

The future is  
built with  
environmental  
technology from  
Sweden





# Preface

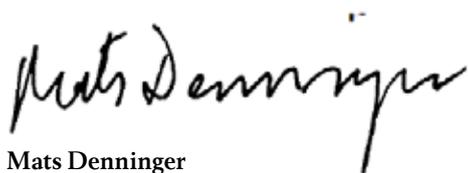
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Sweden is widely seen as a leader in terms of environmental action and sustainable development. This is due to coordinated, long-term measures introduced by both public and private actors. A range of technologies has emerged as a result of legislative moves and other incentives. Technologies that help us reduce emissions and use our natural resources as efficiently as possible.

In my role as High Representative, I am concerned with promoting the export of environmental technology to China, India and Russia. All three of these countries face urban challenges of one kind or another. In both China and India, growing urbanisation is placing new demands on infrastructure in the form of water supply, waste management, transport systems and the like. In Russia, the focus is principally on energy efficiency and on upgrading and modernising existing systems.

We have numerous highly developed business companies offering innovative solutions in the environmental technology field. In this publication we have chosen to present a select few. There are many more.

One of our aims is to show the broad range of solutions that our companies are capable of providing. I also hope that the material presented here will lead to contacts and partnerships between companies and organisations in the countries in which we operate.



Mats Denninger  
High Representative

# Bright future for new solar technology

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**By concentrating sunlight, solar energy can be made both cheaper and more efficient. The Swedish company Absolicon Solar Concentrator AB in Härnösand has developed new technology featuring concentrating reflectors that produce electricity, heat and hot water. “A solution to the world’s energy problem,” says the company’s CEO, Joakim Byström.**

Via a silver mirror, the Absolicon X10 solar collector gathers sunlight into a narrow ray with the strength of 20 suns. This concentrated sunlight is focused onto photovoltaic cells, producing ten times more electricity than traditional solar panels. The power is converted into 230V and can be fed directly into the grid.

This new generation of solar collectors is considered particularly suitable for large buildings and industries using electricity, heat, cooling or steam in their processes. The technology also heats water efficiently. The heat loss in an Absolicon solar collector during conversion to hot water is just a quarter of that in a traditional flat solar collector.

## **Profitable investment**

A typical installation might be in a hotel with 50 rooms in southern Spain. Ten solar collectors (100 m<sup>2</sup>) would produce 5 000 litres of hot water – enough to meet the entire hotel’s needs in terms of shower water and hot water for cooking

and washing. It would also generate the equivalent of 20 kW of electricity, enough to power all the lighting, mini-bars and fans.

The repayment period for this investment, given current energy prices and Spanish conditions, would be 6–10 years. In Sweden, with its solar power subsidies, a similar installation replacing one powered by electricity and oil would have a repayment period of approximately 10 years. In a country such as India, the period would be considerably shorter. Here, this technology is deemed to have particularly high potential. Concentrating solar collectors in such countries use just a quarter of the energy and natural resources used by older technology, which means mass production is a feasible option.

## **Multiple benefits**

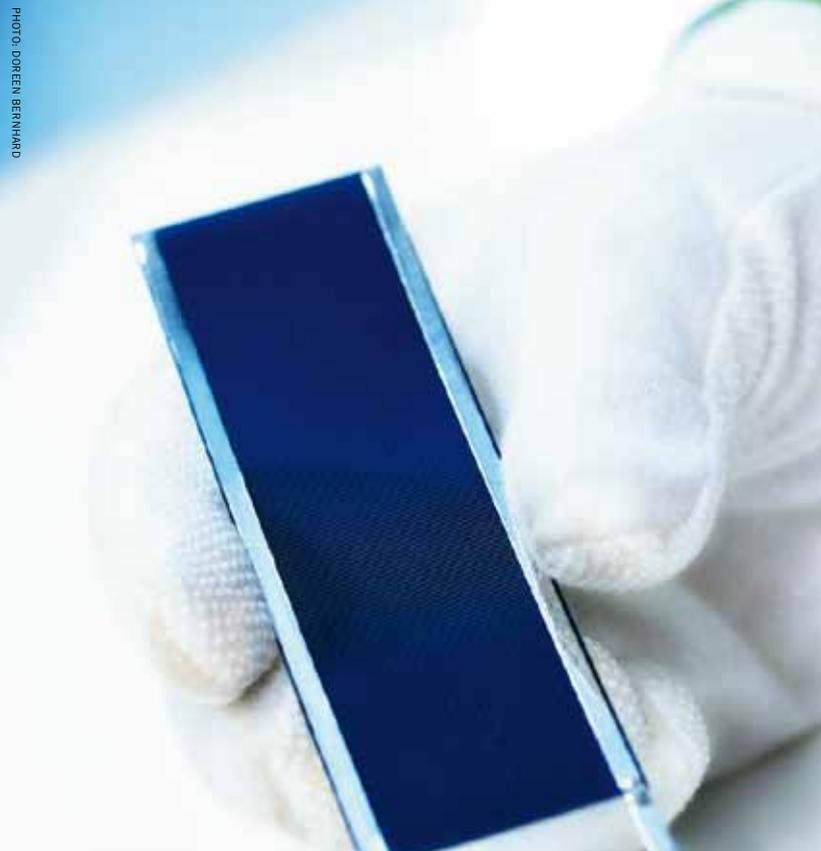
The manufacturing sector stands to benefit in a variety of ways. The solar cells can be exchanged for a thermal

tube that produces temperatures of up to 200°C. This means the heat from the solar collector can be used directly in processes re-quiring steam, such as the textile and food industries.

Heat-powered cooling equipment represents a substantial area of application for water with temperatures of 140–160° C. Hitherto, this well-tested technology has used gas or oil for its energy supply. Now, with the aid of concentrating solar collectors, solar energy can be fully harnessed to cool buildings.

“Industry needs solar energy to lower its energy costs,” says Joakim Byström. “Economic benefit and environmental benefit go hand in hand.” “Concentrated solar energy is the solution to the world’s energy problems. Absolicon will not rest until our solar collectors have been installed in every country in the world.”

In 2011, Absolicon won the prestigious Intersolar Award for the best solar heating product.



**Absolicon Solar Concentrator AB**

**Established:** 2007

**Number of employees:** 10

**Development funding:** Swedish Energy Agency, Swedish Agency for Innovation Systems, Stiftelsen för forskning om koncentrerad solenergi (Sparbankstiftelsen i Norrland), private financiers.

