

Environmental technology on the move

9 companies show the way



Danish Ministry of the Environment



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Environmental technology will make Denmark a green success

The world is facing a series of major environmental challenges, requiring dynamic action on several different fronts. An important part of the solution is the development of ingenious new technologies that directly or indirectly improve the quality of the environment and set new standards for sustainable production.

Eco-efficient technologies already play a crucial role in our efforts to protect the environment and its resources. There is no doubt that without environmental friendly technology, the world would be in a far worse state than it is presently.

Many Danish companies are adept at developing and marketing eco-efficient technologies, and Denmark is at the forefront of development and application of the new solutions. This position is the result of several years' effort, in which an important cornerstone has been in the form of far-sighted, stringent environmental legislation combined with targeted investments in research and development. Even

though public authorities and institutions play a key role, it is however companies that are the main driving force for creating technical solutions.

This publication presents 9 stories about Danish companies, who have had success in developing efficient environmental technologies. They offer good examples of how new technologies – or already known technologies, which are used in new ways – can help resolve global environmental challenges.

Minister of the Environment
Karen Ellemann

Photo: Steen Evald



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Cleaner air in the world's largest cities

A new technology can reduce toxic nitrogen oxide levels, caused by diesel engine exhaust emissions, by at least 90 percent. This creates the prospect of cleaner air in the world's largest cities, all thanks to Danish expertise.

A major source of air pollution in the world's largest cities is caused by exhaust fumes from heavy diesel vehicles, such as buses and trucks. NoNOx technology converts diesel exhaust fumes to harmless nitrogen (N₂) and steam and has been installed in up to 100,000 trucks in Europe. In order to reduce air pollution during the Olympic Games in Beijing, more than 2,000 buses were equipped with this new technology.

Uric acid in exhaust fumes

NoNOx is highly complex, both chemically and technically. It is based on a catalytic converter with an electronically controlled dosing pump. The NoNOx pump sprays a mixture of water and uric acid (urea) directly into the exhaust fumes. The heat in the exhaust system converts the uric acid into ammonia (NH₃) and carbon dioxide (CO₂), which in turn converts nitrogen oxides (NO_x) into nitrogen

(N₂) and steam (H₂O). Nitrogen is a natural constituent of the air we breathe. This technology also offers an opportunity to optimise the engine to achieve low fuel consumption without producing NO_x. NoNOx and similar technologies can thus provide the basis for a 7 percent reduction in diesel consumption in new vehicles, thereby helping cut CO₂ emissions.

Minus 30 degrees Celcius, desert and off-road conditions

The electronically controlled dosing pump is central to the NoNOx technology. Danish company Grundfos had already developed a digitally controlled dosing pump for other purposes.

"We already had the pump, so the challenge was to modify it, both to handle the complex urea and to meet car industry requirements such as coping with temperatures of minus 40 degrees Celcius, desert and off-road conditions," says Jens Lübeck Johansen, Managing Director, NoNOx SCR Division. It was a task that took five years, at times requiring the involvement of more than 20 engineers. However, the efforts

have won recognition with, amongst other things, the Danish EU environment award for the industry in the Environmental Technology category.

"It's an exciting task and a great responsibility for us in the NoNOx team to be able to develop a new environmental technology, which can resolve a major global problem. We have been able to do this because we were a part of Grundfos, a company that both thinks and acts long-term and is keen to develop new businesses in the area of sustainable technology," adds Jens Lübeck Johansen.

Grundfos NoNOx A/S was in September 2010 sold to Emitec Emissions Gesellschaft für Emissionstechnologie mbH. Emitec is a global company specialised in exhaust after-treatment.

Great potential in China

The NoNOx pump offers great market potential worldwide, particularly in countries in which Euro Norms, the European emission requirements for factors such as diesel exhaust emissions, are gradually being introduced. China, which has a larger diesel engine market than the US and Europe combined, offers huge potential. NoNOx supplied its dosing pump to China's largest engine manufacturer, Guangxi Yuchai, in connection with the Olympic Games in Beijing. They're expecting more customers in China.

Finally, the company, which is based in Bjerringbro in Denmark, supplies its pump to Cummins, the world's largest manufacturer of truck engines.



Great expectations for CO₂-based cooling

With support from the Danish Environmental Protection Agency, Danish company Advansor has developed a cooling method based exclusively on CO₂. It offers major environmental benefits and a highly promising market.

There is more to cooling than the processes we associate with domestic refrigerators and freezers. Cooling is used in such areas as food production, storage and sales in the pharmaceutical industry, plastic injection moulding, office air conditioning systems and server rooms. In recent years, ozone-depleting gases such as CFCs and HCFCs have been largely replaced by alternative coolants. These include both HFC-type gases and hydrocarbons. However, neither option is without its problems. HFCs have a powerful greenhouse effect and are covered under the Kyoto Protocol, while hydrocarbons are toxic and inflammable. Much time has therefore been spent on developing a third, environmental neutral solution.



CO₂ offers a long-term alternative

One such alternative is the CO₂-based cooling system manufactured by the Danish company Advansor. CO₂ does not destroy the ozone layer and the quantities of CO₂ involved are tiny compared to other CO₂ emissions, making the greenhouse effect minimal.

