Environmental technology – for improvement of the environment and growth

Action plan to promote eco-efficient technology 2010 – 2011

February 2010

The Danish Government
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Foreword

It is with great satisfaction that I am able to present this – the second – edition of the Government’s action plan to promote eco-efficient technology, not least because it builds on a broad agreement with all the parties comprising the Folketing, Denmark’s parliament. It generates continuity in the ongoing works and provides a sound foundation for the future, to the betterment of the environment and Danish companies.

The Government is allocating more funds than ever before for development of environmental technology. We want our investments in environmental technology to forge a way forward for Danish trade and industry, for Danish exports, and for the concept that economic growth and social development does not necessarily mean conflict with the environment. This action plan allocates DKK 90 million over two years for the testing, development and demonstration of environmental technology applied to water, waste, and air.

The prospects are excellent. Strategic investments enable us to focus in areas with the greatest challenges, and in a strong skills base. The Government has already launched initiatives targeting energy, climate, transport, food, and agricultural technology. In conjunction with the fund for green conversion and commercial renewal; the export promotion initiatives; and the green research package; we now have a strong, broad base from which to work. We in the Government wish to support the entire process – from fledgling idea through to commercial realisation.

I am convinced that in Denmark we have the prerequisites to make an impact in a continually growing market. Danish companies have a proud tradition of being leaders in eco-efficient solutions. More than 700 Danish companies are able to deliver the solutions that will be needed here in Denmark, and abroad. We must endeavour to make the best use of them.

Therefore, we are also focusing on establishing relevant testing and demonstration projects abroad. There is no doubt that, for Danish environmental technology solutions, there is great potential around the world waiting to be realised. Hence, it is highly important that Danish companies are visible in the export markets, and that they have opportunity to adapt their solutions to local conditions.

The action plan follows up many of the initiatives that were launched as a result of the Government’s 2007 action plan. This includes partnership collaborations between companies, research institutions, and the authorities, as well as a focus on the effect of statutory regulation on the development of environmental technology solutions.

I am pleased that this action plan has generated a new and improved framework for the improvement of the environment, as well as for Danish trade and industry.

Minister for the Environment, Karen Ellemann
1. Introduction
Introduction

Clean air in our towns and cities, clean drinking water straight from the tap and proper, responsible handling of our waste – these are public services that are high on the wish lists of Danish citizens. Modern environmental technology is an important key to achieving these.

Environmental technology will also play a crucial role not only in how we tackle the major global environmental challenges such as climate change and loss of biodiversity, but also the problems faced by developing countries such as polluted drinking water, lack of basic sanitary conditions, severe air pollution, and inappropriate handling of hazardous waste.

Finally, rising production and consumption places a burden on our natural resources. Environmental technology has an important role to play in the preservation of our natural resources.

In brief, it is difficult to imagine how a world with a growing population, continued poverty, and a massive need for economic growth can develop without the aid of new and more efficient environmental technologies.

Denmark and Danish companies are amongst the global leaders in technological solutions that meet the environmental challenges faced by the world. We have a sizeable cluster of companies with environmental technology as one of their business areas. For these companies, the key is innovation and high quality that supports competitive power in a growing market – they have to be at the forefront of know-how, market knowledge, and business models, and at the cutting edge of technological development.

This action plan, in conjunction with Denmark’s existing green initiatives, is intended to create an improved framework for Danish environmental technology companies – for the improvement of the environment, prosperity, and employment.
Denmark is a leader within environmental technology; however, the size of the country means that we cannot be best at everything. We therefore need to focus on those areas in which conditions for producing competitive solutions of world class quality already exist.

The Government wants to provide companies with the very best conditions for generating new solutions as an integrated part of its environmental, business, and innovation policy. This is to be achieved through grants for developing, testing and demonstrating new environmental technologies; co-ordination of statutory environmental regulation and investments in environmental technology; collaborations between researchers and businesses; and assistance when businesses are ready to enter the global marketplace with new solutions.

The action plan is designed to provide these companies with improved framework conditions that facilitate competitive solutions for tomorrow’s environmental challenges.
2. The action plan in brief
The action plan in brief

The action plan is intended to support technological development in those areas in which Denmark has the potential to combine commercially-focused technological investment with delivery of solutions to the environmental challenges of the future. This will strengthen not only the competitiveness of Danish companies, but also Denmark’s brand as a country that invests in the environment, know-how, innovation, and creativity. In particular, the Government will focus on solutions to the major environmental problems associated with water, waste and air.

