

Made in Holland



Environmental Technology

Waste processing

Soil remediation

Water technology



“The Dutch don’t fool around when it comes to environment and hold green values exceedingly dear. They have pulled their less environmentally minded counterparts up to their standards... The last thing the Dutch want to do, is waste their land on waste. They have taken garbage management to new levels.”

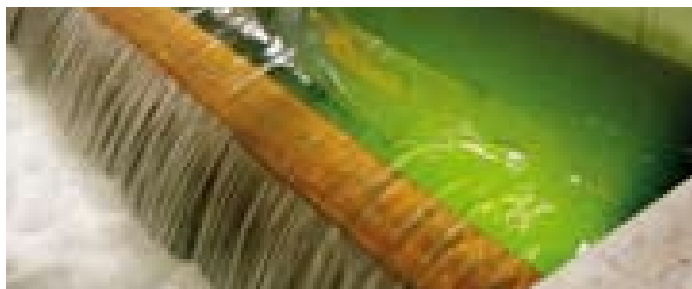
(A leading Canadian newspaper, *The Globe and Mail*, was already reporting on Dutch innovations in tackling environmental problems on 18 November 2000. Ed.)



Pioneers in international business

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About this publication

July 2006

Made in Holland, Environmental Technology, is a publication of the EVD, Agency for International Business and Cooperation, part of the Ministry of Economic Affairs. **Editor-in-Chief** Aimée van Lijf **Editing** Peter Koll, Bonnie Davis, Jolanda Donkersteeg **Editorial address** EVD Made in Holland, P.O. Box 20105, 2500 EC The Hague, The Netherlands, madeinholland@info.evd.nl **Contributors** NWP, VLM, Vereniging Afvalbedrijven, VROM, Koen Donker van Heel, Marc Mijer, Arnoud Veilbrief, Jan Trommelen, Gerda van Groesen, Karin Hakkenberg van Gaasbeek **Translation and revision** Balance Maastricht/Amsterdam **Basic design** Mood Factory, Amsterdam **Lay-out** Arjen Hoogland Ideeën, The Hague **Photos/illustrations** Hollandse Hoogte, Corbis, Teo Krijgsman, Gerhard van Roon **Printing** PlantijnCasparie The Hague **Copyright** Articles may be reprinted or reproduced only with acknowledgement of the source: Made in Holland, Environmental Technology / EVD
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Ministry of Economic Affairs

In Brief



New water treatment plant in New York

SHARON Systems LLC, a joint venture involving Grontmij and M²T, has been appointed “Systems Integrator” by the city of New York for a water treatment plant that will deal with waste water from parts of Manhattan and the Bronx. The SHARON plant is to be constructed at the water treatment site on Wards Island. The technology has been developed by Delft University of Technology, the Holland Delta water authority (ZHEW), and the Grontmij consultancy and engineering firm.

For this project, Grontmij will be working with an American process contractor, Mixing and Mass Transfer Technologies (M²T). As the “Systems Integrator”, the specially formed SHARON Systems LLC will provide the process design and the mechanical and electrical plant, and will be responsible for starting up the process. Construction is scheduled to commence in June 2006.

www.grontmij.com

Netherlands recycles more than European average

More than 80% of all the glass bottles and jars used in the Netherlands are recycled, amounting to more than 412 million kilos a year. The average Dutch person deposits some 50 bottles a year in the bottle bank (21.1 kilos of glass). This puts the country well above the European average of 60% and makes it number 5 in the EU. Currently, the European leaders are Switzerland (96%), Sweden (92%), Belgium (88%), Norway (86%), and Austria (also 86%). The target was that by the end of 2005 the Netherlands would recycle 90% of glass bottles and jars, an annual average of some 25 kilos per person.

When the Glass Recycling Foundation (SPG) was set up in 1981, only 27% of glass was recycled, via 6000 bottle banks. Currently, the Netherlands has 25,000 bottle banks. Relatively speaking, single-person households and country dwellers recycle the most glass.

www.senternovem.nl



Pooling knowledge on high-quality water

KIWA Water Research is collaborating with Shanghai Waterworks Shibe Co. Ltd & Postdoc Research Station to ensure that the water supply in Shanghai during the 2010 World Expo complies with European standards. The partners will be working together for a period of two years and will also be looking at the possibility of setting up a Chinese-Dutch centre of expertise for drinking water. KIWA will also help develop a master plan for the overall water supply for Shanghai's 16 million people. This will require constructing new reservoirs and water treatment plants along the Yangtze River.

Chinese-Dutch collaboration focuses on micro-contaminants in raw water, disinfection and oxidation during water treatment, methods for evaluating the safety of drinking water, and monitoring systems to check on nutrients for micro-organisms and the actual growth of micro-organisms in drinking water systems. Studies will also be carried out of changes in water quality during transport and distribution, the performance of different types of piping materials, methods for determining the condition of piping online, and design criteria for self-cleansing networks.

www.kiwa.nl



Joint drinking water project in Ghana

Vitens and Evides are providing support for South African Rand Water company for a large-scale water project in Ghana. The aim of the project is to improve the management of drinking water supply systems in urban areas.

Ghana Water Company Ltd (GWCL) is responsible for urban water supplies but is not very successful at managing them. The World Bank and the Ghanaian government have requested Vitens and Rand Water to take over operational management from GWCL for a five-year period. Vitens will provide knowledge and expertise in the field of management and will bring in experts in operational management of networks, maintenance of production facilities, administration, and financing.

Evides will collaborate with Vitens primarily by supplying expertise.

The Dutch government has a major programme of investment in drinking water supply projects in Ghana. With this particular project, Vitens and Evides will contribute to the UN's objective of cutting the number of people with no reliable drinking water supply from the current figure of one billion to 500 million by 2015.

www.vitens.nl/Internationaal/EN/International.htm

www.evides.com

Webplume, a new web portal

GeoDelft has set up a Web portal to check remediation targets for feasibility. The program is primarily intended for users without expertise in the field of groundwater models and is a simplified version of the DG>Plume program. It gives a quick initial impression of the spread of the contamination plume. Webplume determines the effect of advection, adsorption, dispersion, and biodegradation on the spread of contamination. The Web portal acts as a calculator and can be used to determine the risks associated with the spread of soil contamination via groundwater and to determine the post-remediation value in the source area so as to arrive at an acceptable residual risk. Users can freely enter project data at the Webplume web portal and are therefore responsible themselves for the results and how they are interpreted. GeoDelft merely provides a calculator so as to simplify the user's work.

www.delftgeosystems.com



Clever Dutch technology helps create a less polluted world

The Dutch environmental technology sector is not a major player on the global market. But the Netherlands has a great deal to offer the world in the fields of waste processing, soil remediation, and water technology.

By Koen Donker van Heel

In a small but densely populated and highly industrialised country like the Netherlands, environmental issues quickly become a problem. In 2000, for example, the Dutch waste processing industry had to find creative solutions for dealing with some 59 billion kilos of waste. Some 77% of that could be recycled and 12% incinerated (thus providing fuel for generating sustainable energy), with only 9% being dumped in landfills and 2% discharged into the environment.