**Markets/exports:** Installations in Sweden, Spain, Italy, Greece and Chile. A manufacturing unit is planned in India.

**Research contacts:** Close collaboration with the Mid Sweden University. Pursues own research projects, usually together with students from Uppsala University or the Royal Institute of Technology, Stockholm.

**Read more:** [www.absolicon.com](http://www.absolicon.com)

Above: District heating installation, Härnösand.

Below left: Solar cell.

Below right: Receivers – the sun panel heart.

# Exporting sustainable cities

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**Resource-efficient city areas such as Bo01 in Malmö and Hammarby Sjöstad in Stockholm have put Sweden on the world map. Sustainable urban planning has become a Swedish brand of acknowledged quality, and China is one of the countries in which Swedish urban development is now gaining ground.**

Today, over half of the global population are urban dwellers. China is one of the countries in which urbanisation is advancing most rapidly; something like 15 million Chinese per year are migrating to its towns and cities. This is placing a considerable strain on the urban environment.

“Efficient infrastructure and traffic, along with sustainable systems for waste management and water supply, are huge tasks for many urban areas experiencing growth,” says Åsa Bergman, CEO of Sweco Sweden.

## Major potential

Sweco is one of the companies that have developed concepts and ideas for tackling the challenges posed by urbanisation. The company is clear about what is needed: good planning is essential, and sustainable urban planning is largely about introducing the right skills early in the planning process.

The work must be based on open, creative and constructive cooperation between decision-makers, experts and the general public. Here, Sweden has considerable expertise – and this in itself has become a successful export.

Given the growing number of urban dwellers, the importance of sustainable urban planning should not be underestimated.

“Sustainable urban development is vital if we wish to reduce greenhouse gas emissions and global warming,” says Ulf Ranhagen, a senior architect at Sweco and a professor at Stockholm’s Royal Institute of Technology. He adds: “Using integrated planning and a holistic approach, it’s

possible to create climate neutral city districts. This is true both with regards to new projects and the transformation of existing ones.”

## Symbiocity—A Swedish Concept

The Swedish ‘SymbioCity’ concept integrates community planning and urban development from an ecological, social, economic and spatial perspective. It involves adopting an ecocyclic approach to energy, waste and water, community planning, transport and land use planning, and energy-efficient buildings. Caofeidian in China is one city to have applied this concept, which also underlies the development of the Hammarby Sjöstad suburb in Stockholm and has been implemented in other projects in China, Canada and Ireland etc. SymbioCity is supported by a network of Swedish companies and organisations, and the concept has been developed in collaboration with the Swedish Trade Council. Read more: [www.symbiocity.org](http://www.symbiocity.org)

## Key Sweco players in Caofeidian

The Chinese eco-city of Caofeidian, 250 kilometres southeast of Beijing, is an example of Swedish expertise demonstrated on site. Where there used to be fish farming ponds, salt production facilities, oil pumps and the seabed, a whole urban community is being developed. Housing, streets and roads have been established on reclaimed land comprising mud and sand dredged from the bottom of the Pacific. A Sweco team has undertaken a sustainability analysis of the area, which in the future will have approximately a million residents.

In addition to that, Sweco has also produced an urban plan. The first development stage will extend across 30 square kilometres and accommodate some 400 000 inhabitants. It is due for completion in 2020. Sweco has also produced a local development plan for 12 square kilometres of housing, workplaces, schools and a university, plus sports and recreation facilities.

The targets are ambitious. Besides not generating any carbon emissions at all, the new eco-city is designed to deliver a surplus of energy. In the plan it is proposed that 95 per cent of the energy use in Caofeidian should be renewable, and a highly sophisticated ecocyclic system will in principle enable everything in the city to be recycled. The city’s water, waste and energy flows will be viewed as resources. Both treated sludge from sewage works and organic waste will be converted into biogas, for instance, and purified wastewater from dishwashing and clothes washing will be used to irrigate farmland. The eco-city will be based on a system of efficient ecocycles. In addition, a dense network of roads will facilitate public transport and it will be easy to walk and cycle in the city.

“Planning and environmental technology are not everything, however,” says Åsa Bergman, Sweco. “It’s the way people live and behave that will determine whether the solutions we build into the city have the right impact.” To raise environmental awareness, she notes, a sustainability centre is also being built where people can learn more about environment and sustainability issues.



### The Sweco group

**Established:** Sweco has been focusing on sustainable community development and environmental technology for over 100 years.

**Number of employees:** 7 700

**Development funding:** Project exports are financed by private companies, foreign agencies, international banks, Sida, the EU and others.

**Markets/exports:** Operates in 11 countries. Extensive project exports, commissions in 80 countries.

**Research contacts:** Several professorships and two foundations associated with the operation. The foundations encourage R&D in the fields of environmental technology and architecture. They also award a regular energy prize.

**Read more:** [www.swecogroup.com](http://www.swecogroup.com)

Sketches of the future Caofeidian, Sweco.



# A green power boost for rural areas

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**Flexenclosure uses the sun and wind to power base stations for telephony in developing countries lacking sufficient electricity. This low-energy technology reduces operating costs and carbon emissions while giving people in rural areas access to both mobile telephony and energy.**

Flexenclosure is an environmental technology company based in Vara on the Västgöta plains, specialising in adapted energy solutions for global telecom companies. Its flagship, E-Site, is a system for powering base stations in places where no electricity is available.

E-site primarily uses renewable energy sources (sun and wind) to power the stations. The environmental and economic benefits are reduced diesel consumption, lower costs and a reduction of up to 90 per cent in carbon emissions compared with a diesel-driven generator.

## **The flagship sails on**

Today, the product range includes everything from power solutions to complete computer halls. E-site technology is constantly developing. Its special feature is its 'brain', the Diriflex control system. Here, power generation is maximised using renewable energy sources, and the Diriflex also ensures that the battery bank is being used efficiently.

According to the company, base stations using E-site can push efficiency levels above 90 per cent, as opposed to maybe 60 per cent from wind turbines or solar panels plugged into a base station. Flexenclosure notes that a growing

number of mobile operators are seeking green solutions for their rural base stations.