In the light of this, the Government and the parties in the Folketing, Denmark’s parliament, have entered into a political agreement on environmental technology. A budget of DKK 90 million has been allocated, of which DKK 2.5 million has been reserved for development, testing, and demonstration of new environmental technologies, and DKK 7.5 million has been reserved for initiatives relating to partnerships and regulations that promote innovation.

The parties have agreed that the investment is to focus on environmental technology for clean water, air pollution, and waste-processing. Environmental technology for clean water will be prioritised. Of the DKK 82.5 million, the parties to the agreement have approved reservation of DKK 10 million to promote the global perspective through development, testing and demonstration of projects abroad.

The action plan translates the political agreement into the tangible initiatives/activities listed on the next page.

In common with other Government initiatives, the action plan comprises part of the follow-on to “Danish solutions for global environmental challenges – the Government’s action plan to promote eco-efficient technology” from 2007. As such, it also comprises part of the follow-on to the EU Environmental Technologies Action Plan (ETAP). Through this action plan, the Government will intensify efforts in those areas in which Danish environmental technology companies are among the international leaders. The Government deems it important that the forthcoming initiatives are optimised using our experiences from the recent action plan. Finally, the Government deems it important that these initiatives help strengthen Denmark’s contribution to the prioritisation of EU endeavours to promote environmental technology – as part of the upcoming 7th Environmental Action Programme for the EU. It is anticipated that this will be adopted during Denmark’s presidency of the EU in 2012.

The agreement and this action plan are intended to detail further the investment focus. This will include not only prioritisation of efforts in a number of key areas – water, waste, and air - but also strengthening of the international dimension by establishing development, testing and demonstration projects abroad (primarily in India and China).

Finally, the parties to the agreement have agreed that the action plan must support efforts to combat climate change where this is a natural aspect of technological developments within the three prioritised environmental areas. Throughout the globe, water solutions will have to be adapted to a new climate. Waste and wastewater management must be designed so that it contributes to a reduction in emissions of greenhouse gases. Similarly, existing solutions for combating air pollution must be developed further in order to accommodate fuel combinations different to those currently available.
### Element in the agreement

#### 1. Development, testing and demonstration of new environmental technologies

- Promote Danish environmental technology through a grant scheme for the development, testing and demonstration of new environmental technology in the following areas:
  - Water
  - Waste
  - Air
- Promote Danish eco-efficient solutions in selected markets by means of:
  - Establishing testing and demonstration projects in partner countries
  - Establishing frameworks for technology transfer, including co-operation agreements, partnership models, and the demonstration of Danish expertise
- Continue the provision of a secretariat to manage and follow up the grant scheme, including:
  - Specialist environmental and market-relevant evaluation of applications
  - Advice, information and guidance for businesses
  - Analyses to determine where new environmental challenges are associated with new needs for development, testing and demonstration of environmental technology
  - Analyses of the competitive power of Danish businesses and of the market for environmental technology solutions
- Promote co-operations across Europe for the development, testing and demonstration of new environmental technologies.

#### 2. Partnerships and regulations that promote innovation

- Stimulate the market for environmental technology solutions by means of:
  - Mapping barriers in environmental regulations to the development of environmental technology (in Denmark and the EU)
  - Mapping how future regulations can promote Danish technological development in selected areas
  - Providing information to companies on forthcoming environmental regulations, and on potential markets for new eco-efficient solutions
- Promote collaboration between businesses, knowledge environments, the authorities and users by means of:
  - Following up existing partnerships in areas such as water and shipping
  - Establishing partnerships in selected export markets
  - Analysing the options and potential for future Danish partnerships

#### 3. Public sector demand

- Initiate an introductory presentation for the parties to the agreement on how green public sector procurements can be used to promote the development and demonstration of environmental technology.
3. Focus areas within the action plan
Investments in development, testing and demonstration of new and promising environmental technology solutions are prioritised. Water, air, and waste are priority areas, with water given top priority.

These areas include a vast number of Danish and global environmental challenges; our efforts will focus on solving specific environmental challenges in strategically selected fields.

When inviting and evaluating applications, priority will be given to projects that are technologically innovative, and have potential to improve the environment. A further requirement is that the solutions must contribute to reducing costs and/or help to secure the competitiveness of Danish environmental technology companies in the global marketplace for environmental solutions. Invitations for applications will target interested parties that develop and produce technological components or solutions capable of delivering real environmental improvements.

Private and public Danish companies, institutions, and other actors will be invited to apply. Foreign companies and actors may participate as collaborative partners or sub-contractors.

Grants will be awarded after a technical evaluation that first and foremost covers the potential to reduce environmental impact, but also includes the market potential. The scheme will be set up in accordance with applicable EU rules on subsidies, including the EU Framework for State aid for research and development and innovation.