Incinerate or dump?

In 2003, the 679 companies making up the Dutch waste processing sector had a combined turnover of EUR 4.6 bn. Approximately 40% of that turnover was generated by only five companies: SITA Nederland, AVR, Essent Milieu, Van Gansewinkel Groep, and Shanks Nederland. These companies operate primarily in the field of waste disposal and waste processing by means of incineration or landfill dumping. In most cases, it is smaller companies that concern themselves with the reuse and recycling of waste (paper, glass, plastics, and textiles).

In the Netherlands, waste incineration is important, and the twelve companies involved have a joint capacity of 5.18 million tonnes. Poland, by contrast, has only a single incineration plant, which processes 0.04 tonnes. EU environmental legislation will therefore have a major impact on the new Member States and will consequently offer significant opportunities for the Netherlands in a number of subsectors. These include

The government has designated the water sector as an innovation area

logistical systems for removing domestic and industrial waste, incineration combined with energy recovery, reuse of organic residues, and – last but not least – clean technologies. It is not only end-of-pipe solutions using filters, waste processing, and water treatment that offer opportunities but also more efficient low-waste production using less energy and water. Speaking on behalf of the Dutch Association of Suppliers of Environmental Technologies (VLM), Trudi van Spankeren has this to say: “What we are really good at in this country is comprehensive waste processing. In other words, processing that does something positive with the waste, for example using it as an energy source. It is not impossible that as soon as all the Chinese and Indian populations start consuming oil we will be faced by an oil shortage. With that in mind, you can say that waste is the raw material of the future.”

Clean soil

The Netherlands is a world leader in the field of soil remediation. This is because the well-being of the Dutch population is directly linked to the scarce amount of space available and the stringent legislation in this field. A total of some 1200 soil remediation projects take place in the Netherlands every year. Over the past 20 years, the main techniques have been perfected, for example washing soil and biological decontamination, with increasing use being made of DNA technology.

In this area, the SKB (Foundation for Knowledge Generation and Transfer on Soil) plays a key role, involving as it does not merely “problem owners” such as companies and authorities

but also problem solvers such as contractors, consultants, and research and teaching institutes. A great deal can be expected of the techniques for on-the-spot remediation that have been developed in this country – for example biological remediation, oxidation, and air injection – as well as of soil decontamination equipment. Harry Vermeulen, director of the SKB, puts it like this: “The Netherlands is particularly strong in soil investigation techniques and on-the-spot remediation technology. It is also good at incorporating soil remediation and management into property development. The SKB is working with a number of EU countries in the context of the EURODEMO project to share experience gained with new remediation techniques. That experience can be particularly beneficial to new Member States. A lot of the SKB’s work in fact focuses on EU collaboration, for example regarding R&D and Environmental Technology Verification systems. This means that we can position Dutch expertise in this field very effectively.”

“Green growth” by purifying waste water

The Dutch water sector has an annual turnover of some EUR 9 bn, EUR 2 bn of which is from exports. That is still less than the turnover of a giant in this field such as the French Veolia. The 222 Dutch companies involved in water treatment therefore need to focus primarily on niche markets, something that they are very successful at doing. According to the organisers of the 2005 World Exhibition in Aichi (Japan), for example, the Dutch water treatment company Paques is one of the top 100 in the field of environmental technology.

In 2003, the turnover in the waste water treatment sector in the Netherlands came to EUR 2.9 bn. The potential turnover is much higher, however, because the Dutch government has designated the water sector as an innovation area. In this context, there will be a special focus on expanding Wetsus, which deals with innovative programmes for water treatment and the use of water to generate energy. There is no lack of knowledge in this field in the Netherlands, with large-scale knowledge brokers and sector representative organisations such as KIWA, NWP, RIZA, TNO, and VLM. Trudi van Spankeren, who represents the VLM within the European umbrella organisation EUCETSA, says: “We have managed to get our strategic research agenda made the basis of the Seventh EU Framework Programme. We also intend working on pilot projects to demonstrate to countries like China and Canada how our water treatment technology works in actual practice. Our objective here is of course to boost exports. The Netherlands has a very good reputation in this field. I predict an excellent global future for Dutch membrane bioreactors and other water treatment systems and for remote monitoring and sensor systems.”

www.vlm.nl

www.skbbodem.nl

www.verenigingafvalbedrijven.nl

www.nwp.nl

www.vrom.nl

Technology

Wetsus: a new approach to water technology

Wetsus, a centre for water technology, aims to discover sustainable solutions to tackle the impending shortage of fresh water. Wetsus brings together the expertise of top researchers at Dutch universities and research institutes, industry, and government. It adopts a multidisciplinary perspective on such fields as biotechnology and separation technology, two crucial technologies for water treatment. Wetsus's ambition is to become a European Centre of Excellence for water. According to Johannes Boonstra, the company's business director, "Wetsus was set up as a top technological institute. There are lots of institutes like that, of course, but what makes Wetsus different is that we take a multidisciplinary and collaborative approach to demand-driven research for industry". Over the next few years, Wetsus will focus on six particular topics: salts, decentralised water treatment, membrane bioreactors, biofouling of membranes, energy from water, and sensing. All this is intended to produce commercial applications that are not just cost-effective but also sustainable.

Safe and healthy water can be produced by using reverse osmosis and nano-filtration membranes, where all kinds of micro-organisms unfortunately feel at home. The micro-organisms form a biofilm on the membrane which then constantly expands, producing "biofouling". Gert-Jan Euverink, the company's assistant director for research, says: "Biofouling

means that the layer of micro-organisms on the membrane ultimately become so thick that it increases the resistance of the filter to the passage of water. That accounts for a great deal of energy and money. Removing the micro-organisms prior to membrane filtration is an expensive and non-permanent solution. Even if just a single bacterium escapes, it can multiply on the membrane and create the same problems all over again. The same applies to membrane cleaning: not all of the bacteria are removed, and they start to multiply again after cleaning has been completed. The best approach is to prevent and/or restrict biofouling, and that was what our research assignment involved." Several disciplines are involved, including microbiology, surface chemistry, membrane technology, and process technology. An additional problem is that the biofouling process cannot easily be simulated in a laboratory. Wetsus researchers therefore constantly need to work in the field to study operational filters. "In the laboratory, biofouling by bacteria does not take place. We therefore examined industrial filters to identify the bacteria that first established themselves on a membrane and which other bacteria then follow. As soon as we know the main types that are present, we can study that part of the process in the laboratory. In the future, we hope to be able to use living organisms to get rid of the bacteria, in the same way as the bacteria on your skin protect you against harmful bacteria."

www.wetsus.nl



Safe and healthy water



Mechanical separation of asbestos

The VAR B.V. recycling company has developed a system for mechanically separating asbestos from building rubble and soil. The technique minimises the need for manual separation, greatly reduces the residue that is left, and makes a major improvement in working conditions and safety. This means that fewer workers are necessary to separate the asbestos and it also produces a higher yield. One significant improvement is that the semi-mobile system can be set up in one day.