“CO₂ cooling marks the end of the journey for the many problems related to cooling systems,” explains Torben M. Hansen, Director at Advansor Energisystemer.

“We have discovered a cooling method that is based on natural coolants, which do not emit ozone-depleting gases or powerful greenhouse gases. They are not toxic, do not use flammable liquids, require less energy and can be positioned anywhere.”

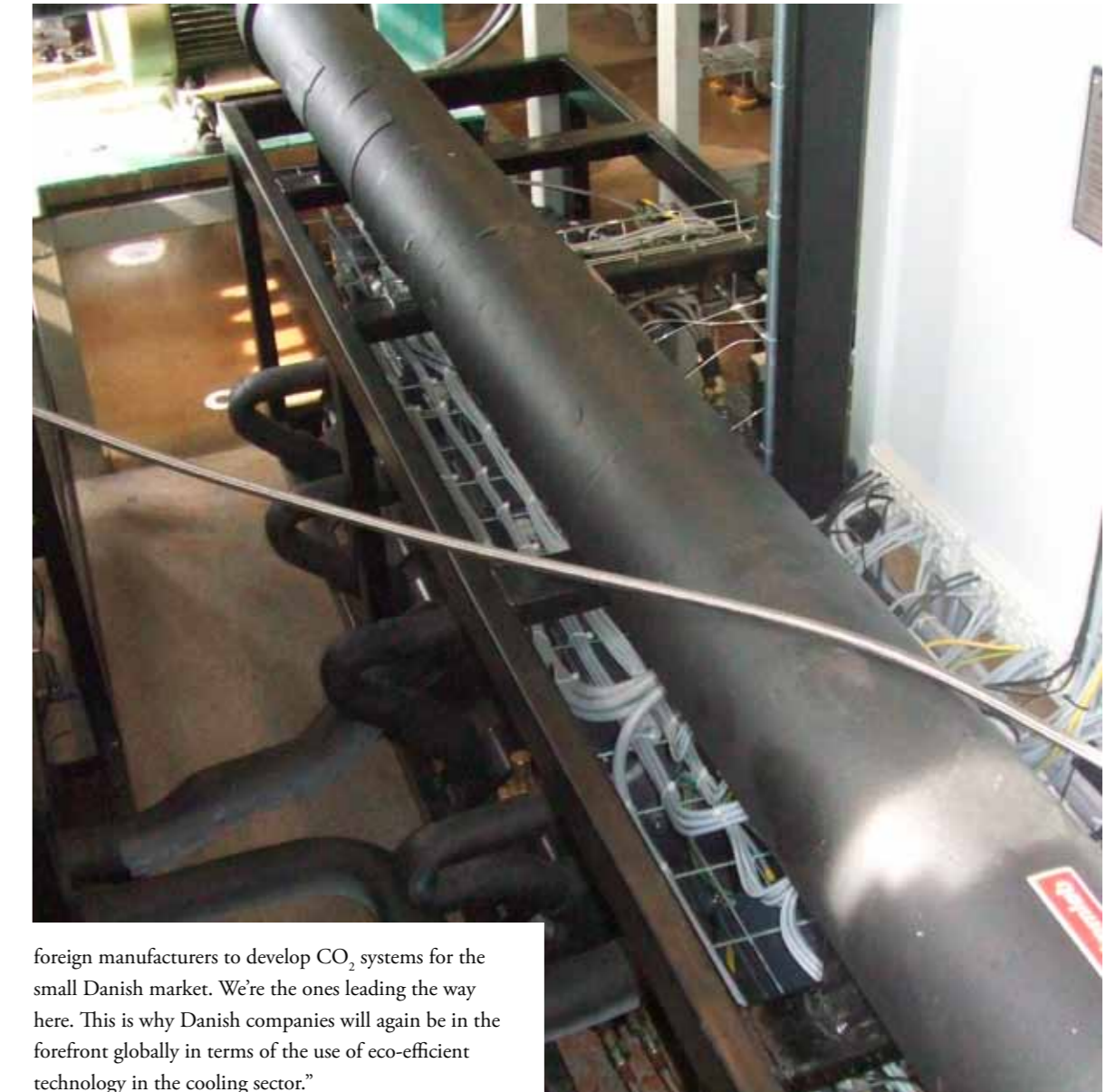
Danish EPA support preliminary work

The Danish Environmental Protection Agency (EPA) has played a key role in the development of CO₂-based cooling. By providing financial support for activities including preliminary analysis and the production of a demonstration system, the Danish EPA has helped Advansor to reach the stage at which the company today can produce a comfort cooling system based exclusively on CO₂. The system can be used in offices, server rooms and in various industrial production areas. Advansor also manufactures purely CO₂-based cooling systems for supermarkets. Measurements show that these systems can reduce power consumption by 10-20 percent compared with conventional supermarket cooling systems.