The evaluation and awarding of grants will be undertaken by the Ministry of the Environment secretariat for eco-efficient technology, which will also advise, guide, and inform businesses about other grant options, specific projects, etc.
The environmental challenges
Clean drinking water, pollution of the aquatic environment, loss of biodiversity and natural assets, overexploitation of water resources, and adaptation of the water infrastructure to climate change constitute the most urgent environmental challenges in relation to water – both in Denmark and worldwide. Also, there is an increased interest in water as a qualitative element in the urban environment.

Over the coming years, Denmark will focus in particular on the following: an initiative to ensure the volumes and quality of drinking water; implementation of the Ballast Water Convention; optimisation and energy efficiency measures for use of resources in wastewater treatment, from the “consumer” to “treatment”; compliance with specific environmental targets for lakes, watercourses, and harbour areas; and reducing the risk of flooding and wastewater overflow as a result of extreme rainfall.

As a result of the change in usage of Denmark’s harbours, municipalities have prioritised the creation of attractive new urban areas here for which a clean and rich aquatic environment is essential. Environmental technology provides solutions for this.

Denmark’s options
Numerous technologies are available that can help to meet the challenges related to water. However, technologies developed for dedicated purposes cannot always be applied to generate optimal solutions in other applications. It is necessary to look at integrated system solutions; alternative systems for dealing with wastewater in large and small volumes; and alternative systems for supply water for a variety of purposes, etc.

Denmark is home to a number of leading suppliers and technologies for specific technologies related to water, e.g. pumps, modelling tools, water purification, wastewater treatment, and valves. Denmark is also home to specialist companies providing advice and know-how on optimisation of integrated system solutions.

Danish environmental companies are rarely competitive on purchase price alone. Instead, their competitive power is grounded in factors such as low operating costs, reliability, solutions for particularly challenging problems, and realisation of system synergies. Danish companies have been particularly adept at combining new research results and new technologies to create quality solutions for water-related tasks. These include IT, sensors, and nano-based membranes.

What we want to achieve
The objective is to realise new and more effective technologies for works relating to the aquatic environment not only in Denmark, but also globally.

There is a need to develop, test, and demonstrate water technology that is capable of protecting Denmark’s aquatic environment, and of securing the country’s drinking water supply. It must be possible to adapt solutions and facilities for the water sector to changes in the climate.
Because the challenges for Denmark in the water sector are much the same as those worldwide, development and demonstration must be prioritised in those areas in which Denmark and Danish companies are able to play a role in solving the global water environmental challenges. This applies in particular to pollution of the aquatic environment and drinking water; and adaptation of the water infrastructure to climate change.

Following a number of episodes that resulted in polluted drinking water, the Ministry of the Environment has heightened the focus on securing clean, good quality drinking water for consumers. This is enabled through protection of the groundwater, and a programme dedicated to the water supply. The Government’s initiatives in this area will be defined in a forthcoming action plan for clean drinking water, in which environmental technology will comprise one of the initiatives.

The implementation of the EU Water Framework Directive requires a targeted drive to create a good aquatic environment in lakes, watercourses, and coastal waters. The initiatives must be adapted to local challenges and objectives. This will mean, for example, particularly effective wastewater treatment where local discharge of wastewater hinders realisation of the goal. Concomitantly, there is a need for instruments and methods that support effective administration of Denmark’s implementation of the Water Framework Directive.

In the forthcoming urban policy initiative, the Government focuses on promoting water as a quality factor in the urban environment. Lakes, watercourses, canals, inlets, and seas provide experiences and opportunities for activities. The cleaner they are, the more the opportunities and the better the conditions for plants and animals. Moreover, rainwater is to be seen as a resource rather than a problem in our towns and cities.

The Government’s strategy for climate adaptation focuses on the need to adapt the water environment to the changed climatic conditions, in which extreme rainfall will occur more often. There is a need for solutions that reduce the risk of flooding and wastewater overflow. There is also a need for better management of the entire drainage system.

The international Ballast Water Convention addresses the reduction, prevention, and minimisation of the introduction of invasive species into the marine environment by targeting discharge of ships’ ballast water and fouling growth on ships’ hulls. These are the most important sources of invasive species in seas and rivers.
It is the Government’s objective to ensure an effective Danish implementation of the Convention, whilst at the same time securing maximum benefit from this major market.

Many of the world’s poor countries are facing very serious challenges in connection with adapting to climate change and water. Some countries will be hit by drought, whilst others will suffer flooding. The aim is to promote the development of environmental technology for climate adaptation and water that can be applied to meet the challenges facing developing and newly-industrialised countries.

