environment

The environment influences our health. Air pollution, dangerous chemicals and noise are all examples of environmental factors that harm our health. These are also areas in which eco-efficient technology can help reduce impacts on the environment and our health. Danish efforts to develop technologies that reduce the environment's negative health effects must be targeted and intensified.

<b>Objectives</b>	Promoting eco-efficient technology that contributes to avoiding or reducing air pollution, chemicals and noise that are harmful to the environment and health and encouraging Danish enterprises to exploit the commercial opportunities connected with these technologies.
<b>Activities</b>	<ul style="list-style-type: none"> <li>• Mapping of Danish strongholds.</li> <li>• Establishment of testing and demonstration schemes for new and promising technologies for limiting noise and air pollution.</li> <li>• Special effort to reduce particle pollution.</li> <li>• Continue the effort to substitute the use of undesirable chemicals.</li> </ul>
<b>Funding</b>	DKK 26 mill. for 2007-2009 and DKK 63.5 mill. for efforts against particle pollution.
<b>Responsibility</b>	Ministry of the Environment.



### 2.9.1 Current perspectives

In recent years, there has been strong national and international focus on the connection between the environment and health. Within areas such as air and noise pollution and chemicals, the modern way of living, producing and consuming has consequences for the environment that affect health.

Despite significant improvements, air pollution still has serious effects in the western world, where, for example, it increases the incidence of asthma, lung cancer and circulatory diseases. The European Commission has estimated that the number of early deaths in the EU resulting from particle pollution is over 300,000 annually. In many large cities in Asia, Africa and Latin America, air pollution from industry, energy and transport is far more extensive than in the EU. The possibilities of limiting air pollution are largely dependent on getting new technological solutions on the market; which is also pointed out by the Commission's Thematic Strategy on air pollution.

Many people, who live in cities and along national or regional roads, are bothered every day by noise. In Denmark, approx. 700,000 homes are burdened by road noise that exceeds the exposure level for new homes, and investments are being made regularly in noise-reducing initiatives. According to the world health organisation, WHO, road traffic noise can lead to actual stress-related health problems. Thus, there would be large health gains in reducing noise levels. Estimates also indicate that there is great business potential in noise-reducing technology for the Danish and European market.

A number of chemicals used today increase the risk of cancer, reduced fertility, over sensitiveness and allergies. The EU's new chemical regulation (REACH) will ensure much greater knowledge about chemicals and provide increased incentives to develop and apply substances that are less harmful to the environment and to health. This is an area where the future global market is expected to be enormous and where there will continue to be huge challenges in the form of finding useful non-harmful alternatives for a number of substances and applications.

Air pollution, noise and chemicals are just three examples of how the connection between environmental factors and human health are already in focus in national and international environmental policy. This is why these areas will also continue to be emphasised. In the future, enterprises that develop and sell technologies that aid in reducing or removing the environment's negative health effects will have access to a large growth market.

### 2.9.2 What we would like to achieve

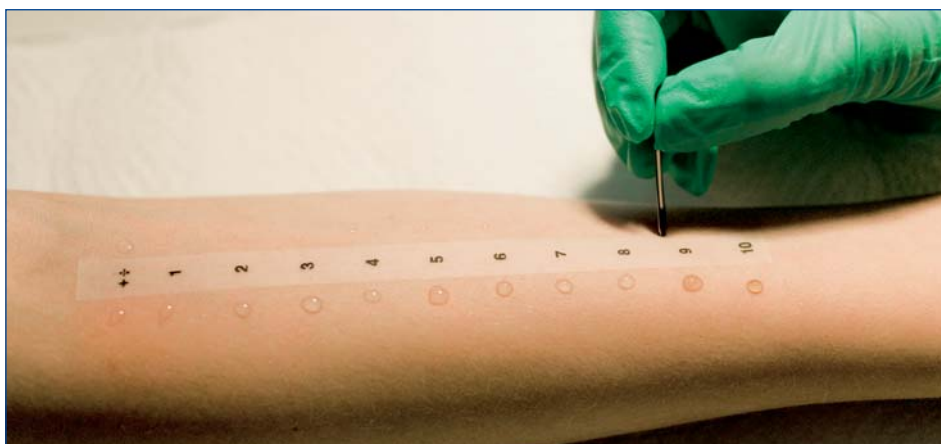
The government would like to promote eco-efficient technologies that contribute to reducing air and noise pollution and the use of chemicals dangerous to the environment and to health. Danish enterprises within these areas will aid in improving health while also taking advantage of the commercial potential in the growing global demand for these technologies.

In 2003, the government presented a strategy called "The environment and health go together" with a ten-point plan for the environment and health. The strategy has been followed up by a number of initiatives that focus especially on chemicals, water, noise and air pollution and on strengthening international collaboration.