VAR's manager Hans Boer says that 99% of asbestos is marketed in the form of sheeting. "We have developed a method for removing flat sections from waste material mechanically. The separator removes not just asbestos but also glass, etc. The amount of shattering of the recycled granules is therefore much better than that of granules produced from material that has not been dealt with by the new system." The system mechanically removes asbestos particles of up to 100 millimetres and can achieve a production capacity of between 700 and 800 tonnes a day. Testing under worst-case conditions showed that between 92% and 96% of the asbestos was removed. In actual practice, the percentage is higher. After treatment, the soil or rubble can be reused as category 1 sand or granules.

www.var.nl

Tracing polluters

How do you prove that a particular company is responsible for a serious case of soil contamination? Until recently, all you could do was look at the history of the site. But if more than one company used the site in the past that approach was unsatisfactory. TNO Built Environment and Geosciences has now developed a method that combines historical research with forensic soil investigation. The organisation has successfully applied the combined techniques to date soil contamination. The system is currently being used in the Amsterdam petroleum harbour. Amongst other methods, it uses gas chromatography and mass spectrometry, measurement of tritium levels in the groundwater and – important in the case of leakage into

the soil – modelling of the way substances are transported in the contamination plume, together with knowledge of how contaminants behave once they have entered the environment. This has made it possible to divide up contamination of the petroleum harbour into a number of different phases, namely prior to 1941, from 1941 to 1975, and post-1975. Whether this combination of technologies can be used is determined by the particular problem, the nature of the contamination, and complexity of the site. For the owner of an area where the soil is contaminated, this may mean the difference between having to cover the cost of remediation itself and being able to discover which company was actually responsible.

www.tno.nl





Separation of grey and black water

Each of us produces about 140 litres of domestic waste water a day. All of it ends up in the same sewer, whether it's "grey" water (i.e. slightly contaminated waste water from your bath, shower, sink, or washing machine) or "black" water (i.e. waste water containing faeces). A consortium including the firm of Landustrie Sneek BV is trying to improve this situation. It is not possible to treat waste water for each home individually but it can be done for a cluster of 2000 people, for example, or for a school, block of flats, or office building. Separating grey and black water makes it much easier to purify the grey water, while the black water can be fermented to produce biogas. In turn, the biogas can be used to produce hot water and/or electricity for nearby homes.

To increase the concentration in the fermentation reactor, a vacuum toilet is used which consumes only one litre for each flush rather than seven. This produces a water saving of 25%, although this can be increased to 50%. The sludge that remains can be used as artificial fertiliser. Because the amount of water from the toilet is so much less, it also costs a great deal less to apply additional treatment techniques so as to remove such things as hormones and remnants of medication. The Dutch town of Sneek is currently using this method in a new district of 32 homes to remove grey and black waste water separately and to purify the black water.

www.landustrie.nl

Soil remediation using soya

The metal industry and dry cleaners make a great deal of use of chlorinated degreasers and solvents such as Per and Tri. If they leak into the soil, these substances can cause serious contamination, referred to as VOCl contamination. Hannover Milieu- en Veiligheidstechniek (HMVT) has developed an entirely new method for dealing with this kind of contamination. The new technique is called "ENNA", short for Enhanced Natural Attenuation. The problem in dealing with soil that is contaminated with VOCl is often the lack of sufficient organic carbon to ensure natural dechlorination. Injecting nutrients to speed up the degradation process is possible but the substances used are often quickly consumed or are leached away. To remove the contamination, a number of injections of nutrients may be necessary over the course of some years. The solution that HMVT has come up with involves soya. The company injects a single dose of a very fine emulsion of 10 to 15% of soya oil and other ingredients into the soil, with the particles being no larger than 2 µm. The nutrients required for degradation of the contamination are released gradually over a period of five to ten years, causing the contaminants to be broken down by the bacteria in the soil. With the HMVT system, VOCl contaminants are dissolved approximately 1200 times better in soya oil than in groundwater.

www.hmvt.eu

International trade fairs

where you will find Dutch companies

China

10–14 September 2006

IWA World Congress & Exhibition

www.iwa2006beijing.com

The Netherlands

26–29 September 2006

Aquatech

www.aquatechtrade.com/amsterdam

Belgium

10–13 October 2006

Ifest

www.ifest.be

Germany

24–27 October 2006

Entsorga-Enteco

www.entsorga-enteco.de

France

28 November–1 December 2006

Pollutec

www.pollutec.com

Canada

29–30 November 2006

Canadian Waste & Recycling Export 2006
(CWRE2006)

www.cwre.ca

The Netherlands

2007

Waste & Cleaning RAI

Trade fair for the waste and
cleaning sector

www.afvalreinigingsrai.nl



***Maltha
Glasrecycling
Nederland B.V.***



Photo: Teo Krijgsman
Text: Jan Trommelen

Glass never decays, ever. Not even just a bit. So as not to harm the environment and to save energy, Dutch glass factories make their products primarily (90%) on the basis of recycled material from used bottles, jars, and other containers. But the Maltha glass recycling company wanted to go further, and in 2002 it began processing other kinds of glass, for example from old car windows and insulating glass. Maltha created its own processing systems to do this. In fact it is one of only a few companies worldwide that can deal with this kind of glass. With branches in Belgium, Portugal, and France, it was Maltha that introduced the bottle bank in the Netherlands in 1978.

Recycling glass is highly beneficial because it cuts energy costs by some 18% and consumption of raw materials by 30%. It also reduces CO2 emissions. Working with Delft University of Technology, Maltha is constantly engaged in improving its integrated process management and the quality of the materials it processes. Consumers can help in the latter respect by cleaning out jars and bottles properly before depositing them in the bottle bank and by not adding ceramics, earthenware, porcelain, or heat-proof glass.

www.maltha-glassrecycling.com

Treating waste water worldwide

Nijhuis Water Technology treats water and waste water for industry and government worldwide. The company's international network of branches, agents, and distributors enables it to provide clients with the necessary equipment, process design, construction, and service.

By Marc Mijer

managing director Tonnie Eijt

Giant drilling platforms out at sea have to cope with strong currents, powerful waves, and stiff winds. To do so, they rock slightly when these forces act on them. That's good for the structure of the platform but it doesn't help when the oil is being separated from the water used to help pump it up from under the sea bed. One oil company asked Nijhuis Water Technology (NWT) to come up with a way of ensuring that the rocking motion of the platform didn't cause the various liquids to slop over the edge of the separator basin. The tailor-made answer NWT produced involves a gyroscopic flotation unit that allows the basin to move with the drilling platform, thus preventing any of its contents being spilled.

NWT has the necessary experience and expertise to produce specific solutions like this, but it can also provide standard designs based on patents developed by the company itself, by universities, or by clients. We asked Tonnie Eijt, the company's managing director, whether this technology was why clients chose to do business with NWT. "They do of course think it's important," he said. "That's how we can solve their problems. It enables us to combine the process of design and construction, allowing us to guarantee the required result for the agreed price." NWT also offers a variety of flexible financing constructions if required.