In 2000, in order to improve the lives of the poorest people in the world, world leaders agreed to 8 Millennium Development Goals which are to be achieved by 2015. For water, the goal is to halve the number of people without access to safe drinking water and basic sanitation. Environmental technology will have an important role to play in realisation of this goal.

**What we are going to do**

Development, testing, and demonstration projects will be set up in the following areas:

**Protecting vulnerable aquatic environments**
- Treatment to low limits; treatment of wastewater from buildings in open countryside and smaller urban communities; advanced treatment focussing on problematic substances; and modelling tools that support and increase the efficiency of management of the aquatic environment.

**Securing clean drinking water**
- Continuous monitoring of drinking water quality; treatment of polluted drinking water (xenobiotics, microorganisms and undesirable natural substances); and technology that can contribute to the formation of groundwater.

**Climate adaptation**
- Technology that reduces the risk of wastewater overflow and floods during extreme rainfall; and modelling tools to map the need for the climate adaptation of the water infrastructure.

**Major global challenges in the water field – ballast water, water-saving, and energy and water**
- Purification and other treatment of ballast water; re-use of treated water; water-saving technology, and energy optimisation of the water infrastructure.

**Solutions for monitoring the aquatic environment and water quality**
- Technology and methods to optimise and automate monitoring of the aquatic environment.

The above list will be updated in the autumn of 2010 after an evaluation of new needs and opportunities. The water sector will be invited to a workshop on this.
The environmental challenges
The major environmental challenge within the waste sector, both in Denmark and globally, is the growing volumes of waste and its consequent impact on the environment and health. The world faces a scarcity of resources and yet, at the same time, there is unexploited potential in waste, which contains considerable energy and material resources.

It is therefore a major challenge to not only prevent the generation of waste, but also to collect and process the waste in such a way that there is minimum impact on health and the environment. Amongst other things, this involves maximal waste recycling, or other measures that prevent the loss of resources.

Overall, waste policy has three focus areas: scarcity of resources, the climate, and the protection of health and the environment.

A number of raw materials are in limited supply—including elements such as phosphorus and copper. Firstly, it is important to limit our consumption of resources, and secondly it is important to recycle natural resources. Thirdly, when resources are put back into circulation, it is important that their quality is not reduced.

Waste is an important element of Denmark’s options for meeting the climate challenge. It is possible to recover the energy from most waste fractions without impacting on the climate balance sheet. Nevertheless, over a life cycle, larger CO2 savings can usually be achieved from recycling than from burning waste.

It is a challenge to reduce the overall environmental impact and health problems connected with waste, including combating the spread of undesirable substances. Denmark has focused on improving processing methods for many years, but there is still a need for further development in this area, for example in connection with particularly problematic substances such as persistent organic pollutants (POPs).

Denmark’s options
Danish technologies will be involved in solving some of the world’s waste problems. Technologies have been developed that enable a reduction in the volumes of waste sent to landfill, and technologies are available that can secure exploitation of waste resources with a lower impact on the environment and health.
The Danish waste sector has a number of strengths. The most important of these are:

- Waste incineration – a major global provider of incineration technology is based in Denmark.
- Denmark has attained a leading position in biogas technology, especially in relation to livestock manure.
- Suitable technologies have been developed for burning waste as a replacement fuel in cement ovens.
- Development of biogas, bioethanol and biodiesel technologies is taking place in dedicated research and development clusters.
- Treatment methods have been developed for a range of hazardous waste, such as oil waste.
- There is ongoing development of technologies for processing special waste fractions, such as wind turbine blades, rock and mineral wool, concrete crushing, and systems to process shredder waste, laminated glass, gypsum, and car rubber.

Export of Danish know-how and system solutions is increasing. These include consultancy services for major waste processing systems, incineration technology, integrated energy and waste solutions, and solutions connected with waste incineration. Danish companies also export smaller system solutions such as recycling centres.

There are a number of potential areas where, with further technological development, it is possible to achieve significant environmental and economic advances:

- Reducing the emissions of greenhouse gases and increasing energy efficiency.
- Recycling resources.
- Processing special waste fractions; reducing hazards and volumes.
- Processing biodegradable waste: biomass gasification, production of biodiesel and bioethanol, and enzyme-based pre-treatment.