Far-sighted environmental legislation produces benefits

CO₂ cooling is today used by several supermarket chains and several major companies have installed Advansor's comfort cooling system. Sales in the supermarket sector are mounting rapidly and, even though the growth rate for CO₂-based comfort cooling systems is modest at the moment, Torben M. Hansen is confident. In a few years HCFC gases are due to be phased out in Denmark. This means that a large number of systems will need to be replaced. Torben M. Hansen expects that the other Nordic countries will decide to follow Denmark's example within a few years. By then Advansor will have a strong position.

“Thanks to far-sighted environmental legislation, we have a five to ten-year head start. It isn't profitable for major



foreign manufacturers to develop CO₂ systems for the small Danish market. We're the ones leading the way here. This is why Danish companies will again be in the forefront globally in terms of the use of eco-efficient technology in the cooling sector.”

Used car tyres represent a valuable commodity

Genan is the world's largest recycler of scrap tyres. This Danish-owned company, based in Viborg, is setting up fully automated processing plants in Germany.

Every year 13.5 million tonnes of tyres are scrapped globally – an accumulation and a burden on our landscape unless it is effectively recycled. The EU imposed a total ban in 2003 on scrapping tyres at disposal sites, but the question remains: what should be done with tyres – burn or recycle them?

“Used tyres represent an important resource. Our vision is for all tyres in the world to be recycled in the most socio-economic and environmentally optimal fashion,” says Lars Raahauge, Director of Business Development at Genan, which recycles scrapped tyres.

Artificial pitches and asphalt mix

One of Genan's areas of expertise is recycling the 67 percent rubber granulate extracted from used car tyres alongside steel and textiles. Genan has developed a range of rubber powder and granulate products, which can be incorporated

in a huge variety of products: underlay for athletic tracks and artificial pitches, paints, flooring, tyres and as an additive in asphalt. Genan's technical concept also includes a procedure for processing the steel fraction (18 percent), which makes it very pure and particularly suitable for remelting.

From Viborg to the global market

Genan's Viborg plant can handle all tyres scrapped in Denmark. In 2003 the company set up a scrap tyre recycling plant close to Berlin. This was followed in 2008 by a factory in North-Rhine Westphalia and in Bavaria in 2010, which provide Genan with the capacity to process 30 percent of all scrap tyres in Germany. Genan is in the process of becoming established in the US and is planning to set up 15 large factories across the world during the next 8 years. Its ambition is to capture 10 percent of the global market.

The Danish model

The term “Danish model” is generally associated with the particular structure of the Danish labour market, but there is also a Danish model in the tyre sector, one which plays an important part in Genan's success. The model is based on

a charge payable on import of tyres. When the tyre is worn out, the garage takes it to an authorised collector, who will then deliver it to Genan's plant in Viborg, for instance. The scheme works because the garage can get rid of old tyres for free and because there is money available in the Danish Tyre Council's Environmental Foundation for various activities, including paying the collectors.

Recycling IS more environmental friendly than incinerating

Genan has instigated a Life Cycle Assessment (LCA) analysis in order to compare the recycling of tyres with incinerating them in cement works, which is a common form of scrap tyre disposal worldwide. The analysis was carried out by the Danish Topic Centre on Waste (now CRI) and the FORCE Institute in cooperation with the IFEU (Institute for Energy and Environmental Research) in Germany and involves a total of nine types of environmental impact. Recycling is more environmentally friendly than incineration across all nine parameters, including lower GHG emissions, energy consumption and reduced acidification.



Exporting Danish environmental standards

Gabriel is a Danish producer of upholstery fabrics. One of the cornerstones of its business strategy is to apply the same high environmental standards across its production sites in Denmark, China and Lithuania.

In many developing countries the textile industry exerts a significant environmental impact because its production methods are not subject to any requirements and controls. Many of the plants use large quantities of energy, water and chemicals. Also, the finished textiles may contain chemical residues that can harm the environment and people's health.



Many years of Danish input pays off

The Danish textile industry has benefitted from the Environmental Protection Agency's development programmes for cleaner technology and products over the last 15 years. Many Danish textile companies therefore now have a strong market position in regard to supplying the growing demand for sustainable textile products. Gabriel, one of Europe's largest manufacturers of quality furniture textiles, belongs to this category. In 1996, its production site in Aalborg was the first textile company in Denmark to run an environmental management system in compliance with EMAS and ISO 14001.

"We have devised a business strategy with environmental management as a tool for increasing our competitiveness. This ensures that our products can compete in terms of environmental considerations, quality and price," explains Kurt Nedergaard, Manager of Quality, Environment and Production at Gabriel.

Cleaner technology at dye factory in Lithuania

Gabriel's biggest environmental advance is its Gaja and Comfort ranges. Gaja, which is made of 100 percent wool,

carries the EU Flower eco-label and is currently one of the most widely used furniture textiles in the EU. Comfort products are made of 100 percent recycled polyester fibres. Production is water-based and products carry the Oeko-Tex health label. Until 2008, wet treatment, dyeing and after-treatment were mainly carried out at the dye factory in Aalborg, which has always been at the forefront of developing the cleanest possible technologies. For example, specially designed machines were introduced at the dye factory that facilitate the switch from mass production to small, specialised order production runs – without increasing the environmental impact. In 2008 and early 2009, Gabriel moved production from Aalborg to the dye factory Scandye UAB in Lithuania. Gabriel owns 40 percent of Scandye and is determined to continue developing its high level of quality and environmental standards in production.