Direct support

Another reason for clients to work with NWT is the proven success of its solutions. The company has a file of more than 3000 references from all over the world, ranging from multinationals to small companies (see website). "In many cases, we can immediately show potential clients that

The basin moves with the drilling platform

our solutions are already operational for previous clients. Sometimes we take them to view a completed project and otherwise we put them in touch with previous clients so that they can get information by phone."

NWT's head office is in Dinxperlo, a little town in the far eastern corner of the Netherlands. At first sight, it doesn't look like a very convenient location from which to do business on a global scale. "That's not important," says Tonnie Eijt. "We have a large international network, with branches of our own in the United States/Canada, Egypt, Poland, the Czech Republic, and – since recently – China. We also have agents and representatives almost all over the world. We train them so that they are very well informed about our products. Thanks to that approach, customers can always talk to someone locally, regardless of where they are located themselves.

That contact will be abreast of the local rules and regulations and can provide initial support when needed."

Test systems

With about 100 employees, NWT is a medium-sized company in its field. According to Eijt, that's a good thing to be. "Suppliers that are much smaller than us don't have the same range of options, while bigger ones often seem to be less flexible and more expensive." NWT does everything possible to provide flexibility and a client-oriented approach. Many of its staff have an advanced level of training and a large number of them are shareholders in the company, meaning that they have an interest in "going the extra mile". "We are in a position to provide solutions quickly," says Eijt. "We have the knowledge and software in house for the leading brands of industrial equipment, meaning that in most production environments we can get down to work right away."

If a client is unsure about the solution offered, NWT has a large number of test systems available to demonstrate what can be done in the particular case concerned. "We also have systems available for hire," says Mr Eijt. "That's very useful for companies that only have problems at certain seasons, meaning that it's not necessarily worth their purchasing a complete system. They can then hire one from us for the relevant period."

Saving space

NWT recently developed an interesting system for a pig farm in Chile, making it possible to extract the water from the animals' manure. The clean water this produces is then used to irrigate vineyards. A further advantage is that it greatly reduces the

amount of CO₂ that the farm emits. "That is also economically interesting," says Tony Eijt. "It allows clients do comply with the Kyoto pollution standards and they can therefore trade in emission rights." Another process recently developed by the company – and the subject of a patent application – is the Hexaflot. This is an advanced dissolved air flotation unit available in a number of different models with capacities up to 1500 m³/h for a single unit that is still easily transportable. This piece of equipment also has a smaller footprint than its competitors, taking up 25% less space.

All NWT's activities are subject to stringent safety and quality requirements. The company holds an ISO 9001 certificate and has quality manuals based on that certificate.

There are many reasons why industrial organisations need to treat waste water. Even if it is not required by law, treatment may be cheaper than paying statutory emission charges. Other companies decide to treat their waste water because customers want them to do so or because they simply want to comply with the most stringent standards for environment-friendliness. Nijhuis Water Technology has solutions available for all such cases, regardless of the type of industrial activity concerned.

www.nijhuis-water.nl

Soil remediation using direct and alternating current

Dutch companies have been developing advanced soil remediation methods for 25 years now. Holland Milieutechniek has come up with an extremely interesting soil remediation system using electricity.

By Arnoud Veilbrief

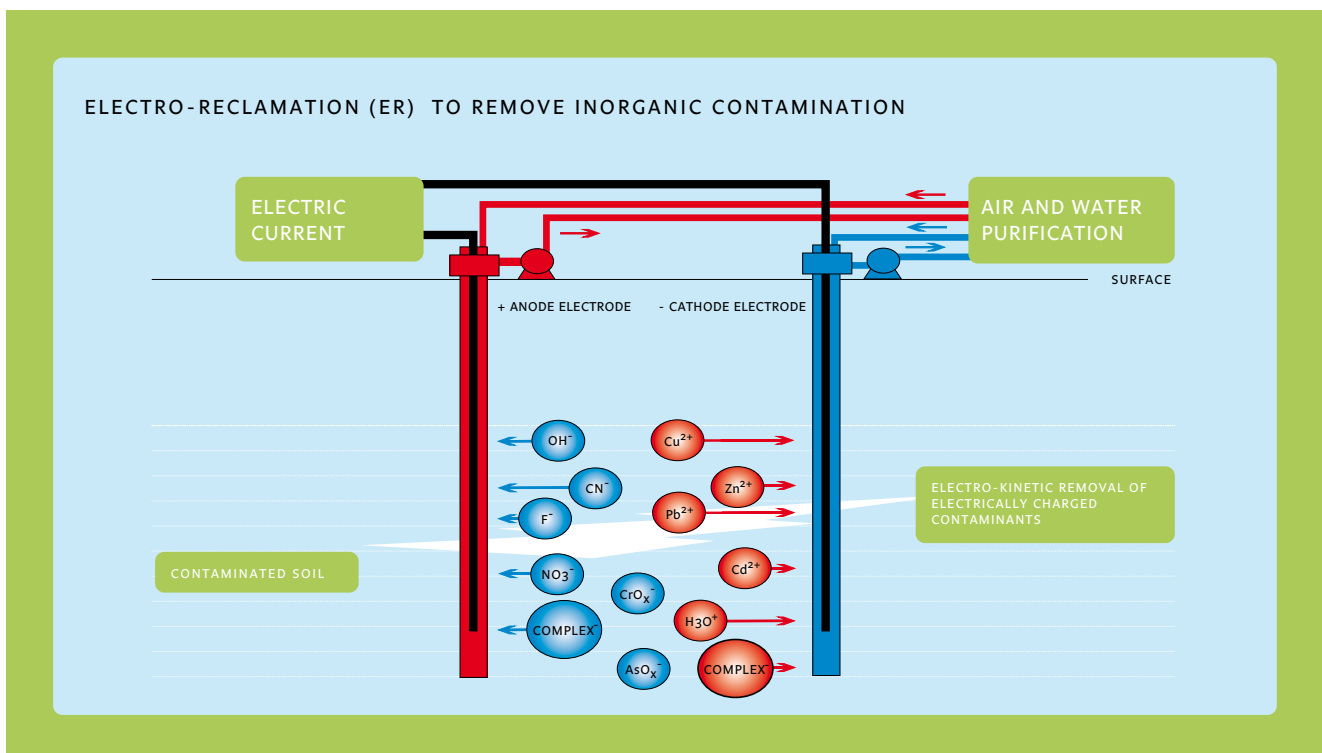
In the late 1970s, it was discovered that a new Dutch housing estate had been built on contaminated land. There was an enormous scandal and a large number of environmental technology companies sprang up as a result. Leo de Zeeuw, CEO of Holland Milieutechniek, says: “The environment became a major business. Contaminated residential areas were discovered – supposedly – all over the place and almost every contractor set up a soil remediation operation.”

In the course of time, however, the hype about contaminated residential areas ebbed away and most of the new companies eventually disappeared. Holland Milieutechniek survived because it had developed something really special. “Our soil remediation technology uses electricity,” says Mr De Zeeuw. “We work on the spot, meaning that none of the contaminated soil needs to be excavated or removed, even if it’s very deep in the ground.”