**What we want to achieve**

The efforts made must underpin the goals for the waste sector. The long-term goal is zero waste from recyclable and energy-containing resources. Therefore, a fairly broad approach is to be taken for waste processing, and differing treatment methods. The target is minimum 65% recycling of the total waste volumes.
The Waste Strategy 2009-2012 (Part 2) sets out a number of specific initiatives that are to be instigated to promote eco-efficient technology in the waste sector. This includes initiatives to reduce the waste volumes going to landfill; to ensure recycling of resources; and to ensure energy recovery. The quality of recycling is to be raised, for example through more expedient processing of organic waste, and of construction and building waste. Scarce resources are to be recycled, and there is to be a focus on technology development for the treatment of special waste fractions.

**What we are going to do**
Grants will be offered for development, testing, and demonstration projects in the following areas:

**Resources**
Improved utilisation of resources through increased recycling and energy recovery; reduction in waste volumes sent to landfill; for example projects on waste gas residues, shredder waste, wind turbine blades, and phosphorus from ash generated at combustion of selected organic waste fractions.

**The environment and health**
Development of sorting technologies, hereunder special treatment of contaminated building and construction waste containing substances such as PCBs.

**Climate**
Organic waste, including technologies for processing biodegradable waste, such as biomass gasification, production of biodiesel and bioethanol, and enzyme-based pre-treatment.

The above areas comprise the three focus areas that form the basis of the Government’s waste policy, as set out in Part 1 of the Waste Strategy 2009-2012.

The above list will be updated in the autumn of 2010 after an evaluation of new needs and opportunities. The waste sector will be invited to a workshop on this.
3. focus areas within the action plan

Air

The environmental challenges
Great strides have been made within air pollution in recent decades, but air pollution continues to be a problem in Denmark, as it does in the rest of the world.

It is estimated that every year in Denmark air pollution results in a large number of deaths, 160,000 asthma attacks, and 2 million absences due to illness. Nonetheless, Denmark is not as badly affected as some countries. In many large cities in Asia, Africa, and Latin America, air pollution from industry, energy, and transport is far worse. The problems in Denmark are caused primarily by emission of particulates and nitrogen oxides (NOx) from motorised transport, and emission of NOx, particulates and polycyclic aromatic hydrocarbons (PAHs) from wood-burning stoves.

In Denmark, there are 241 companies involved in environmental technology within the air sector. They employ 38,000 full-time workers and have an export share of 64%.

Both in the EU and Denmark there has been a heightened focus on reducing emissions from the major power and industrial plants, and from new cars and trucks. Even though there is opportunity for continuous improvement in these areas, there is a need to focus on other sources, such as wood-burning stoves, local domestic heating, and ships.

Improvements to the major power stations and cars mean that, in Denmark, wood-burning stoves are increasingly the source of particulates pollution. The EU believes that by 2020 shipping will be responsible for the majority of NOx pollution in the EU.

Importantly, the climate challenge also affects air pollution. The increased use of biomass as a CO2-neutral alternative to coal and oil has consequences for the technologies intended to reduce air pollution. The changed composition of fuels and the associated changes in combustion technologies mean new technological challenges to reduce air pollution such as particulates, NOx, dioxin, SO2 and the like.

Denmark's options
The ability to limit air pollution depends to a large extent on new technological solutions. Particulate filters for diesel vehicles, filters for incineration plants, and NOx catalytic converters are just some examples of technologies that lead to improved air quality.

Danish companies that produce technology to combat air pollution generally serve the global market. These are export companies that work closely with their customers, and in this area Danish companies are believed to have sound opportunities to continue to hold their own. Danish companies deliver a range of solutions that are competitive within areas such as removal of NOx, particulates, and SO2. The companies generally participate as sub-contractors of technology to foreign companies, including car-manufacturers, ship engine-builders, and constructors of coal-fired power stations. Within shipping, in particular, there is a major future po-
3. FOCUS AREAS WITHIN THE ACTION PLAN

tential to realise cost-effective reductions in air pollution through the development of new technologies.

As a maritime nation, Denmark not only has a responsibility to help reduce air pollution from shipping, but it also has the necessary skills. Leading shipping companies are Danish, and even if ships are no longer built here, Denmark is home to many key sub-contractors, particularly within engine technology, and technology to combat air pollution.

Denmark also has a long history of technological development aimed at reducing air pollution from wood-burning stoves and local energy plants. Danish manufacturers are thus already far in advance of the field with their new wood-burning stoves and technologies that reduce particulate pollution. Many of the wood-burning stoves bear the Nordic Swan ecolabel.

Denmark holds much expertise within limitation of air pollution from major power stations, an area in which Danish energy generation companies have been working systematically for many years to reduce emissions. We have led the way with regard to use of biomass for energy production, and we already have wide experience of the impact of increased use of biomass on air pollution.