## **The beauty of it**

"The economic beauty of it is that the reduced operating costs you get with E-site act as a strong incentive on mobile operators to install this green solution," says CEO Stefan Jern. He adds:

"No political pressure, law amendments or government subsidies are required. What's good for the customer – lower operating costs when renewable energy substitutes polluting diesel oil – is also good for the environment."

The company's calculations speak for themselves: a single base station run wholly on diesel oil can use 20 000 litres per year. This means a total annual operating cost of between USD 30 000 and 50 000. With E-site, the cost can be reduced by up to 90 per cent, which means a saving of almost USD 45 000 dollars per year/site. Reduced diesel dependence also reduces vulnerability to diesel price hikes.

The environmental benefits are equally obvious. The reduced use of diesel for powering a base station corresponds to a reduction in carbon emissions of something like 50 tons per site/year. In Nigeria alone, there are several thousand

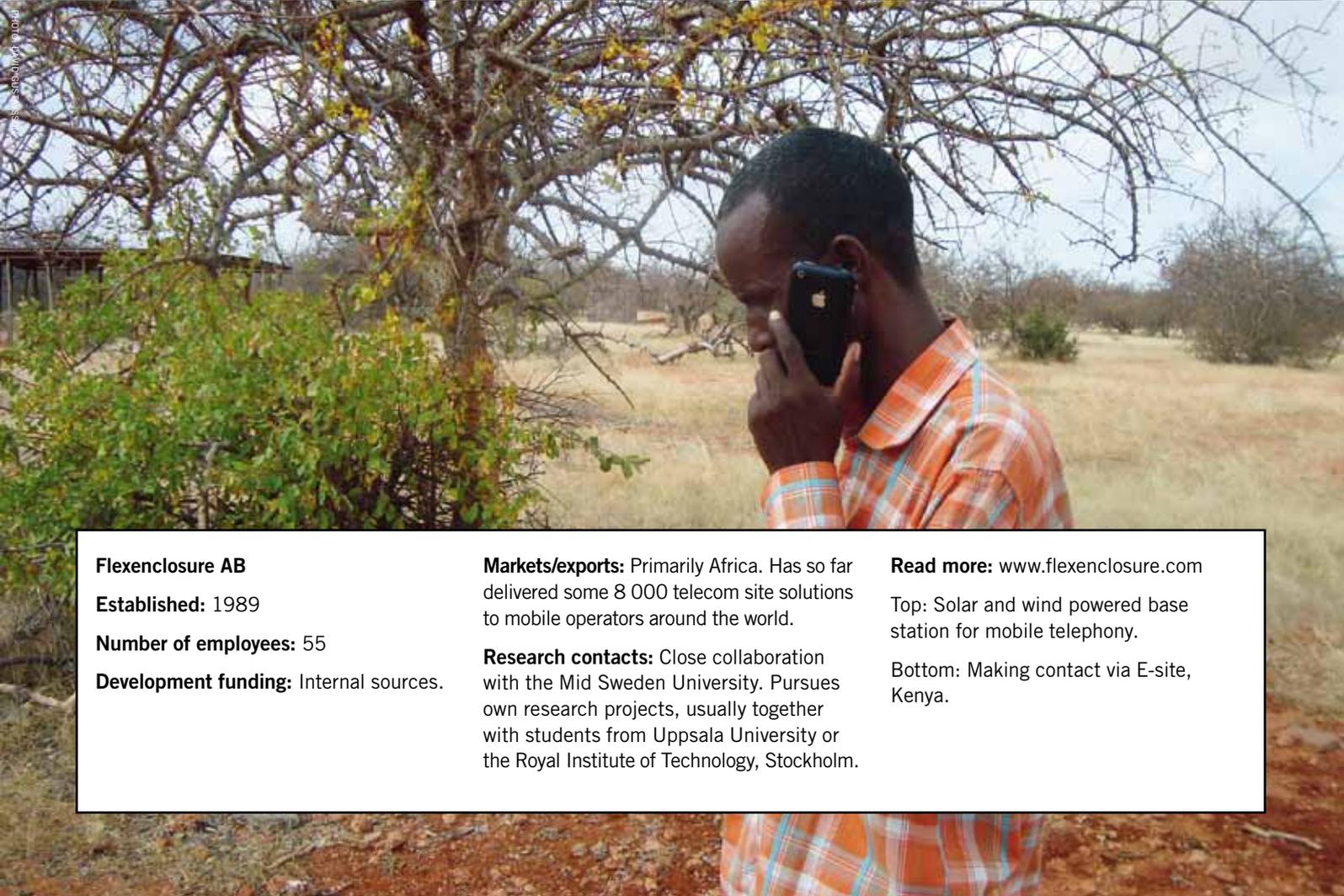
diesel powered telecom stations. Here, the technology can reduce carbon emissions by over 100 000 tons per year.

"While upgrading a diesel-powered site with solar panels and wind turbines to an E-site may seem like a relatively expensive move, such an investment is recouped in the space of about two years," says Stefan Jern. "Over five years, the mobile operator's return often exceeds 100 per cent."

## **Surplus energy for the community**

A new and highly interesting feature developed in collaboration with Ericsson is Community Power, which enables mobile operators using E-site to distribute surplus energy from the base stations to local communities. In practice, it transforms the site into a power plant supplying the communities surrounding it. Places where electricity has never been available can now access it to charge mobile phones, to light streets and to run cold-storage rooms for medicines etc.

Community Power has aroused great interest in the telecom industry and won the industry's most prestigious prize, the Global Mobile Award, in the category Best Use of Mobile for Social & Economic Development.



**Flexenclosure AB**

**Established:** 1989

**Number of employees:** 55

**Development funding:** Internal sources.

**Markets/exports:** Primarily Africa. Has so far delivered some 8 000 telecom site solutions to mobile operators around the world.

**Research contacts:** Close collaboration with the Mid Sweden University. Pursues own research projects, usually together with students from Uppsala University or the Royal Institute of Technology, Stockholm.

**Read more:** [www.flexenclosure.com](http://www.flexenclosure.com)

Top: Solar and wind powered base station for mobile telephony.

Bottom: Making contact via E-site, Kenya.

# Water and wastewater solutions for the future

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**High-efficiency systems for water and wastewater treatment and for biogas production. Sweden's Purac is at the forefront of efforts to tackle two of the prime challenges faced by society today – clean water and energy for both people and industry. The company's installations are currently to be found in some 70 countries worldwide.**

Purac is a part of the Läckeby Water Group, an independent, privately owned Swedish group. The company's core business idea is the treatment of municipal and industrial wastewater and the production of renewable energy through the conversion of waste and residual products into biogas.

