

IWA WORLD WATER CONGRESS in Beijing from 10-14 September, 2006

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Holland Water Innovation

DUTCH WATER AID AND INNOVATIONS



▶ **Prince Willem-Alexander**
Inspire further innovation

▶ **Pieter van Geel (VROM)**
Drinking water main task for China



FOREWORD

Inspire further innovation

Dutch drinking water industry very dynamic



Prince Willem-Alexander

In recent years awareness has increased that a worldwide water crisis is a real possibility. Increasing industrialisation and a growing world population on the one hand make for a higher demand for water, while on the other hand we see fresh water supplies running low as a result of climate change, pollution and abstraction of ground water. Such a crisis is not imaginary. Some countries and regions, notably in the Third World, are already suffering water shortages as well as occasional flooding. But I don't believe in doom-mongering. People cannot live without water and will therefore do anything they can, like in the Netherlands, to be able to 'live with water'.

I know all too well that many people, organisations, research institutes and companies around the world are working with water. The Global Water Partnership, for instance, is a global network, for exchanging experience in water management between regions, countries, NGO's and companies. The network is informing, facilitating and inspiring. The United Nations have also incorporated a reliable water supply in their development agenda: the Millennium Development Goals specifically refer to clean and safe drinking water. And I know personally that this goes beyond mere talk. Action is being taken at all levels. In October last year I attended the Yellow River Forum in China, where management of the Yellow River was the focus of attention and impressive results were achieved. In March this year I attended the Fourth World Water Forum in Mexico, where literally hundreds of local initiatives and concrete results were presented. The Forum made an enormous impression on me.

Innovation and development of new technologies are key to adapting ourselves to a future water situation. In this field much is happening already: in agriculture the search is on for ways to increase yields using less water. The drinking water industry is very dynamic and is investing a lot in research and application of new technologies.

It's also looking for creative funding mechanisms, which are necessary in order to invest. I am proud the Netherlands is a pioneer in this area. Whether large scale or small scale applications, Dutch companies are leading the way with technologies for purification of drinking water and treatment of waste water. It is fascinating to see how a piece of equipment, designed in the Netherlands, is keeping water supplies going in reconstruction areas like Aceh after the tsunami and north Pakistan after the earthquake. The installation takes in raw water on one side from a stream or a little lake and on the other side clean and safe drinking water for thousands of people comes out.

I sincerely hope that the examples from this special edition will inspire further innovation.

Prince Willem-Alexander





The miracle from the tap

**Theo Schmitz, managing director VEWIN:
Dutch drinking water fresh, safe and cheap**

The Dutch are blessed with a great good: the world's most respected drinking water supply. 24 Hours a day, seven days a week, everyone has access to clean, fresh and safe drinking water of excellent quality. It flows from taps everywhere and for the Dutch there's nothing very special about that. "But we should realize that such a fantastic drinking water system hasn't been built in one day", says Theo Schmitz, managing director of the Association of Dutch Water Companies, VEWIN.

The Netherlands' geographical location in a favourable, temperate climate zone has contributed hugely to the Dutch drinking water miracle. It's a welcome bonus, but

such as purification with UV light. All these aspects contribute to the quality of the drinking water system we have in the Netherlands today", says Schmitz. "On top of that everybody in the Netherlands is connected to the water mains and everybody contributes to paying for it. So thanks to all this, healthy drinking water can be supplied at low cost."

Millennium Goals

Dutch drinking water: a miracle, but only as a result of 150 years of hard work. That is a fact not to be overlooked with respect to the Millennium Development Goals for 2015, VEWIN's managing-director Schmitz stresses. "It highlights what huge steps need to be taken internationally to achieve

both in technologies and spatial planning, including use of soil and rivers – but also by investing."

Facts and figures

Between 1853 and 1970 all Dutch households have been connected to the public water mains. Security of supply is now 99.9 percent. Right from the start public health has been the guiding principle of drinking water supply. And public health is still dominating, both in technology and in legislation. Consumption is on the decrease and currently stands at 124 liters per person per day.

The Dutch network of water mains has a total length of 116,000 kilometers, the total number of connections has reached a record high of 7.3 million and the total annual investment of drinking water companies in quality and quantity of drinking water was 450 million euros in 2005.



HEALTHY DRINKING WATER SUPPLIED AT LOW COST

the efforts of the many generations before us deserve most of the credit. "It is all thanks to these generations who in the past 150 years have done so much work in the geomorphologic infrastructure, i.e. the underground and the infrastructure. This has been bequeathed to us by our ancestors and we add research and application of innovative technologies,

such a system. The entire infrastructure will have to be built. That will cost an enormous amount of money. Everyone will have to pay charges, and for large numbers of people in developing countries that is an insurmountable problem", he says. "The international community will have to help solve that immense problem, mainly through transfer of knowledge –



UV/hydrogen peroxide purification is the future

New, revolutionary method for treatment of surface water

After a long period of intensive research the new hydrogen peroxide/ultraviolet water treatment is successfully being applied by the North-Holland Water Company PWN at its Andijk production plant. “We are attracting a lot of national and international attention”, says Martien den Blanken, managing-director of PWN Water Supply Company North-Holland. “This new, revolutionary method for surface water treatment is the future.”

“**S**ince 1968 the water treatment plant at Andijk has been supplying drinking water for a large part of the province of North-Holland. We use water from the IJsselmeer (the former Zuyderzee) there”, says Martien den Blanken. “For a couple of days the water is contained in a reservoir before it is pumped to the plant. There it will pass through micro strains to eliminate large particles and algae. Next it will undergo coagulation. Suspended particles are encased and removed. After filtration the water is then clear. So far the treat-

ment of surface water looks quite conventional. But next the water undergoes treatment in the UV/peroxide installation. Here hydrogen peroxide is added to the water which is then treated with ultraviolet light. Micro-organisms (originating from plants or animals) such as bacteria and viruses are rendered harmless. Also chemical pollutants such as pesticides are broken down. Coal filtration removes the leftover fragments. Post disinfection with chlorine is no longer necessary.”