Direct current

About 20 years ago, one of Mr De Zeeuw’s colleagues succeeded for the first time in removing heavy metals from the soil using direct current (a process known as electro-reclamation or ER). Up to that point, this had only been possible in the laboratory and never on a larger scale. Holland Milieutechniek refined the system and patented it. It is in fact the only company in the world that can offer this technology. “It works the same way as a battery,” says Leo De Zeeuw. “We insert a positive and a negative pole into the ground. Particles with a positive charge migrate to the negative pole and those with a negative charge to the positive. Eventually, the heavy metals and things like cyanides can be removed from the groundwater and brought to the surface. This method also enables us to transport electrically charged nutrients through the soil.”

Direct current



Alternating current

Holland Milieutechniek also uses alternating current to clean up contaminated land (electro-bioreclamation or EBR). This method is used mainly when the contamination involves hydrocarbons (oil or petrol) or solvents. "Using alternating current, we gradually heat the soil to a temperature of about 40°C. We insert a filter into the soil between the two electrodes and use it to remove as many pollutants but as little groundwater as possible. We also pump out contaminated subsurface air." This technology does not, however, consume a great deal of energy. "The soil is highly resistant, meaning that

Global operations

The Dutch company makes a great deal of use of its technologies in Japan, where soil contamination has been the subject of increasing concern in recent years. "Tokyo has a large number of small-scale galvanising plants," says Leo de Zeeuw, "meaning that in many places the soil is contaminated with zinc. The Japanese government is pursuing an extensive programme of soil remediation, and that's where we can help." Dutch-based Holland Milieutechniek is now looking for foreign partners. These may be companies licensed to use the patented technology but joint ventures are also among the options. "We

Method much used abroad

it takes a long time to heat it up. On the other hand, it is also an extremely good insulator. This means that once it has been warmed up, it remains warm for a long time and we then need to use hardly any more power."

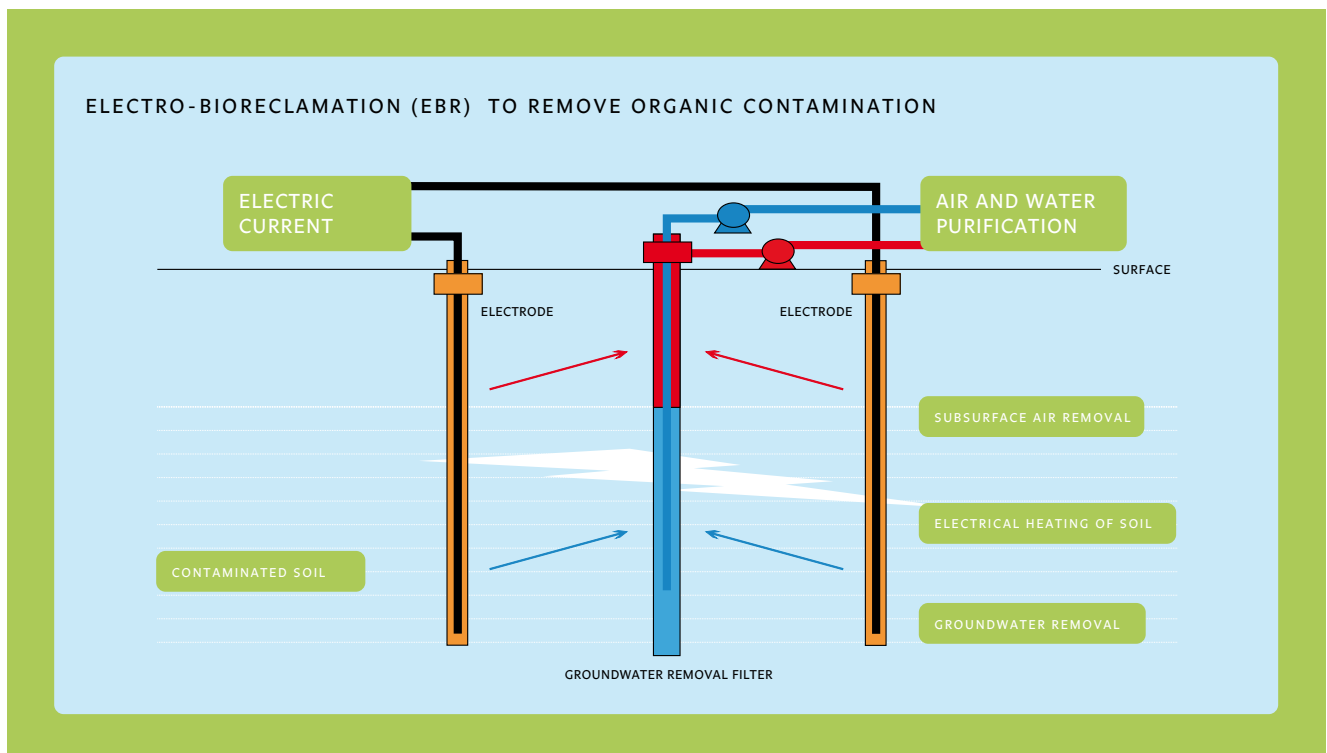
Buildings not affected

Holland Milieutechniek has used these techniques during a large number of projects both in the Netherlands and elsewhere. A now-closed silver company in the town of Nieuwpoort used to use chlorinated solvents to degrease the metal and these had leaked into the soil. Excavating the contaminated soil was not an option because it would have meant demolishing a historic arsenal dating back hundreds of years. Holland Milieutechniek's solution to the problem involved alternating current. "We cleaned up the soil without a single building needing to be demolished," says Leo de Zeeuw. "These technologies are our showpiece products, but we also use other methods, for example with micro-organisms; only if all else fails do we remove the contaminated soil. We tailor the method we use to the specific problem."