## **The whole chain**

Carefully developed process engineering adapted to the needs and overall economy of each individual site is what makes Purac a market leader in its field, the company says. Products and services extend throughout the chain from idea and planning to operation and maintenance of entire plants.

To date, Purac has completed more than 4 000 contracts, primarily in Europe and Asia. The contracting business unites the company's know-how regarding processes, design and contracting with its internally developed and licensed technologies for increased efficiency and more economical operation. Purac uses

methods that it says are capable of reducing floorspace needs and operating costs by up to 50 per cent.

## **Success factors**

Purac has long experience of systems for water and wastewater plant in both Sweden and the outside world. The industry norms and standards established early on in Sweden helped bring Swedish environmental technology well to the fore in the international arena.

Purac has for instance undertaken a number of projects in China, Sri Lanka and Russia, funded by Sida. The company has long been an established and successful actor in China, while India and Russia are viewed as interesting but challenging markets. Russia's relatively complicated business structure sets limits for what – by international standards – comparatively small companies like Purac can achieve. In India today, demand for water and wastewater treatment is still largely being met by domestic companies.

## **Expansion opportunities**

The market may pose challenges, but growing needs suggest there is room for expansion. Demand for clean water and energy continues to rise all over the world.

"Even quite wealthy countries like Sweden and other developed nations face constant deterioration in their raw water quality, which means waterworks will have to be expanded," says Division Director Jonas Fack.

Given the rising pace of population growth and urbanisation, the need for wastewater treatment looks likely to increase dramatically. At the same time, global energy needs are perpetually increasing.

"The production of biogas from things like refuse and waste, sludge from treatment plants and industrial wastewater gives you green, renewable energy while at the same waste is being turned into something beneficial instead of being a burden on society," says Jonas Fack. "Here, Purac can help create a better world."



**Purac** (a division of the Läckeby Water Group)

**Established:** 1956

**Number of employees:** 118

**Development funding:** Established on three continents: Asia, North America and Europe. Has completed contracts in 70 countries.

**Read more:** [www.purac.com](http://www.purac.com)

Top: Wastewater treatment plant, Oslo, Norway.

Bottom: GEWE Lamella Sedimentation System for drinking water, Brisbane, Australia.

# New timber dryer halves power bills

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**Timber drying kilns are the great energy guzzlers in sawmills. But that is about to change. A company in Luleå in northern Sweden, Alent Drying AB, has developed a new timber drying method. The result: drying times are shorter and electricity consumption has been halved.**

## **Rapidly profitable**

The method can be applied in existing drying kilns by changing the control system and installing the new drying software – an investment that is recouped within a year.

Alent's drying method benefits both the environment and the economic situation in both industrialised and developing countries. In Sweden there are an estimated 1 500 chamber dryers, which, using the new technology, can each save 100 000 kWh per year. The EU zone has some 10 000 dryers, while there are perhaps a further 100 000 elsewhere in the world. Overall, the saving potential is huge: the company estimates that if all timber drying in the world were to

use Alent's method the saving would correspond to the output from 25 coal-fired power plants.

## **Focus on volume**

Alent's drying software is currently being developed for Microsoft's latest platform so that it can be used in standard PCs and in control units from the world's leading manufacturers. The focus is on boosting volume growth. For some time now, the company has had patents that save both the environment and energy when timber is dried, and it will shortly be ready to enter markets outside Sweden.

Its international business strategy involves selling program licences and know-how to an intermediary – timber

dryers or companies working to improve energy utilisation in industry.

"We're hoping that Alent will be a good example of Swedish environmental technology exports emphasising what we're good at in Sweden," says the company CEO, Erik Björkman. "Swedish wood and drying technology is already internationally respected, both in research and in application. Our drying method opens up a new multidisciplinary area of application by combining wood physics and energy and environmental technology with modern control engineering. These are three areas in which Sweden is at the cutting edge."



**Alent Drying AB**  
**Established:** 2005  
**Number of employees:** Two. Nine people associated with the operation.

**Development funding:** Swedish Energy Agency (royalty loan), private financier (StenvallsTrä AB), Norrbotten County Administrative Board, Långmanska Företagarfonden.

**Research contacts:** Close cooperation with sawmills and wood researchers both in Sweden and abroad. Advanced control technology being developed in partnership with Luleå University of Technology.

**Markets/exports:** So far, a total of 50 chamber dryers at eight sawmills in Sweden have incorporated the Alent method.  
Top: Timber drying.  
Bottom: Sawmill in Sikfors, Piteå.



# Less nitrogen leaching with new plant fertiliser

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**SweTree Technologies is a company which, in close cooperation with Swedish universities, has developed a new type of fertiliser based on the amino acid arginine instead of ammonium and nitrate, which are normally used in plant fertiliser. The company's arginine-based product, arGrow, has been shown to have several environmental and biological advantages.**

SweTree Technologies is a forestry biotech company that specialises in developing and commercialising products and technology to boost forestry production, tree processing, fibre modification and new materials based on cellulose.

ArGrow developed out of an environmental project at a nursery for forest trees in 2001. Studies at the nursery showed that arginine is effectively bound to the crop, which reduces the leaching of nitrogen by 40–95 per cent when it rains. This strong binding also means that the total fertiliser required for plant cultivation decreases by 25–30 per cent.

## **Better plant quality**

The first large-scale cultivation with arGrow was in 2006. During cultivation, differences in quality were found between plants cultivated with arGrow and plants cultivated with conventional fertiliser based on ammonium and nitrate.

“We discovered that the arginine stimulated the plants' root growth in a completely different way to traditional fertiliser. At the same time, it was easy to achieve a high nutritive content in the plant while retaining root quality,”

explains Jonas Öhlund, project manager at SweTree Technologies.

Root development and the quality of the root system are extremely important for forest plants. After having been cultivated under optimum conditions with an abundance of water and nutrients, they are planted out in clearings where the water and nutrient supply is usually low. With arGrow, plants are shown to establish themselves and grow rapidly. This is important as mortality is highest during the initial period after the plant has been planted out.

“ArGrow produces a strong plant with adequate nutrients and resources,” says Torgny Näsholm, Professor of Forest Ecology and Management at SLU, the Swedish University of Agricultural Sciences. “We believe that this is because arginine matches a plant's natural method for storing nitrogen. The plant can thus absorb nutrients easily and efficiently.”