**What we want to achieve**

Our initiatives to achieve cleaner air in Denmark, and globally, are designed to help generate new and more effective technologies. More specifically, the grant scheme is intended to support the Government’s efforts to improve the air quality in Denmark, where a particular challenge currently is to reduce the air pollution from smaller Danish biomass gasification plants. Wood burning has risen by 100% in Denmark since 2000 – which has resulted in a considerable increase in particulates pollution.

Our initiatives will also contribute to developing effective solutions to meet and, in the long run, to tighten the regulation of air pollution in the EU and globally, including the recently-adopted requirements of the IMO governing emissions of NOx, SOx and particulates by ships.

**What we are going to do**

Grants will be offered for development, testing and demonstration projects in the following areas:

**Ships**
Technology to reduce particulates, NOx, and SOx emissions from ships.

**Wood-burning stoves**
Development of technologies designed to reduce the pollution produced by wood-burning stoves and minor energy plants, particularly in respect of particulates and PAHs.

**Biomass**
Adaptation of technology to ensure that greater use of biomass does not lead to increased air pollution.

The above list will be updated in the autumn of 2010 after an evaluation of new needs and opportunities. The air sector will be invited to a workshop on this.
The international environmental challenges

A number of environmental challenges currently faced by Denmark are a result of cross-border pollution. This means that any initiatives implemented elsewhere in the world could also benefit Danes. Environmental challenges that we may have solved in Denmark still exist widely in many other countries.

There are a number of specific environmental challenges that are pressing in other countries but that no longer exist in Denmark. Major parts of production have been relocated to other countries – and a number of associated environmental problems went with them. Textile and leather manufacturing, dyeworks, tanneries, shipbuilding, ship-engine building, chemical manufacturing, manufacturing of electronics, shipbreaking, etc., are activities that have largely been moved to other countries, where they form a basis for growth and employment. Danish companies are often still the suppliers of the technology, the equipment and the know-how that are needed for environmentally-sound manufacturing. If these solutions need to be demonstrated and tested on a large scale, it is necessary for this to happen where there are relevant demonstration opportunities – and it needs to take place in close dialogue with the potential customers.

In many cases, Danish companies have the capacity to modernise treatment plants and waste-processing facilities, so that they are comparable with the solutions we recognise from Denmark. Even if the technologies and the challenges are basically the same, different natural conditions (temperature, precipitation, recipient types, etc.) and different social frameworks (environmental regulations, waste composition, labour costs, the size of cities, infrastructure, etc.) mean that the technologies have to be tested, demonstrated, and adapted locally.

Denmark’s options

The tradition of far-sighted environmental regulation in Denmark has helped to give Danish companies a head start with regard to a range of technologies designed to meet various environmental challenges. For most companies, however, the Danish market is too small to create the economy for technological development or to permit competitive production. For the most part, Danish
environmental companies have developed into export companies, with customers, production, development and collaborative partners located around the world. Many are now leading companies in their specialist fields.

Some of these technologies have already been tested and demonstrated in Denmark and have proved their effectiveness. This applies, for example, to scrubbers, which enable removal of SOx and mercury from waste gas, and to alternatives for HFC gases. Other technologies will continue to have a greater need for actual demonstration projects.

The possibilities for establishing testing and demonstration projects abroad are highly dependent on whether these projects have secured a local foothold. A formalisation of bilateral collaboration and partnerships with local actors and authorities can, in many cases, be a prerequisite for establishing specific projects. Denmark’s brand as a pioneering country with a relatively high environmental standard can help to open doors to new markets for Danish companies.

For many Danish companies, the partnership model can also provide the basis for collaboration with local partners on major projects, or projects that integrate multiple technological solutions.

What we want to achieve
The main purpose of our efforts in this area is to carry out development, testing, or demonstration projects in selected countries with the aim of demonstrating the suitability of the technologies there where the challenges are actually being faced, and under local conditions. The projects are evaluated using the same general criteria that apply to projects implemented in Denmark, and the same rules apply to awarding grants, including requirements for joint funding by the companies involved.
There must be a clear expectation that the technologies and solutions that are developed and demonstrated have the potential to be self-supporting – in other words that there is interest in the recipient countries in investing in, and in continuing, the projects.

Support may be awarded to special objectives and initiatives that:

- Promote export of Danish solutions within the fields of water, waste and air.
- Contribute to the transfer of Danish environmental technology on commercial terms, and thereby support the solution of major environmental problems.
- Implement the Government’s action plans for greater collaboration with India and China – including the implementation of specific environmental agreements with the two countries.
- Contribute to the promotion, adoption and implementation of new international environmental conventions by demonstrating sound solutions for new requirements.
- Support the work on the Basel Convention, the Shipbreaking Convention and the Ballast Water Convention.