### 2.9.3 The action we will take

The government will launch initiatives that will promote the development of eco-efficient technologies for air, noise and chemical pollution:

- *Detailed study of Danish strongholds regarding air:* In order to expand knowledge about growth potential for Danish enterprises that develop and sell technologies for limiting air pollution, a study has been initiated of current and possible future Danish business strongholds in the area. The study will elucidate, for example, whether there is a basis for establishing one or more partnerships in the area equivalent to those already initiated (cf. section 2.1). An initiative has been taken to establish a partnership for environmentally friendly wood burning. The maritime area is also a potential candidate.
- *Study of Danish strongholds regarding chemicals:* A study of Danish strongholds will be initiated for technologies that can lead to the substitution of dangerous chemicals. Based on the study, the need for increased public/private collaboration in the area will be evaluated.
- *Testing, demonstration and further development of promising air technologies:* Funding will be offered for the testing, demonstration and further development of enterprises' new and promising technologies for reducing air pollution. This will include, for example, technologies that can reduce air pollution from vehicles (especially NO<sub>x</sub> from diesel vehicles), ships, wood-burning stoves and boilers, incineration plants and industrial enterprises. The focus areas for the scheme will be selected on the basis of the technologies' technical, environmental and commercial potential.
- *Preparation of technical documentation that will increase the pace of the effort to limit air pollution from shipping:* In cooperation with relevant enterprises, the initiative will be taken to prepare documents that describe and document in detail how a number of technologies can be applied to reduce air pollution from shipping. The documentation will, for example, be a part of the Danish effort to tighten IMO (the UN International Maritime Organization) regulation of air pollution from shipping. The focus, for example, will be on the technical modification of existing ship engines that reduce the amount of NO<sub>x</sub> pollution produced.
- *Testing, demonstration and further development of promising technologies concerning noise:* Funding will be offered to support the testing, demonstration and further development of enterprises' new and promising noise-reducing technologies, which can include, for instance, improving the noise performance of retreaded tyres, low-noise asphalt, noise insulation and shielding of homes, and the noise abatement at enterprises.
- *New regulations:* The new law on environmental zones in large cities and the forthcoming statutory order on air pollution from wood-burning stoves and boilers are expected to have positive effects on the demand for environmentally friendly technologies. In selected areas, a mapping, etc will be initiated to support the national and international regulation of air pollution, including Danish implementation of the EU regulations.
- *Subsidies for particle filters:* To reduce particle pollution, the existing support scheme for particle filters on heavy vehicles will continue.
- *Analysis of technological barriers:* An analysis will be carried out of where significant technological barriers exist to reducing air pollution harmful to health based on Denmark's international obligations on air quality and emissions ceilings.
- *Substitution of chemicals:* Danish efforts regarding the substitution of substances dangerous to the environment and health will continue with special focus on chemicals under the REACH approval programme, chemicals on the Water Framework Directive's list of priority substances as well as chemicals covered by EU bans. Projects have already been started that will result in the improvement of options for replac-



ing specific undesirable chemicals such as lead, biocides, fluorinated greenhouse gases and certain brominated flame retardants with less harmful alternatives. General projects have also been started in which tools for substitution, for example, data-bases on chemicals and their alternatives, are being developed for use in enterprises.

- *Strengthen Danish influence on the regulation of chemicals in the EU:* The development of computer models to assess chemical substances as alternatives to animal experiments is an area in which Denmark has a leading position in the EU. The government will ensure the continued development of this area for promoting the use of less harmful alternatives and will strengthen Danish influence on the future implementation of REACH.

The Ministry of the Environment is responsible for implementing the above activities.

#### 2.9.4 Timetable

2006

- Air pollution: December: Adoption of legislation on environmental zones.

2007

- Air pollution
  - Analysis of Danish strongholds published.
  - Technical descriptions sent to IMO that describe and document a number of existing technological options for cost-effective reduction of air pollution from shipping with special focus on the modification of existing engines.
  - New statutory order on air pollution from wood-burning stoves and boilers.
  - Analysis of technological barriers.
- Chemicals: Initiate analysis of Danish strongholds.
- Noise and air pollution: First tendering procedure for funding for testing, demonstration and development.

2008

- Chemicals: Analysis of Danish strongholds published.
- Air pollution: An innovation partnership will be established for environmentally friendly wood burning.
- Tendering procedure for funding to support testing, demonstration and further development, including in relation to the substitution of chemicals.

2009

- Tendering procedure for funding to support testing, demonstration and further development, including substitution.

Developments in the timetable can be followed at [www.ecoinnovation.dk](http://www.ecoinnovation.dk).