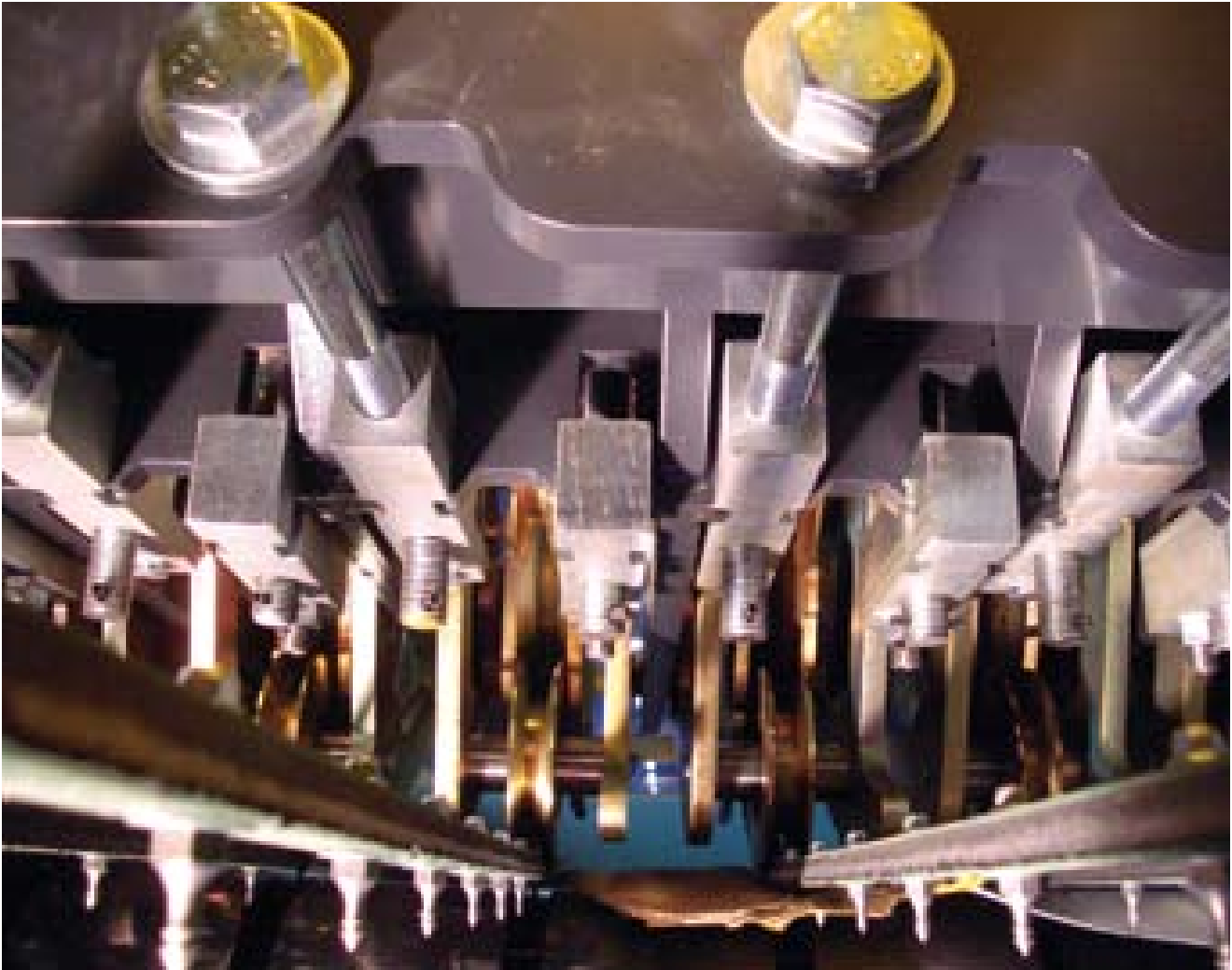
are looking particularly at France, Italy, Portugal, Spain, and the United Kingdom," says Leo De Zeeuw. "We are interested in finding companies that want to become expert at using our technology. They don't even need to have a background in soil remediation. But they do need to be clever and prepared to invest in the technology." Mr De Zeeuw explains that soil remediation using electricity is only of interest to companies and clients that are prepared to adopt a long-term approach. "Soil remediation projects can take years, and it takes time to learn how to use the technology and to apply it."

www.hollandmilieu.nl

Alternating current



What's new in waste processing?



Effective separation of paper and cardboard

In 2005, 77% of all the paper used in the Netherlands was recycled. One of the pieces of equipment aiming to ensure even more efficient recycling of paper is the Paper Spike produced by the Dutch firm of Bollegraaf. The Paper Spike is a machine for automatically separating paper from cardboard. After the material has been sieved, the machine separates the cardboard from the paper. The principle is that the material is transported in only a single thin layer and is then pierced by the machine's spikes. Because paper is not as stiff as cardboard, it is pierced but does not remain on the spikes. It falls off and is immediately directed to the conveyor belt for paper. The cardboard does remain on the spikes and is then taken to the proper destination and removed from them.

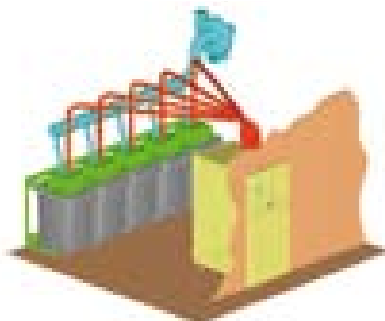
The Paper Spike is available in widths ranging from 1200 to 2000 millimetres wide. It not only improves the quality of recycled paper but saves a great number of man hours in sorting. The largest version, the Paper Spike 2000, can process up to 12 tonnes an hour. Several Paper Spikes can also be positioned side-by-side.

www.bollegraaf.nl

Disposable packaging goes back to the supermarket

In some Dutch towns and cities, residents pay according to the volume of household waste that they present for disposal. The “Re-Vendor” produced by IDcan and Manufacturing Technical Assemblies can lead to a significant saving in this respect. This machine can be located at a supermarket, for example, allowing customers to get rid of disposable packaging, thus significantly reducing the amount of household waste they produce. The Re-Vendor reads bar-coded milk cartons or shampoo bottles, for example, and then shreds them, after which the material is automatically stored according to type. Shredding the packaging allows the supermarket to store far more waste in its skips than otherwise, thus saving on space and transport costs. Reusing a kilo of plastic from the Re-Vendor means a reduction of six kilos in CO2 emissions.

The first Re-Vendor was installed at a Dutch supermarket in 2003. The customer receives points for the packaging he or she presents and can save up the points towards gifts. After the first year, the town assessed the effectiveness of the Re-Vendor and found that all concerned, including the town itself, had saved money. The supermarket owner was also happy because the presence of the machine turned out to have attracted new customers.



www.idcan.nl
www.m-t-a.nl



Self-emptying waste bins

A few years ago, the Dutch town of Almere connected up homes and businesses to the “OAT” system. This rapidly transports waste underground to central collection points. Currently, 995 housing units and some 180,000 square metres of business space are connected to the system. Although Almere pioneered the system in the Netherlands, there are numerous towns elsewhere in the world that already use it. The special thing about the Almere system is that CentralNed has installed more than 100 self-emptying waste bins. After being dumped in the bin, the waste finds its way into a computer-controlled buffer which is emptied depending on how full it gets. A fan creates a vacuum that sucks the waste to a terminal just outside town, where it is stored before incineration.

To prevent any accidents to local people, the lids of the bins close automatically a few minutes before the vacuum is created. The big advantages of the system are that less manpower is required to remove the waste, the town does not require refuse lorries, and overflowing, malodorous waste bins are a thing of the past.

www.centralned.nl

Dutch company now processes Canadian waste

In 2005, Orgaworld, one of the biggest Dutch processors of organic waste, reached agreement with Conestoga-Rovers & Associates to produce compost from organic waste in the York region of Canada. Waste will be separated and collected on a large scale. Plans were drawn up for the composting project because the region has a lack of space for landfills, meaning that most of its waste is currently taken to the United States for disposal. The project involves an order for 40 million Canadian dollars, with an option for expansion to 100 million dollars. The project comprises the construction and operation of a tunnel composting plant developed by Orgaworld. The company expects to begin processing the waste in January 2007 and hopes that the project will help it break into the growing North American market. In the Netherlands, Orgaworld deals with some 264 kilotonnes of organic waste annually, a figure that is set to double over the next few years. Orgaworld processes waste to produce compost, biostimulators, fertilisers, substitutes for fossil fuels, and sustainable energy. The company also devotes a great deal of effort to developing innovative processing techniques for organic waste. It collaborates with government bodies, other waste processors, and major industrial companies.

www.orgaworld.nl

What's new in soil remediation?