What we are going to do

Grants will be offered in the following areas for development, testing, and demonstration projects abroad:

Modernisation of wastewater treatment plants in India, with a focus on energy efficiency, reduction of greenhouse gas emissions; and improved and cost-effective wastewater treatment. This project forms part of the implementation of the co-operation agreement on the environment with the Indian Ministry of the Environment and Forests.

Application of Danish expertise within protection, mapping, extraction, and distribution of groundwater in northern China, where groundwater levels are falling, there is pollution of groundwater resources and a water shortage. This project is being implemented in close cooperation with the Chinese Ministry for Water Resources.

Application of Danish expertise in an integrated campaign to reduce the elution of nutrients into watercourses and lakes. This will include planning and developing systems to clean wastewater, map sources of pollution, analyse possible solutions, demonstrate relevant technologies and solutions, etc. This project follows up an environmental agreement between the Yangtze River Commission and the Danish Ministry of the Environment.

Development, testing, and demonstration projects for which Danish companies can provide solutions, and which can take place in collaboration with the authorities and companies in the recipient countries.
Partnerships and statutory regulations that promote innovation
Environmental legislation has a marked influence on the development and use of eco-efficient technologies. Experience shows that incentives to develop and use new technology laid down in legislation can help to secure ongoing development of, and investment in, eco-efficient technology. Ambitious and far-sighted legislation can thus help to create new markets and a demand for environmental technology solutions.

The technological possibilities have a major influence on which regulations and standards can be imposed. The costs associated with use of the various technological solutions are often crucial in this respect. Its significance has the most impact in those countries where economic funding for the necessary investments is not available.

A large part of the environmental regulation that is significant for Danish environmental technology companies is laid down at EU and international level. It is therefore a particular challenge to compile an overview of current and forthcoming EU and international regulations and to assess their impact on technological development. This applies both to new regulations, and to informing companies of future opportunities and markets. The sooner companies are aware of a new market, the greater their chances of developing the best technology before their competitors. Danish businesses must be given the best possible conditions to enable them to get a head start with technological development. A stable regulatory environment and, not least, early information about forthcoming regulations help to ensure stability and thus security for investments.

In addition, it is important, that the authorities obtain greater insight into environmental technology possibilities. Existing technology that can meet stricter environmental requirements provides a better foundation on which to tighten up environmental regulations. It is important that regulation continues to provide an incentive to develop new solutions which span a wide range of areas.

In light of this, the following focus areas are prioritised:

- Mapping how future regulation can promote opportunities for Danish technological development in selected areas.
- Mapping new technological opportunities to tighten up environmental requirements – in Denmark, the EU and in international forums.
- Mapping barriers in existing environmental regulations to the development of environmental technology in selected areas.

In addition, priority is given to providing targeted information to Danish companies about forthcoming environmental regulations and potential markets for new eco-efficient solutions.

Those initiatives under the action plan that are intended to create synergies between innovation and environmental regulation must also help implement the Government’s business climate strategy, which includes a code for regulation that promotes innovation within the climate and the environment.
Partnerships are formalised forums for co-operation established to create synergies between research institutions, companies, public bodies, and users with the aim of developing effective, cheap and rapid solutions to environmental challenges. The partnerships ensure, amongst other things, dynamic knowledge development and a dedicated research and development platform.

With “Danish solutions for global environmental challenges”, the Government launched five partnerships that address prime key environmental challenges. The need for new partnerships is subject to ongoing evaluation. At present, under the auspices of the action plan, seven partnerships have been established within the environment, climate and energy.

Looking ahead, partnerships will target environmental areas in which Danish actors are facing particular challenges. For example, this could be due to changes to the existing regulations.

Emphasis is also placed on entering strategic partnerships with authorities and actors in relevant partner countries. This could apply to implementation of bilateral co-operation agreements, specific development, testing, or demonstration projects abroad, etc.

The following partnerships will continue:

- The partnership for cleaner shipping – focusing on helping to implement new IMO rules on air pollution from ships.
- The partnership for technology transfer and the export of Danish wastewater solutions to India – part of the co-operation agreement between Denmark and India.
- The partnership for groundwater co-operation with China – focusing on utilising Danish know-how and technology within groundwater in northern China.