Value-added cooperation in China

In 2006, Gabriel's office in China achieved ISO 14001 certification. The office employs five local quality and environmental engineers, whose job is to select subcontractors according to their ability to comply with ISO 14001 environmental requirements and EU Flower eco-label criteria.

"Our philosophy is that we aren't simply going to outsource production – we're going to export our whole way of thinking. We value the importance of building partnerships so that our subcontractors see us as advisers rather than supervisors. In many cases, you need to start by making people understand the environmental repercussions and business opportunities. Indeed, the subcontractors that we have helped have definitely got something out of it – value-added cooperation that can produce visible results in the bottom line," says Kurt Nedergaard.



Diode lighting for rock concerts of the future

They supplied the lighting for the opening ceremony at the Beijing Olympic Games and Live Earth concerts in 2007. Now Aarhus-based Martin Professional A/S is developing environmental friendly concert and event lighting for the future. The first products are already available on the market.

When rock stars appear bare-chested at outdoor concerts in October, this is not only a sign of the energy they generate themselves. It also has to do with the fact that concert lighting often comprises bulbs and halogen lamps where less than 10 percent of the energy is converted into light, while the remaining 90 percent is converted to heat. It is a huge waste of energy and therefore, an environmental problem. Among other things, this issue was addressed at the Live Earth concerts whose aim was to draw the world's attention to global warming. The concerts were held on 7 July 2007 on all seven continents.

The multiple benefits of diode-based lighting

The concerts were to be trailblazers, showing that it is possible to organise even large events in an environmental

friendly way and, in particular, that the use of bulbs can be kept to a minimum. The diode-based Stagebar 54 from the Danish company Martin Professional was chosen to provide lighting at the main concert in Wembley Stadium, along with other equipment, including Martin's MAC 2000 Wash. Diode-based lighting is 75-90 percent more efficient than filament bulbs. Moreover, diodes do not contain any toxic heavy metals (one of the pollutants present in other types of energy-saving bulbs), they use less electricity, last significantly longer and benefit from longer servicing intervals. Some of the advantages of lower electricity consumption include a reduced impact on the climate, cleaner air as a result of fewer NO_x emissions and less waste produced from air purification at power plants.

A need for further development

Martin Professional develops and produces an extensive range of lamp types and solutions, which are used to create wonderful lighting experiences, from night clubs to cathedrals. It is also a company with a clear environmental policy, which could be significant for lighting – and energy consumption – at rock concerts of the future. Martin Profes-

sional's range currently includes six diode-based light sources; four types of lamps and two types of light panels. Most can be used for stage lighting, but presently, their features are not sufficient to meet the demands of a major rock concert. At a rock concert, a lighting fixture delivers a flood of colour at a high level of brightness. This requires technology that has not yet been developed.

A major technological advance

Martin Professional has thus initiated a research project intended to provide the basis for a complete change of technology in the stage lighting sector. Martin is joined in this project by Aalborg University's Department of Energy Technology and Department of Physics and Nanotechnology. A budget of DKK 30 million is available, including DKK 15 million from the Danish National Advanced Technology Foundation. The project is expected to enable Martin Professional to make a huge technological leap and greatly benefit the environment. As project manager Henrik Wadman from Martin explains:

“In lighting systems, heat equals loss. One of our strategic projects is to create more environmental friendly products with a higher light output per watt. This is why one of the areas we are focusing on is diode technology.”



A significant reduction of chlorine in swimming baths

New water purification technology can reduce the amount of chlorine used in swimming baths by 80 percent, making it more pleasant, healthy and environmental friendly to go for a swim.

Water and air in swimming baths contain chlorine compounds that sometimes give us red eyes, cause discomfort and in some cases provoke acute asthma attacks.

Engineering firm Skjølstrup & Grønborg has been conducting research over the last 10 years into filter technology. It has now developed a completely new water purification technology in collaboration with experts and other companies. This technology is already being used in Denmark in the large Aquadome pools at the Lalandia holiday resort in Rødby and at the Bernstorffsminde School, some of whose pupils are junior elite swimmers.

“Out of the 20 swimmers, who attend the school at the moment, six of them had exercise-induced asthma when they arrived. None of them have used their asthma medication since,” says Rene Nielsen, the school’s vice-principal.

Impurities are removed efficiently

The new technology is based on an in-depth analysis of the current purification methods used in swimming baths.

“When we swim in a pool we leave skin cells and other impurities behind. The problem is that when chlorine comes into contact with dissolved skin cells, urine and sweat, harmful chemical substances are produced, including chloroform and chloramines. This occurs in the water, especially when the impurities accumulate in the filters,” explains Ole Grønborg of Skjølstrup & Grønborg. The company’s solution aims to remove organic impurities so quickly and efficiently that the need for chlorine is reduced and there’s reduced time for the harmful substances to arise.