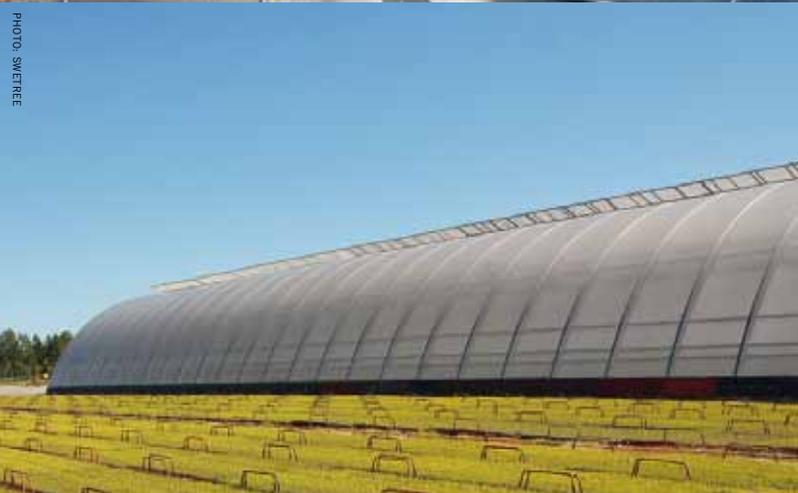
## **Global market**

ArGrow's potential extends far beyond the Swedish market. Reducing nitrogen leaching to groundwater and water-

courses in connection with industrial cultivation is a global environmental issue and the environmental control requirements are getting stricter. SweTree Technologies is seeing growing interest from both private companies and state institutions. Extensive commercial tests are currently in progress on species of tree other than Swedish pine and spruce in North America and Australia.

In another project, arGrow is being optimised for eucalyptus in countries including China and Uruguay. The production of eucalyptus is fertiliser-intensive. This is largely because eucalyptus is often cultivated in countries with daily precipitation. The environmental benefits of using a fertiliser that does not leach when it rains are, therefore, particularly high in such countries.

SweTree Technologies believes there is great potential for the expansion of its operations to include areas other than forestry. One example is golf courses. These require large quantities of nitrogen to fertilise the grass and are often located in or close to areas that are environmentally sensitive.



**SweTree Technologies AB**

**Established:** 1999

**Number of employees:** 30

**Development funding:** Swedish Agency for Innovation Systems (several projects) and EU subsidies.

**Markets/exports:** Ongoing joint projects in the Nordic region, South America, the US, Canada and Asia.

**Research contacts:** Close cooperation with several universities, including Umeå University, SLU and KTH, the Royal Institute of Technology.

**Read more:** [www.swetree.com](http://www.swetree.com)

Top: Fertilising with ramps, Gideå plant nursery, Örnsköldsvik.

Bottom left: Root of a forest plant.

Bottom right: Growing on free land.

# Purification of tap water and oceans

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**Advanced research for just over a decade lies behind Wallenius Water's water purifiers. Without the use of chemicals, the technology purifies the water in kitchen taps, swimming pools and oceans of harmful microorganisms and other undesirable substances.**

Wallenius Water's story began in its fellow subsidiary, the shipping company Walleniusrederierna. A plan was presented in the mid-1990s to gradually reduce the environmental impact of vessels. One of the focus areas was to find a method of purifying their ballast water without creating new environmental problems. Shipping uses up to five billion tonnes of ballast water per year. This water is used to stabilise cargo vessels. The ballast water may contain contaminants and foreign species that risk multiplying and replacing natural ecosystems if the water is emptied without having been purified.

## **From ballast water...**

Intensive work was begun to develop a purification method that met the tough requirements of the UN's International Maritime Organization, IMO. The project was implemented with one of the biggest suppliers in the maritime industry, Alfa Laval, and resulted in PureBallast, the first IMO-approved, chemical-free product for purifying ballast water.

The technology has since been installed in numerous vessels around the world. However, it has yet to enjoy

a full international break-through. The reason for this is partly to be found in the regulations for international shipping.

"Although the IMO classifies unpurified ballast water as a major global threat to the environment, the convention that was supposed to force vessels to purify their ballast water has not been ratified by enough countries for it to enter into force," says Torkel Elgh, the Wallenius Water CEO.

## **... to purification on a broad front**

In parallel with the development of technology for purifying ballast water, the Wallenius company developed a number of other products based on the same technology. This is Wallenius AOT (Advanced Oxidation Technology); patented, chemical-free technology inspired by the way in which nature itself purifies water. A light source and a catalytic surface are used to create free radicals that break down harmful microorganisms and other undesirable substances in the water without harmful residual products being produced.

The purification technology can be used for both small quantities of water and large volumes of thousands of cubic metres of water. As the technology

makes it possible to recycle the water, it has a positive impact on both energy consumption and profitability. One of the beneficiaries is industry, where large volumes of water are often consumed.

## **In showers and swimming pools**

Another area of application is the property sector, where chemicals or heat are frequently used to keep water free of microorganisms. The Legionella bacterium, which causes Legionnaires' disease and Pontiac fever, is a common problem in this connection. Bacteria can be spread via showers and similar installations where there is water mist. Wallenius AOT allows the temperature in the hot water system to be turned down, thus reducing the Legionella bacteria to a minimum.

A practical example of how the technology works can be seen at the swimming pool in Sundbyberg, which was able to reduce the use of chemicals and thus the bound chlorine by 70 per cent. At the same time, both water and energy consumption have decreased. Less chlorine consumption has also contributed to a better working environment for the staff.



**Wallenius Water AB**

**Established:** 1996

**Number of employees:** 35

**Markets/exports:** Wallenius Water's water purifiers are sold worldwide via distributors and partners in four major segments: industry, energy, marine industries and properties.

**Research contacts:** Partnership with KTH, Stockholm, and others. Conducts its own research into photocatalysis.

**Read more:** [www.walleniuswater.com](http://www.walleniuswater.com)

Cleaning ballast water has a major impact on the global ocean environment.