TCE method for biological soil remediation

The firm of Bioclear has developed TCE, a promising new biological method for soil remediation. TCE can be used on soil that is contaminated with volatile chlorinated hydrocarbons (VOCI) originating from operations such as dry cleaners and metal companies.

Bioclear uses an anaerobic bioreactor to deal with the VOCI biologically, with the substances being broken down into harmless components. The bioreactor is installed above ground at the contaminated site and contains active bacteria that are infiltrated into the soil together with the right nutrients. Over the course of time, the soil itself takes over the cleansing function from the bioreactor. What makes the new method so innovative is the independent cleansing process that continues when no more bacteria are added.

This environmentally friendly method means that TCE is a sustainable technology. It has been tested and the results indicate that it can effectively remediate contaminated soil quickly and with relatively little effort. Contamination is removed so thoroughly that the soil can be reused as clean soil. Very little remains in the way of hazardous waste and the technique is often cheaper than using conventional remediation methods.

Bioclear consists of a team of professional experts in the field of the environment and sustainable biotechnology and focuses on soil remediation, water treatment, and industrial processes.

www.bioclear.nl

Soil remediation with compressed air

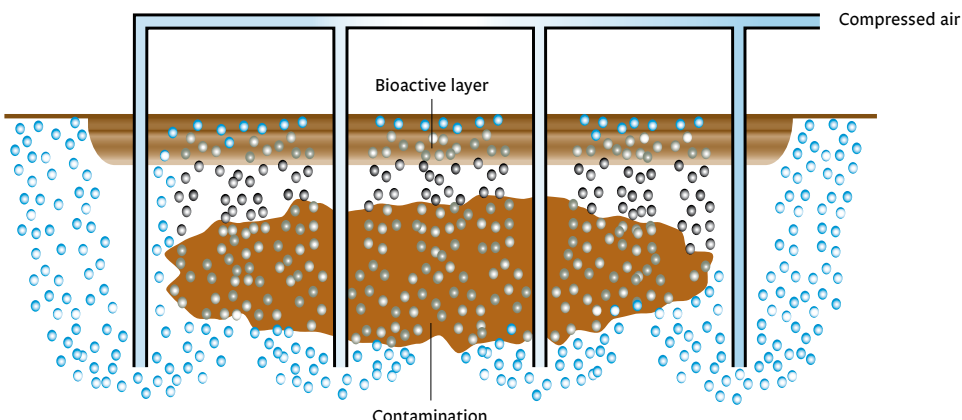
This spring saw the final phase in the remediation of an industrial site in the Dutch town of Geleen, where an area of 27,000 m² of contaminated soil and groundwater had to be dealt with. In 1997, it was found that a leak had contaminated the whole area with benzene down to a depth of 24 metres. Excavating the contaminated soil was not an option. The solution was provided by the firm of Terreco, which uses the PuriSoil® soil remediation technique. PuriSoil® is environmentally friendly, cost-effective, and can be used for any kind of soil and at any location.

Pipes are first installed down to below the contaminated layer and compressed air is then injected through them. In the top layer of the soil, a specially developed bioactive layer is created with the aid of the PuriSoil® starter. The air then flows up through the soil, taking with it the contaminants, which are broken down and converted into carbon dioxide and water.

More than 1000 air injection pipes with a diameter of 2 cm have been installed going down to a depth of 32 metres. The supply of air is remotely controlled, with each injection point being

operated separately. By the end of the project, PuriSoil® will have injected about 60 million cubic metres of air into the soil, enough to remove the hundreds of tons of benzene and to make the bioactive layer harmless.

www.terreco.com





The Amsterdam suburb of IJburg

Effectively sealing off contaminated soil

At sites all over the world, a total of more than 6.7 million m² of soil is safely sealed off from its surroundings using Trisoplast®, a material developed by the Dutch firm of TRISOPLAST® Mineral Liners. Soil remediation projects often make use of traditional mineral barriers, which are robust and naturally long-lasting. Differential settling or desiccation can, however, lead to cracks in these materials, meaning that they are no longer as effective at protecting people and the environment as they are meant to be. Their performance also declines over time. What makes Trisoplast® so special is first of all its simplicity. The performance of this material is based on onsite mixing of the bentonite-polymer components with a mineral filler such as sand.

Water is added to create a strong, dense, and solid gel structure that is mechanically strong and flexible and that provides hydraulic performance between 100 and 1000 times better than traditional mineral sealing materials. Trisoplast® is also much thinner than existing sealing barriers. One example of its use is at Diemerzeedijk, where remediation took place prior to construction of the Amsterdam suburb of IJburg. The contaminated soil was sealed off using Trisoplast® and a top layer was then added in which small trees, bushes, and flowers can grow. Sealing off the contaminated soil with Trisoplast® meant that construction of the new suburb could continue without any delays being necessary.

www.trisoplast.nl

Soil remediation combined with storage of heat/cold

TNO has developed two methods that combine storage of heat/cold with onsite stimulated breakdown of soil contaminants. The advantage of these methods is that they can remediate the soil more cheaply while at the same time providing sustainable energy. The two systems involved are ATES (Aquifer Thermal Energy Storage) and GEUS (Groundwater Energy Exchange System). TNO can combine the two systems with stimulated breakdown of contaminants in the soil. This generates clean energy and at the same time cleans up the soil. ATES reverses the pumping direction each season, thus creating a heat sink and a cold sink. As a result, relatively cool groundwater can be used to cool homes in the summer, with the same water being used after re-infiltration in the winter to heat them. GEUS pumps groundwater up at a constant temperature throughout the year and that water is then either cooled or heated. Combining this with ATES and carefully adding just the right dose of substrate stimulates onsite degradation. Creating the heat sink further increases the rate of biological breakdown because the temperature is higher. Reversing the pumping direction twice a year causes the contaminants and the substrate to shift between the two sinks. Pumping up contaminated water and infiltrating the soil with substrate in a carefully specified manner means that the contamination is controlled from the geohydrological point of view; it also stimulates biological breakdown. TNO has now patented the two systems.

www.tno.nl

What's new in water technology?

Effective waste water treatment at lower cost

Nereda™ is DHV's innovative technology for aerobic water treatment and can be used to treat both industrial and domestic waste water efficiently and effectively. The new treatment technology was developed in close cooperation with Delft University of Technology and STOWA (the Dutch Foundation for Applied Water Research). DHV received financial support from the STW Technology Foundation.

The special thing about this technology is that the bacteria that decontaminate the water naturally clump together as they grow and form pellets. The effective way in which they then settle means that the equipment is much smaller in scale than with standard methods. Nereda™ also makes use of a simple process and extremely compact reactors with a footprint that may be no more than 25% of that of conventional active sludge systems. Additionally, Nereda™ combines biological removal of nitrogen and phosphates from waste water and can save significantly on energy costs. The simplicity of the technology means that it requires lower investment and operating costs. As a result, smaller enterprises and less wealthy countries will be able to improve the quality of the surface water.