Vandpartnerskabet shows the way

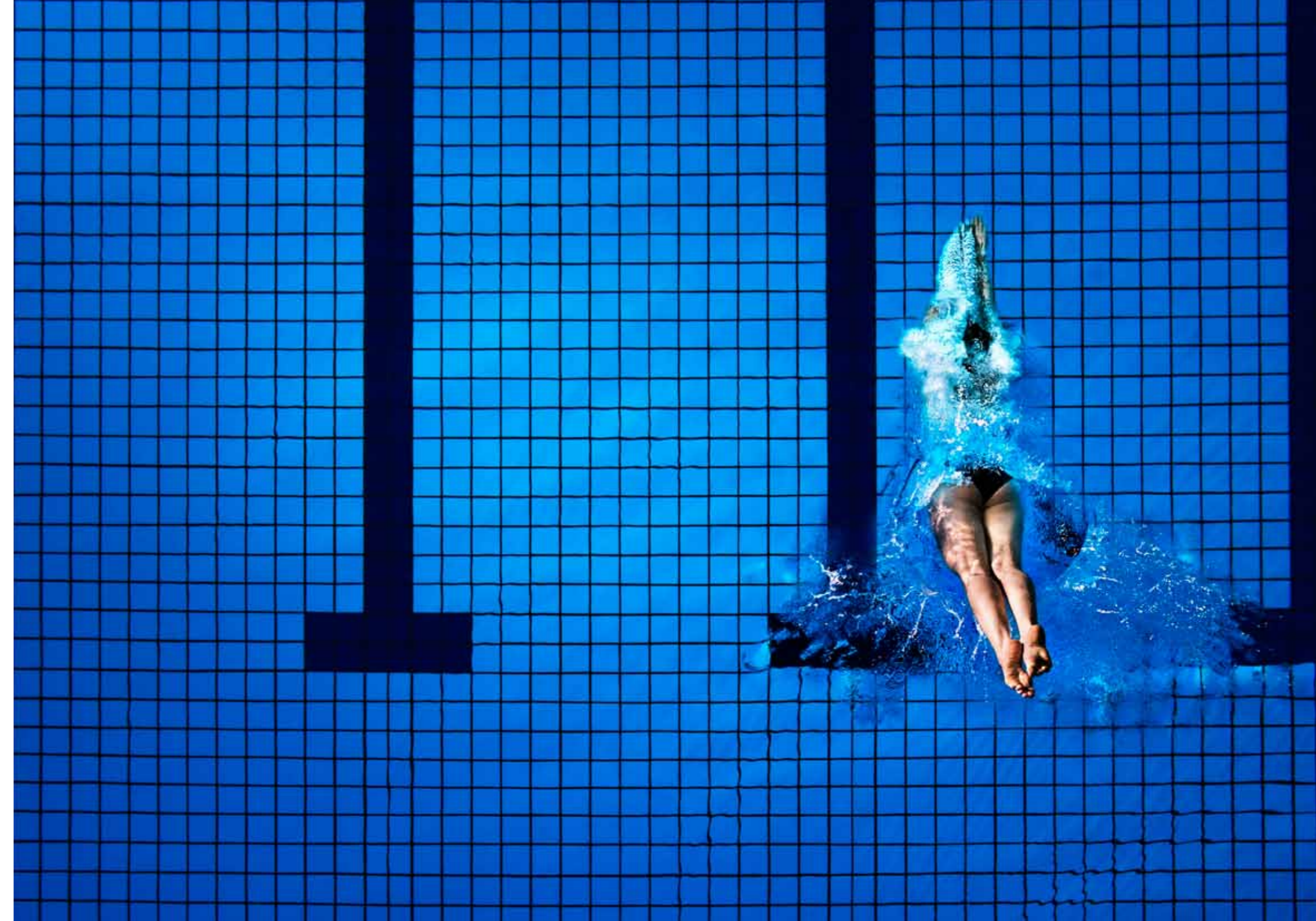
Those involved in the development of the new technology cooperate as part of Vandpartnerskabet 2006-2010, an innovation platform for Danish companies, research institutions, organisations and public authorities with cutting-edge expertise in water supply. The topic group focusing on “recreational water” had visions of technologies that could hugely

improve water quality and received support for carrying out preliminary analyses and technology testing. The water purification systems at Bernstorffsminde School and Lalandia have provided Danish environmental companies with new knowledge and a promising demonstration project.

“A small company like ours doesn’t have the capacity to capitalise on the opportunities offered by the new technology. But as part of ‘Vandpartnerskabet’ we are examining how to, along with other companies, set up an organisation capable of achieving the huge export potential,” comments Ole Grønborg.

A return on investment within three to five years

Lalandia estimated that the additional costs for the new system can be recouped within four years. In the case of a normal swimming bath, Ole Grønborg expects that the investment costs will be roughly 25 percent higher than the costs of a conventional system. However, the additional cost will be paid off in roughly three years due to the savings on chlorine, acid, staff time, electricity and water. In many cases the new system can be installed for the same price as an ordinary system.



Old Russian window in modern framework

A 250-year-old window has made a comeback. One of the reasons for this is new requirements with regard to noise from road traffic. Façade and window manufacturer HansenProfile is expecting the “Russian window” to take off.