New partnerships which are currently being established:

- A partnership for ballast water – focusing on the forthcoming implementation of the Ballast Water Convention.
- A partnership within waste focusing on shredder waste (the waste fraction from companies that process waste products containing metal) that is currently sent to landfill.
- A partnership for managing on-site rainwater so that sewage overflow at extreme rainfall is prevented. The aim of the partnership is to help develop technology so that horticultural operators and park owners can manage rainwater in their own facilities.
Public sector demand

Public procurement can stimulate a larger market for green products and new technology. Through dialogue with the suppliers, public sector demand can be used to help develop and trial new green technologies and products.

Denmark’s public sector is a consumer of large volumes of goods and services. An environmentally-conscious procurement policy can help achieve significant reductions in environmental impact and energy consumption. Using procurements, the public sector can stimulate development and introduction of products and services that are not currently available, but which require product development to meet current or future needs of citizens. Increased collaboration between procurers and manufacturers will enable development of eco-efficient products or technologies, for which there is a demand. In this way, procurers’ know-how and networks are involved as input for consumer-driven product innovations.

In extension of the agreement on a new action plan to promote environmental technology, the Minister for the Environment will initiate an introductory presentation in the spring of 2010 on the role of green public procurement as an element in the efforts to promote the development and demonstration of environmental technology.

In 2008, Danish public procurement spending by the State, the regions and the municipalities amounted to DKK 160 billion.
4. The action plan – part of the integrated push for green technology
The action plan for environmental technology is part of an integrated up-prioritisation of green technology and research by Denmark. The action plan covers those focus areas that are within the Ministry of the Environment’s area of responsibility and focuses on water, air and waste. The initiatives encompassed by the plan form an integrated part of Denmark’s overall environmental endeavours. In light of this, initiatives that can be funded through other public grant or funding schemes will not be prioritised. In this way, the action plan reflects a desire to ensure that the investment to promote eco-efficient technology is optimally focused and locked onto technology expertise.

A brief overview of Government grant and funding schemes intended to promote green technology and research is presented below.

The Energy Technology Development and Demonstration Programme (EUDP)
The EUDP was set up through legislation in 2008 and provides support for the development and demonstration of new energy technologies. The programme can provide support for the following:

- Projects that cover the development and/or demonstration of new efficient energy technologies.
- Research projects that pave the way for or support demonstration.
- The development of public/private partnerships for new energy technologies.
- International co-operation.
- Dissemination.
The Centre for Green Transport
The Centre for Green Transport was established within the Danish Road Safety and Transport Agency as a result of the Government’s and the reconciliation parties’ agreement on “A Green Transport Policy” of January 2009. The purpose of the centre is to initiate activities that promote the reduction of CO2 emissions from road transport without reducing mobility.

The Green Development and Demonstration Programme
Following on from the agreement on Green Growth from June 2009, a Green Development and Demonstration Programme was established, which focuses, amongst other things, on supporting the development of:

- Improved sustainability of crop production
- Improved sustainability of livestock production and improved animal welfare
- A more CO2-neutral production of energy in agriculture
- A market-driven organic sector
- Higher growth in productivity and value creation

The Fund for Green Conversion and Commercial Renewal
In connection with the Agreement on the distribution of the globalisation reserve for innovation and initiatives 2010-2012, funds have been set aside for a Fund for Green Conversion and Commercial Renewal. The fund is designed to serve the following objectives:

- Use and dissemination of consumer-driven methods of innovation.
- Market-readying and commercialisation of new green solutions.
- Green innovation and exports.
- Green conversion in hard-hit areas.
- Market development of public health and welfare solutions.

With regard to green technology, focus is on supporting the market-readying, commercialisation and export of new green products and services within fields such as energy, waste-management, wastewater, construction, transport or agriculture.
The Strategic Research Council
The Strategic Research Council (DSF) administers funds for 2009 and 2010 for research projects relating to competitive environmental technologies that cover areas including water, waste and air pollution. The basis for DSF’s prioritised areas is described in FORSK2015, which was published by the Ministry of Science in 2008. Furthermore in 2010, as a result of the globalisation agreement of 2008, DSF is offering funding for research into energy systems of the future.

In connection with the 2009 agreement on distribution of the globalisation reserve for research and development 2010-2012 it was agreed – as provided by the strategy proposal Green research – Status and prospects – that the Strategic Research Council should provide support for research in the following fields:

- Bio-resources, food and other biological products.
- Climate and climate adaptation.
- The Greenland Climate Research Centre.
- Green transport.
- Environmental technology (funds will not be available before 2011).

Green Lab dk – test facilities for climate technologies
Establishment of the centre was grounded in the Government’s Business Climate Strategy and the Agreement on the distribution of the globalisation pool for research and development 2010-2012. Grants can be awarded for the establishment of test facilities in strategic areas that enable businesses to demonstrate and test new climate technologies on a large scale.
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