Nereda™ is a sustainable system because it treats waste water effectively using far less in the way of construction materials, chemicals, and energy. Expectations are that Nereda™ pellets will be just as successful in the field of aerobic treatment as UASB pellets are for anaerobic treatment.

www.Nereda.net

www.DHV.com



Telemetry using CARS

The 54 pumping stations operated by the sewage water treatment company in the Danish town of Solrød are all monitored remotely by a single PC. This is possible thanks to the CARS software produced by the Dutch firm of YP Telemetrie. CARS is a Central Alert and Registration System and is designed to be as user-friendly as possible. In the case of the company in Solrød, this meant they could write their own Danish-language version on the spot. Using CARS to monitor a sewage system has major advantages. Vandalism or malfunctions are immediately identified and reported to the employee in charge. In the event of high local water levels, a backup pump can be switched on just by pressing a button. Sewage water in the German towns of Grevesmühlen, Boltenhagen, Dassow, and Lüdersdorf is monitored remotely in real-time by a single central CARS unit. CARS is a telemetry package with full SCADA functionality and with countless applications, for example in monitoring polders, cold stores, solar energy equipment, landfill sites, flood control barrages, and wind farms. YP Telemetrie also enables users to develop or expand CARS projects with the aid of the CARS Builder package. Other important modules are CARS Decision Maker and CARS Maintenance, which automatically indicate when maintenance is required.

www.yp-telemetrie.com

www.carsonline.eu

Sustainable removal of ammonium from waste water

Ammonium can be removed from waste water by means of Anammox bacteria, a system that is less expensive than conventional nitrification/denitrification. The equipment concerned is the ANAMMOX® reactor, produced in collaboration between Paques, the Holland Delta water authority, and the universities of Delft and Nijmegen. When combined with partial nitrification, the ANAMMOX® reactor can achieve savings of some 60% in electricity consumption and 100% in chemicals. Approximately 90% less sludge is produced.

This is not only a cost-effective way of removing ammonium from waste water but it is also a sustainable technology because every tonne of nitrogen removed reduces carbon dioxide emissions by four tonnes.

The first ANAMMOX® reactor – which is extremely compact because of its high biomass concentration – was installed in 2002 for research and optimisation purposes. In combination with the SHARON* process, it treats the water extracted

from sludge by a sludge treatment plant; this water contains very high levels of ammonium. Currently, the reactor has a capacity of 500 kilos of nitrogen a day. The Holland Delta water authority calculates that the reactor not only reduces nitrogen emissions but that it also brings about an annual saving of approximately EUR 100,000. Paques has since installed two more ANAMMOX® reactors in the Netherlands.

www.paques.nl

** The use of a Single tank reactor for High activity Ammonia Removal Over Nitrite (SHARON) differs from the conventional removal technique because it dispenses with the normal second phase of nitrification, namely the conversion of nitrite into nitrate.*



Anammox granule

Desalination with Seaguard

Extracting drinking water from seawater sounds simple enough but the technology involved is actually complicated and expensive. Seawater first needs to be treated before it can be desalinated. Ultrafiltration membranes are used to filter out most of the particles, bacteria, and microbiological contaminants contained in the water. These membranes are not always entirely effective, however, and many desalination plants therefore make use of thermal desalination. The Seaguard system, a dedicated pre-treatment membrane produced by X-Flow, makes this unnecessary. The Seaguard was designed with a view to robustness, ease-of-use and a reduction in the overall “cost of ownership”. According to Rick Rosberg, X-Flow’s Global Director Sales & Marketing: “In 1997 we presented our first paper about this topic and one year later we completed our first pilot trials on seawater. Now the performance and total cost of ownership are at such levels that membrane pre-treatment outperforms conventional technologies.”

The dimensions of the equipment mean that it can be installed in any reverse osmosis pressure

vessel. Based on the X-Flow XIGA™ membrane, the Seaguard can be coupled directly to the seawater intake pumps. Energy consumption is extremely low and the inside-out mode means that no air is necessary to clean the membranes, thus reducing corrosion by aerosols. The Seaguard reduces the pre-treatment time for seawater to less than 15 minutes in each case.

www.x-flow.com



www.hollandtrade.com

Holland



Environmental Technology

Websites

VLM

The Dutch Association of Suppliers of Environmental Technologies (VLM) acts as a platform for companies operating in this field. Its aim is to represent the interests of its members, provide information, and promote trade and exports. The Association has some 72 members, specialising in environmental technology and focusing on one or more areas of the environment. Members have environment-specific knowledge which they apply in the form of equipment to prevent or reduce pollution.

www.vlm.fme.nl

VLM Japan

The VLM also has a Japanese website with profiles of its members. The site was set up by the Dutch embassy in Tokyo in collaboration with the EVD.

environment.madeinholland.jp

The Netherlands Water Partnership

The Netherlands Water Partnership (NWP) is an independent body set up by the Dutch private and public sectors. Its aim is to promote co-operation and coordination between the various parties in the Dutch water sector, thus ensuring that the Netherlands makes a greater contribution to solving international water problems and strengthening the country's position on the international water market. The organisation acts as a focal point for the exchange of information among its more than 130 Dutch members.

www.nwp.nl

Partners for Water programme

The Partners for Water programme aims to combine forces so as to strengthen the international position of the Dutch water sector. It comprises three components: policy harmonisation, sector-wide cooperation, and an incentives scheme. Cooperation between the various parties (companies, government departments, research and teaching institutes, and NGOs) will benefit the sector and is essential if international water problems are to be tackled effectively. The EVD is managing the programme in the period from 2005 to 2009 in collaboration with the Netherlands Water Partnership (NWP).

www.partnersforwater.nl

Water in the Netherlands

This site gives an overview of Dutch expertise in relation to water, water management, the water sector, and water policy.

www.waterinthenetherlands.nl

Association of Waste Companies

The Association of Waste Companies represents the interests of Dutch companies operating throughout the chain, at both national and international level. The companies concerned collect, recycle, reuse, compost, incinerate, and dump waste. Companies involved in managing sewers are also among the members.

www.verenigingafvalbedrijven.nl

Netherlands Ministry of Housing, Spatial Planning and the Environment

The Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM) has set the following priorities: To create a pleasant living environment, to pursue a policy of spatial development, and to ensure a sustainable future.

www.vrom.nl

TNO Built Environment and Geosciences

TNO Built Environment and Geosciences promotes innovation by government and industry focused on sustainable structuring, use, and management of the built environment, the infrastructure, and the subsurface. The organisation's clients are the sectors of government and industry that are directly involved in sustainable structuring.

www.nitg.tno.nl

Training programmes

There are training programmes that focus on the environment in various places in the Netherlands.

www.alterra.wur.nl

www.geo.uu.nl

pages.ta.tudelft.nl

w3.tm.tue.nl

National Institute for Public Health and the Environment

As well as carrying out research itself, the National Institute for Public Health and the Environment (RIVM) collects and applies information gathered from all over the world. It produces a large number of reports and recommendations each year.

www.rivm.nl

www.hollandtrade.com