In 1762, the architect Bartolomeo Rastrelli was commissioned with the design of the Winter Palace in Saint Petersburg. He used new knowledge about thermodynamics, established during the Enlightenment, to develop a window that drew freshly heated air into the palace, whilst also reducing the noise. The “Russian window”, as it is called (“for-tochka” in Russian), became known in Denmark because Danish engineer Sergio Fox was involved in the renovation of the Winter Palace in the late 1990s. He saw the potential of the window and convinced façade and window manufacturer HansenProfile, who have since further developed the Russian window.

Russian window reduces traffic noise

The principle behind the old Russian window is very simple. It comprises two layers of glass with a space between them.

The outside layer has an opening at the bottom, while the inside layer has an opening at the top. Both openings can be controlled. The thermodynamic effect is created when the air between both layers is heated up by the sun. The warm air rises upwards into the house and, at the same time, new fresh air is drawn in between the windows through the opening at the bottom. Heat and ventilation are thus obtained in an extremely environmental friendly manner. The Russian window also reduces noise considerably. Nowadays, this technology is known as the “3rd generation window” or, when referring to windows from HansenProfile, Hansen 3G. The first Hansen 3G windows were tested by the Danish Energy Agency in 2002. The conclusion was that the window reduced traffic noise by 28 decibels when open. This corresponds to the noise insulation provided by a closed window with insulated glass!

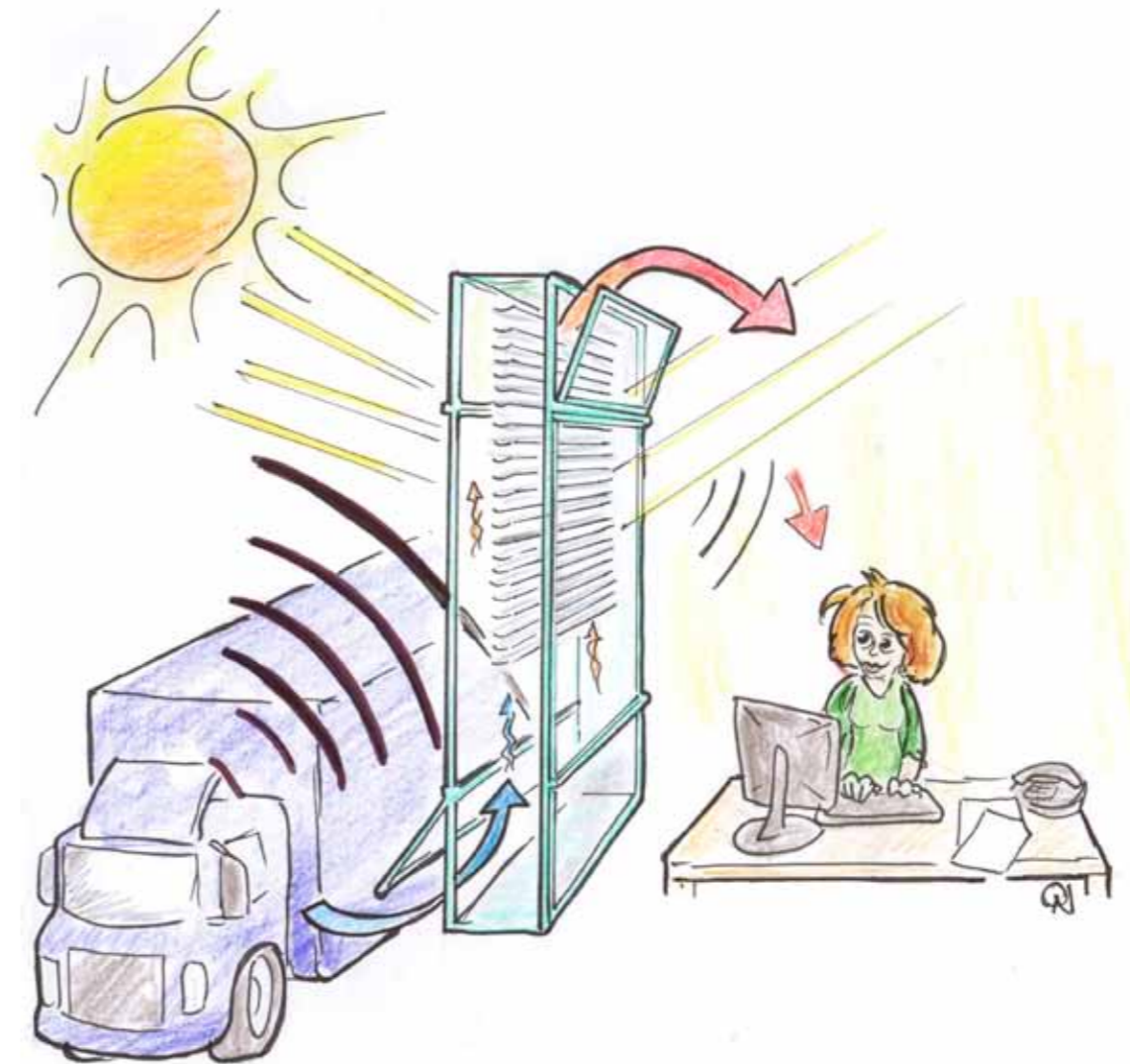
From the Winter Palace to Ørestaden

This Russian window became relevant a couple of years later when Jaegersborg Water Tower in Denmark were to be converted into accommodation for young people. The Water Tower is located in a heavily congested area, which made

noise reduction a decisive factor for this much-discussed project. Testing carried out in the tower showed that Hansen 3G windows with external and internal openings at 45 degrees reduced traffic noise by 32 dB from 69 to 37 dB. This is a significant damping effect, which means that the Water Tower’s young residents can let in fresh air while limiting the noise. Recently Københavns Energi used Hansen 3G windows for a new office construction in Ørestaden.