# Technology to help reduce energy consumption

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**Saber is the name of a measurement system that allows users to keep track of how much power, heat and hot water they are using. Monitoring energy consumption gives people an incentive to manage it better. The company behind the technology is KYAB Sweden AB.**

Easy monitoring of their power, heat and hot water usage helps households and workplaces get to grips with their energy consumption habits. Experience shows that it is possible to save around 20 per cent of energy consumption simply by changing user behaviour. This necessitates relating people's actions directly to their consumption of energy. Saber Pro and Saber Home from KYAB now make this eminently feasible by means of real-time measurement and educational visualisation of consumption.

## **In real time**

Saber is essentially a system for real-time measurement of electricity and district heating. The system also has measurement technology that can divide up the consumption curve for district heating, for example, into heating and hot water without additional meters needing to be installed. The system is connected to the

energy meter and the results are provided to the users via the Internet. Consumption is displayed in real time and allows users to be directly informed about and see the effects of changes in their use of hot water, power and heat.

## **Also for non-residential premises**

Information on and visualisation of consumption is also possible in large properties, such as public buildings and companies.

"Studies show that companies and public institutions can save between 10 and 30 per cent of their costs for power and heat by knowing how they consume energy and changing their behaviour to reduce waste," says Kimmo Yliniemi, CEO of KYAB Sweden AB.

KYAB has recently begun to market and commercialise its measurement systems. The company has already sold systems to around 100 properties. Sales

took off in 2010 and the system has been installed in schools and other public buildings.

Luleå Municipality has been using the Saber Pro system since 2009 and the Saber Visualizer system since 2010, as a result of which its power consumption has fallen. Premises where the measurement systems have been used include a culture centre, a restaurant and the Norrbottensmusiken premises. The system is also being used in schools and KYAB says that there are plans for it to be extended to cover the city hall and other properties. The company itself feels its prospects are good:

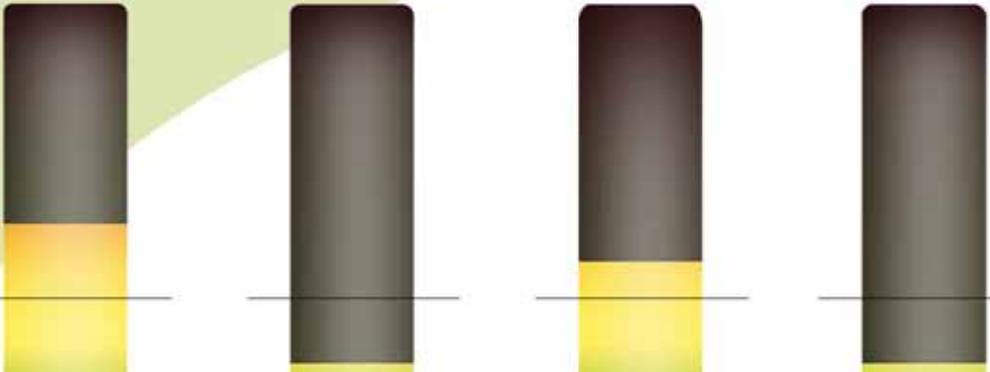
"We anticipate that KYAB will have sales of SEK 30 million within three years and that we will be operating in at least five countries within five years," says Kimmo Yliniemi.




**Uppkommande event:**  
 Magnus Betnér, Kultursenhus 10/6 19:00  
 Veronica Maggio, Pontushallen 11/6 19:00

**+16 °C**  
 14:42

**Nästa buss:**  
 Linje 5 mot Porsön 14:  
 Linje 3 mot Bergnäset 14:  
 Linje 8 mot Kronan 14:



**Dagens lunch:**  

 Husmans: Kyckling 70:-  
 Pasta: Carbonara 65:-  

 Husmans: Köttfärslimpa 70:-  
 Vegetariskt: Linsoppa 70:-

**Vattentemperaturer:**  
 Lulviken    Göltaudden    Aronsbadet  
**8 °C**

**KYAB Sweden AB**  
**Established:** 2006  
**Number of employees:** 9  
**Development funding:** Swedish Energy Agency.

**Markets/exports:** Small-scale exports initiated. The company has partners in countries including the UK, Portugal, the Netherlands and Finland.

**Research contacts:** Luleå University of Technology.

**Read more:** [www.kyab.se](http://www.kyab.se)  
 Top: Smart energy habits in sight.  
 Bottom: Visualising power consumption at a Luleå culture centre.

PHOTO: JOHANNES BILDGRAFER/MAGNUS PERSSON

ILLUSTRATION: KYAB

# Intelligent traffic solutions for sustainable cities

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**Urbanisation and the growing pressure on city infrastructures are posing challenges all over the world. Accessibility has to be balanced against both environmental demands and efforts to ensure an attractive urban environment. The urban solutions of the future will involve cleaner vehicle fuels and more efficient engines, but also intelligent traffic solutions in city centres, road and congestion charges and special environmental zones.**

With its fully automatic, electronic systems for traffic control, the Swedish company Kapsch TrafficCom AB offers innovative solutions both for today's cities and for urban centres of the future. By improving traffic flows, such systems reduce travel time, emissions and noise. Transport companies and public transport systems can hone their logistics when the risk of disruptions in the traffic flow is reduced. There is also a potential for reducing the amount of traffic.

"The extent to which this technology can impact on traffic volume depends on what policy the authorities decide to pursue," says Göran Andersson, Senior Sales Manager of the Swedish company. Experience gained from London, Singapore and Stockholm indicates a traffic reduction of about 20 per cent in central areas.

## **Versatile toolbox**

Today, Kapsch TrafficCom's systems are to be found in 41 countries and on five continents around the world. Italy is one of the company's foremost markets for intelligent traffic solutions in city centres. Such systems are in place in 28 Italian cities and towns, one of the aims being to protect sensitive environments and valuable cultural heritage with the aid of

environment-based traffic zoning. One example is Milan, which established an environmental zone in central city areas where vehicles were charged according to their environmental classification.

"Within just a year of installation, the system had reduced the number of non-classified vehicles by over 50 per cent," says Göran Andersson.

The company's Intelligent Transportation System (ITS) is in fact a toolbox of technological solutions designed to optimise traffic flows and reduce environmental impact. In practice, the system works by equipping vehicles with a 'transponder' or 'tag' that communicates with a traffic control centre. Automatic number plate scanning can then be used to check and register both regular and temporary users. Via specially designed software, wireless communication and GPS (Global Positioning System), the electronic toll system can be adapted to different kinds of traffic applications in both rural and urban environments. Charges can be set according to the type of vehicle, and are payable either in advance or later.