New noise limits promote 3G windows

3G windows became even more relevant, when the Danish Environmental Protection Agency (EPA) issued a guide entitled “Støj fra veje” (Noise from road traffic) in 2007, stipulating new traffic noise limits for residential construction. The Danish EPA has also given funds to the DELTA development and test centre and HansenProfile for investigating how 3G windows can be improved. Once the survey is complete, the results will be compiled in a design guide, which will be made available to the construction industry. The Danish EPA has also supported the development of a model for calculating the savings with 3G windows. 3G windows are 60-100 percent more expensive than ordinary windows but in return, they save energy otherwise spent on heat and ventilation. A calculation model will therefore make it easier for client, contractors and consultants to assess the savings from 3G windows.



New technology halves odour emissions from pig farms

Danish company Infarm has developed a technology that reduces odour emissions from pig manure and is environmental friendly. Smellfighter can benefit in particular those living next door to large pig farms.

In recent years, odour emissions have become a serious environmental problem in agriculture. This is primarily due to the advent of huge commercial pig farms, which can extend to app. 7,500 pigs. However, it now seems that



this type of odour nuisance will not be as overpowering in the future. The Danish company Infarm has developed a new technology that reduces the odour from pig manure in pigsties, tanks and fields by up to 50 percent. Smellfighter, as the technology is dubbed, also reduces the rate of ammonia evaporation by 50 percent. Infarm sees the technology as the dawn of a new era in the countryside.

“Over the years, odour emissions have driven a wedge between agriculture and its surroundings. But now we have a wonderful piece of technology that can remove a huge environmental problem in one of Denmark’s important economic sectors,” says Allan Skovgaard, Infarm’s Managing Director.

Two systems and a global patent

The odour from manure is made up of a number of organic substances with long molecular chains.. The Smellfighter technology works by cutting the odours’ molecular chains using ozone gas, which breaks down most odour-causing compounds in manure. When ozone reacts with the manure, it is converted into oxygen. Sulphuric acid is added along



with ozone, which lowers the manure’s pH level, thereby preventing the formation of ammonia, which would normally escape into the surroundings, polluting the natural environment with nitrogen. What is left is a less odorous liquid which retains its nitrogen content, and dry matter. The liquid has the same pH value as water and can be used as plant fertiliser, while the dry matter can either be burned or used to produce biogas.

Changing agriculture

Smellfighter can be set up at most existing pig farms and connected to Infarm’s manure acidification system, which is installed at many sites. It can work in facilities that produce up to 30,000 finisher pigs a year or 800 livestock units. Smellfighter was presented at the agricultural trade fair Agromek in January 2008 where it was classified as a 3-star innovation, that is, one of the “radical new technologies that will change agriculture”. Two systems have been tested in recent years, with more on the way. Infarm has taken out a global patent for the technology and is focusing intensely on its innovation.

Numerous benefits – also for the pigs

This new environmental technology provides numerous benefits. Neighbours enjoy cleaner air and can better enjoy their stay in their garden. Farmers gain a nitrogen-stable, plant-accessible fertiliser, a better working environment, improved chances of meeting local authority requirements and, above all, a better relationship with neighbours and the local community. The decrease in ammonia evaporation, in particular, has a positive impact on the environment. Ammonia contributes via the air to the over fertilisation of sensitive natural areas such as heaths and moors, which results in colonisation by other species of plants.

Finally, the welfare of the pigs themselves is improved. The animals benefit from the reduction in odour and lower levels of ammonia in the pigsties.



An excellent alternative to phthalates

Danisco has developed a vegetable-based substitute for phthalates. The company sees great potential for this, particularly in the fields of food packaging and medical equipment.

Phthalates is the common name given to a group of chemical substances that have the property of being able to soften plastic. As a result, phthalates are present in a long list of PVC-based plastic products such as medical equipment, packaging, textile printing, toys, garden hoses and vinyl flooring.



Animal tests have shown that certain phthalates are endocrine disrupters, which means that they can cause congenital defects. Phthalates can be transferred from e.g. plastic to the environment and be absorbed into the human body.

The EU has classified three phthalates as endocrine disrupters and banned them from items for children aged 0-14 years. Three other phthalates have been banned in articles, which children would be able to put in their mouths. Moreover, Denmark has a total ban on all phthalates in toys for children under the age of 3.

Solution hidden in an Indian bush

In recent years, a number of companies have developed substitutes for the most toxic phthalates. One of the best alternatives has been created by the Danish company Danisco. It is called GRINDSTED SOFT-N-SAFE and is produced from acetic acid and castor oil, which is extracted from the seeds of the castor plant, a crop grown in India. The product is completely biodegradable and if consumed is digested in the same way as vegetable oil in food. SOFT-N-SAFE has gone through extensive testing without any negative effects being discovered.

Chance, luck and skill

The discovery was made through a combination of chance, luck and skill. Danisco has a development department for, amongst other things, emulsifiers (ingredients which bind water and fat). The department knew that certain emulsifiers could be used to soften plastic and decided to investigate the effect further. Torben Svejgård, head of the emulsifiers department at the time, described in an interview with the Danish Ecological Council how it came about:

“Based on our everyday contacts, we knew that there was a search for alternatives to plasticisers, so we took up the idea and did a bit of preparatory work to see whether there was anything in it. 9 out of 10 cases will never result in anything.”

But it worked out in this case, and Danisco’s alternative product has now been approved in areas such as food packaging in the EU, the US, South America and most of Asia.

Keen customer interest

GRINDSTED SOFT-N-SAFE can replace the most common phthalate types in a 1:1 ratio and can be used in current production systems without any modifications.

However, GRINDSTED SOFT-N-SAFE is somewhat more expensive than phthalates. Given that phthalates can account for up to 35 percent of some plastics, manufacturers can reckon on additional costs if they replace conventional plasticisers with Danisco’s healthier and safer alternative. Nevertheless, customer interest is rapidly increasing, and Danisco anticipates a significant increase in turnover in the years ahead.



Danish environmental technology abroad

Denmark has signed cooperation agreements with China and India aimed at promoting the exchange of ideas, knowledge and technological solutions in the environmental sector.

Many of the world's countries are experiencing growing environmental challenges, such as air pollution, water shortage and increased volumes of waste. These are areas where Denmark can offer a number of solutions. The environmental challenges are on the rise due to a faster pace of economic growth, growing populations and higher living standards



e.g. in the BRIC countries. In combination with the relevant legislation and enforcement, this offers a large market for Danish environmental technology.

Cooperation agreements with China and India

Denmark has signed cooperation agreements with China and India aimed at promoting the exchange of ideas, knowledge and technological solutions in the environmental sector. This cooperation takes a number of forms, including public/private partnerships serving as a basis for cooperation between, for example, Danish companies, Danish embassies, the Danish Environmental Protection Agency and partners in the relevant country. The strength of partnerships lies in the fact that they bring together skills in the areas of legislation and environmental issues, challenges in the individual country/region, and possible (technological) solutions.

Partnerships can open up new markets for Danish environmental technology

The "Partnership for Environmental Technology to the Water Sector in India" works closely with the Indian water authorities in New Delhi. A plant demonstrating Danish

environmental technology for effective wastewater treatment will highlight potential energy savings and improvements in water treatment. The long-term goal is to make the wastewater sector more efficient and facilitate access to the Indian market for Danish water technology. The partnership is based on cooperation between the Danish Ministry of the Environment, the Danish Water Forum (DWF), the Danish Embassy in New Delhi and six Danish companies: COWI, Danfoss, DHI, Grundfos, VCS Denmark and Siemens Turbo Machinery.

In China the "Partnership for Ground Water for the Shandong Province" works closely with the Chinese Water Resource Ministry to ensure the availability of ground water resources in the region as well as more efficient water use. Those participating in this partnership include the Geological Survey of Denmark and Greenland, the Danish Embassy in Beijing, COWI China, the Danish Nature Agency and Danish Environmental Protection Agency. The partnership will enable Danish companies to demonstrate new technology and environmental expertise for the ground water sector in China. In addition, the "Partnership for Better Wastewater Treatment in Chongqing" is working to promote the use of Danish environmental technology and expertise in the area of wastewater treatment in one of China's industrial growth centres.

Grants for development and testing

In 2010, Danish companies also had the opportunity to apply for grants for developing and testing eco-efficient technology in India and China. The aim is to develop solutions which work under the current conditions in these countries. Four test and demonstration projects were launched in 2010, e.g. at a Chinese wastewater plant and a Chinese iron and steel plant.



Publication list

- Danish solutions to global environmental challenges. The government's action plan for promoting eco-efficient technology, July 2007
- The Danish action Plan, Environmental technology – for improvement of environment and growth, Danish Government, February 2010
- Danish lessons, information material regarding Danish environmental solutions within the watersector, Danish EPA, spring 2009
- Joining technology, business & environment, 10 Danish enterprises show the way, Danish Ministry of the Environment, April 2005

All publications along with this pamphlet can be downloaded from:
www.ecoinnovation.dk/English/



Environmental technology on the move

9 companies show the way

In 2007 and 2010, the Danish Government published action plans to promote eco-efficient technology.

The plans are intended to encourage Danish companies to become actively involved in developing technological solutions for the world's most urgent environmental problems.

The publication "Environmental technology on the move" presents 9 success stories showing Danish companies developing efficient environmental technologies. These stories are inspiring examples of how new, innovative solutions can benefit both the environment and companies themselves.



Danish Ministry of the Environment