## **Local challenges**

Individual systems are tailored to local conditions and desired outcomes.

Each city has its own traffic patterns and challenges. This in turn means adapting strategies and tools alike, both to keep the traffic flowing and to persuade drivers to alter their travel habits. Properly applied, the technology can be used to control traffic and – via road charges – can also generate revenue. Such revenue can for instance be invested in improvements to public transport. Also, it may provide drivers with the incentive to switch to greener vehicles.

Kapsch TrafficCom's systems are easy to set up and the payback is fairly rapid, depending on the charge level. The choice of technological solution depends on what legislation is in place in the country concerned. If the country has a reliable vehicle register and legislation that allows number plates to be photographed, most parts of the system can be fully automated.

Growing urbanisation is expected to boost the demand for intelligent traffic solutions. Göran Andersson is optimistic about the future and about the company's chances of helping to solve many traffic challenges in expanding cities. Not least as part of the emerging concept of sustainable cities, such as the Swedish 'SymbioCity'.



**Kapsch TrafficCom AB**

**Established:** 1991 (Saab Combitech Traffic Systems AB, converted into Kapsch TrafficCom AB in 2000).

**Subsidiaries:** 6

**Number of employees:** 200 in 8 countries.

**Market support:** Swedish Trade Council.

**Research contacts:** Cooperation with the Royal Institute of Technology, Stockholm, Chalmers University of Technology, Gothenburg, and Jönköping University College.

**Markets/exports:** Europe, Australia, Latin America, the Middle East, Asia and South Africa.

**Read more:** [www.kapsch.net](http://www.kapsch.net)

Top: Electronic road toll, Brisbane, Australia.

Bottom: Multi Lane Free Flow, Melbourne, Australia.

# From waste to environmentally compatible power and heat generation

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**Methane gas leakage from the world's rubbish dumps is not just an environmental time bomb – it is also a source of power and heat. The Swedish company MGE-Teknik AB has turned this to advantage and is manufacturing and selling systems that extract and harness the gas.**

Bengt Granaas, CEO of the Trollhättan-based company MGE-Teknik AB, has seen many of the world's rubbish dumps. The company's niche is the extraction of methane gas from waste deposits (landfills). The environmental benefits are twofold: the atmosphere is spared an additional dose of the greenhouse gas methane while at the same time environmentally compatible electrical power or heat is generated. The company's speciality is technology that automatically regulates gas wells, but it also sells gas engines, gas turbines, steam boilers and flare units.

## **Huge potential**

Methane gas or landfill gas forms when organic material deposited at dumps rots down in oxygen-free conditions. The environmentally hazardous gas is lighter than air and eventually escapes from the landfill. New facilities for gas recovery account for about 60 per cent of the company's turnover, while the reconstruction and upgrading of old facilities account for the rest. Landfill gas facilities are fully automated and require only a skeleton staff. The aim is high performance and environmental care. In the first instance, the methane gas is recovered for use, otherwise it is flared. The task is performed by means of sophisticated technology, but not without some solid preparatory footwork. Before installing the technology, the company

has to familiarise itself with the distinguishing features and content of each individual landfill in order to obtain the best possible results.

"We always begin by examining the waste mass," says Bengt Granaas. "Sometimes there is documentation showing what has been deposited there, sometimes not." The company combines interviews with analyses of its own. The results are then entered into a calculation model that specifies what parameters are to be used for the control of each individual gas well so as to ensure both the best possible levels of extraction and stable quality. The technology is adaptable and quite simply adjusts to the landfill it is to work in.

Gas extraction is a technology with a future. Its global potential is huge. For many customers, the system represents a substantial investment, but given the possibility of selling recovered gas as electrical power it can yield a return fairly quickly.

"Our own facility at a landfill outside Warsaw in Poland is expected to generate 0.5 MW of electrical energy per hour," says Bengt Granaas. "We sell the electricity for SEK 1.10 per kWh plus income from certificates. The facility cost around SEK 15 million to build, which means a payback period of 5–6 years."

## **In modules**

Environmental imperatives and climate

objectives are hastening developments in this field and the Swedish technology company is optimistic about the future. Solid technical expertise, long experience and good results are boosting confidence. MGE has concentrated its manufacturing to Trollhättan, and delivers solutions primarily to Norway, Poland, Latvia and Lithuania. Soon, the company may broaden its horizons further. A research partnership with the US is expected to open new doors. Actors in the South African and Egyptian waste industries have been in touch, and via the Swedish Energy Agency the company has been establishing contacts in India. That country already has a number of systems for gas extraction but many are in poor shape and produce little.

Landfills in densely populated countries like India are often far larger than a typical Swedish landfill. Collecting all the methane gas would necessitate a huge investment on the part of the customer. MGE's solution involves building by stages: the landfill is quite simply divided up and equipped with several small facilities or modules. The system can then be expanded as and when required by the customer. The market is a promising one and MGE-Teknik AB is in the running.

"In five years' time, MGE will be established in India," says Bengt Granaas. "We have the kind of technology that can help meet both climate objectives and energy challenges."



**MGE-Teknik AB**

**Established:** 1998

**Number of employees:** 9

**Research contacts:** Cooperation with SGGW – Warsaw University of Life Sciences, Poland.

**Markets/exports:** Europe and partnerships with India and the US.

**Read more:** [www.mge-teknik.com](http://www.mge-teknik.com)

Biogas extraction at a landfill in Šiauliai, Lithuania.

# Monitoring air quality with Opsis

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**The Swedish company Opsis helps public bodies and businesses to keep check on their air quality, whether emissions from individual chimneys or from diffuse sources. The company's optic measuring equipment can handle most known types of gas emissions and deliver data ready for use in the drive for a better environment.**

Opsis AB develops, manufactures and markets state-of-the-art systems for gas analysis and process control. The technique can measure emissions both from individual chimneys and from engines. With the aid of dispersion models, the company can also chart and track emissions within an extended geographical area. Opsis provides hardware and software for use from the actual time of measurement to the analysis phase and finally to the digital public presentation of results.

The company is represented on all seven continents via a network of subsidiaries and distributors. More than 90 per cent of its sales are exports. All manufacturing takes place at Furulund in Skåne, Southern Sweden. Environmental demands are at the root of the company's expansion. In Sweden, the official requirements concerning environmental quality standards for urban air have led to many assignments. The conditions laid down for operating permits are creating a demand for the technology, while high-quality measurements are also a valuable component in environmental improvement work in certification systems of one kind or another.

## **Tools for communication**

According to Opsis, the benefits of the technology extend beyond environmental demands and the need to show that environments are being improved.

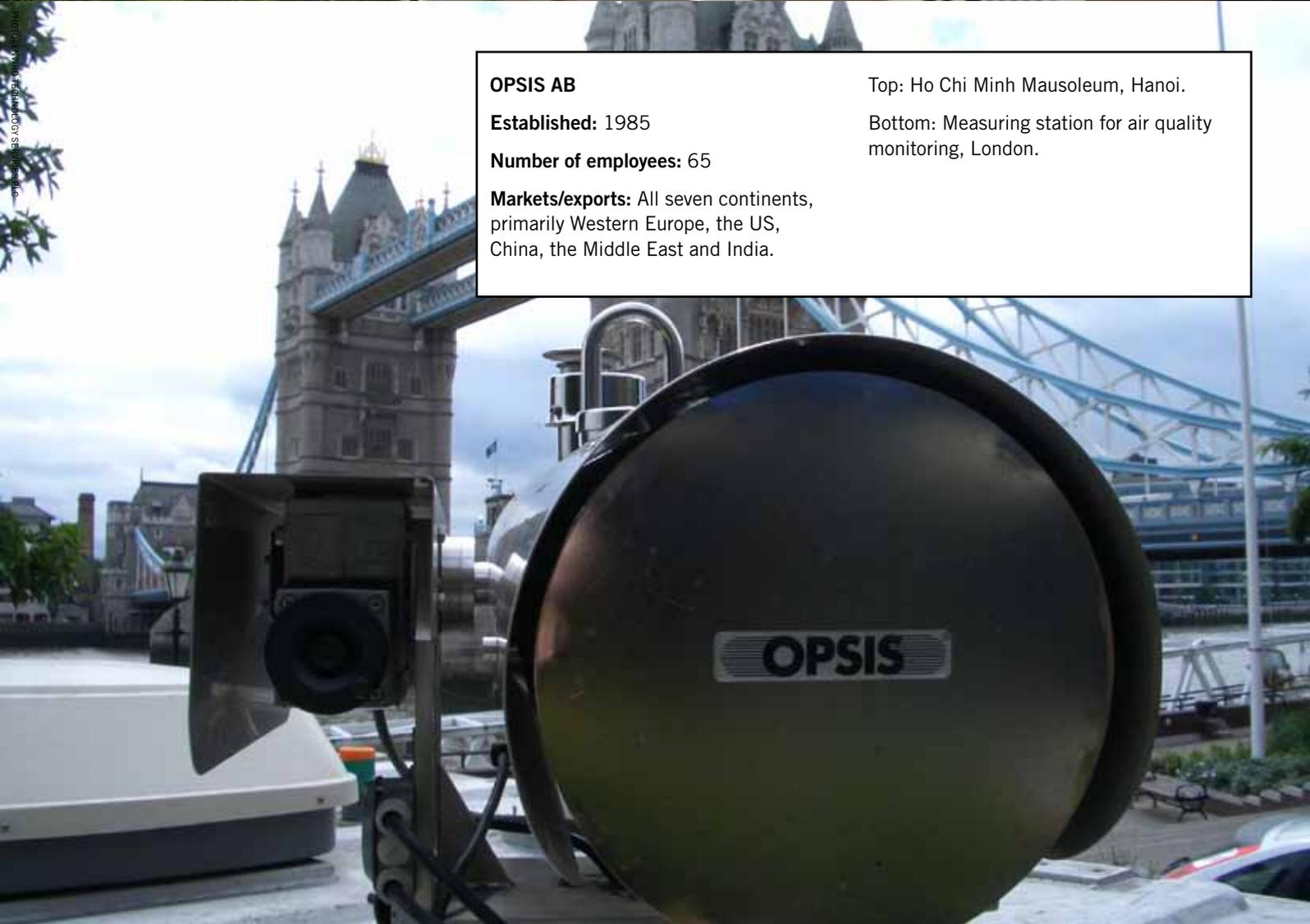
Emissions monitoring can also help optimise industrial processes, boost profitability and improve the working environment. The technology itself does not reduce emissions but it is an important part of the improvement process. Without knowledge – no basis for action, without facts – no good decisions. CEO Svante Wallin views the technique primarily as a tool for dialogue and improvement. High emission levels should not be concealed, instead red figures may spell the beginning of something new and better.

“People thinking about investing in Opsis monitoring systems must want to – and dare to – use and report the results of our measurements,” he says. “The technique should be used to communicate challenges and problems, which in turn provides a sound basis for solutions.” Svante Wallin cites a partnership with the Department of Pollution Control in New Delhi as a case in point. Opsis has installed a measurement system for monitoring air pollution levels in various parts of this Indian megacity. In some districts there is sometimes thick smog, and exhaust fumes from the city's traffic are a tough nut to crack. But the city's inhabitants can now keep track of air improvement efforts via the presentation of measurements on the Internet. This makes for greater awareness and acceptance of public action to combat urban air pollution.

## **New markets**

White light is the core component in the company's measuring technology. Gas concentrations and pollution loads are measured and calculated with the aid of a light source that emits a broad banded white light. The company's basic DOAS (Differential Optical Absorption Spectroscopy) systems use a Xenon lamp as the light source. Measurement paths can extend from 100 metres up to 5 000 metres, depending on local conditions and customer requirements.

Besides the West and India, the company is now established in China and the Middle East. Usually, new markets develop as environmental legislation becomes more stringent. Opsis keeps to the fore by emphasising quality enhancement. Its measuring techniques have been tested and approved by a number of international bodies, including the American EPA and the German TÜV. The company also provides training in measurement technique, calibration and maintenance, and is certified under both the ISO 9001 quality system and the ISO 14001 environmental quality system. In addition, Opsis has an accredited calibration laboratory in accordance with ISO 17025. The company goal? To make a measurable difference – today and tomorrow!



**OPSIS AB**

**Established:** 1985

**Number of employees:** 65

**Markets/exports:** All seven continents, primarily Western Europe, the US, China, the Middle East and India.

Top: Ho Chi Minh Mausoleum, Hanoi.

Bottom: Measuring station for air quality monitoring, London.

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