UV light has been used for a while already in disinfecting rinse water for the treat-

ment of waste and drinking water, says Den Blanken. “But the way UV and hydrogen peroxide are now being applied is very innovative.”

It has taken many years of research. Den Blanken: “Until recently the treatment plant at Andijk used chlorine. But there are environmental problems associated with the use of chlorine. And it doesn't help improve the taste of water either. That's why PWN wanted to substitute chlorine for another substance. Initially we had ozone in mind. But research into that was halted because the water from the IJsselmeer contains quite a lot of bromide. And bromide and ozone together make bromate, which is a health hazard.”

Innovative

Next, research focussed on UV light. In collaboration with the University of Alberta in Canada and a Canadian company manufacturing UV installations, a UV reactor was designed like the one now on stream in Andijk. As of November



2005 the Evides water company is also treating drinking water with UV light at its Berenplaat production location. There the use of liquid chlorine is now a thing of the past as well.

PWN opened its UV/peroxide installation in October 2004. The water company was the first in the world to use this technology on such a large scale. Den Blanken: "The UV/hydrogen peroxide method breaks

Netherlands: "The plant we recently opened at Berenplaat in Spijkenisse is a prime example of innovative thinking and action we may take great pride in. We introduced UV treatment at this plant in cooperation with PWN. Surface water is disinfected using UV light and that is a technique that has not been applied before in the Netherlands. As a result of the new purification method the taste of the drinking

UV LIGHT BREAKS DOWN BOTH MICRO-ORGANISMS AND CHEMICAL POLLUTANTS

down organic micro contaminants and pesticides that cannot be removed with activated coal. The technique enables the water company to guarantee the supply of pure and safe drinking water in the next few decades. Apart from Andijk we are currently constructing a UV/H2O2 installation in Heemskerk."

Good example

Ger Voogesang, managing-director of the Evides water company, which supplies the drinking water in the southwest of the

water supplied by the Berenplaat plant to over 900.000 consumers in the Rotterdam area, has improved. Consumers say the taste is significantly better. The water from Berenplaat did very well in a recent water tasting we organised together with the KIWA research institute. It certainly tastes as good as bottled water or mineral water. And that's a great compliment."

UV treatment is a good example of the excellent cooperation in the Dutch drinking water industry. There is a lot of (inter)national interest in the technique.

COLOPHON

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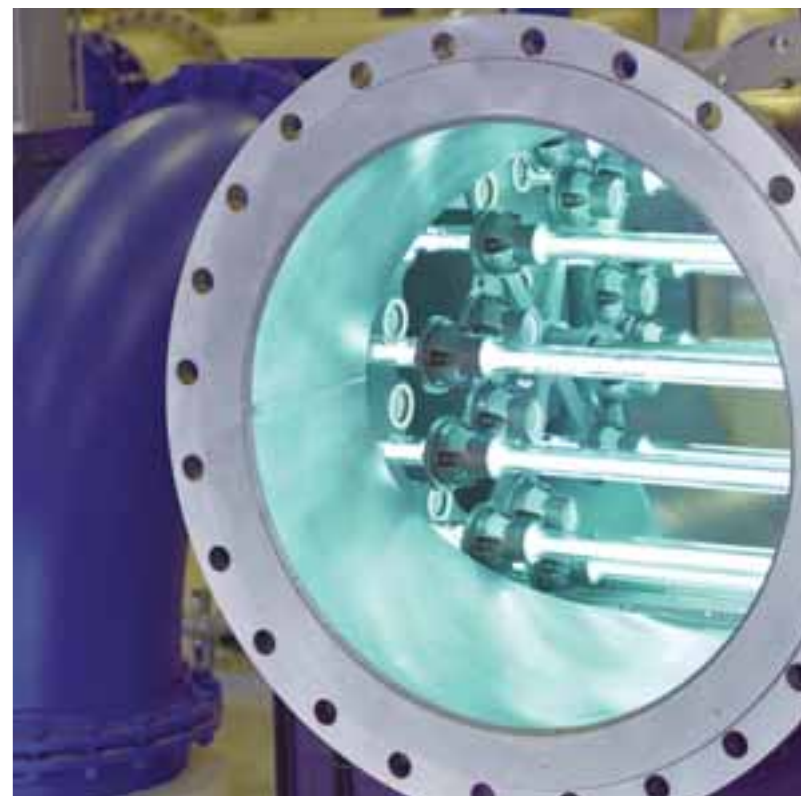
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Drinking water for China key task for 21st century

State Secretary Pieter van Geel (Environment): Many windows of opportunity for further Chinese-Dutch cooperation

“The world can’t afford countries to follow the strategy of grow first, clean up later, as so many countries, like the United States, western Europe and also the Netherlands have done in the last few centuries. If a country makes a bigger environmental pollution first and we then have to try to solve it, we’re too late. There’ll be no planet Earth left. That is why it is so important that we address environmental policy, in China and in India too”, says Pieter van Geel, State Secretary at the Dutch Ministry of Housing, Spatial Planning and the Environment.

China’s rapid growth is putting incredible pressure on the environment which in turn will hamper growth. The State Secretary says water is one of the most notable Chinese environmental problems. “This is a problem affecting all sorts of different areas. Industrial discharges on water systems for example, have a harmful effect on drinking water supply and the ecological system. Or huge problems in water management. It is a qualitative and a quantitative problem, with floods in the south and drought in the north”, says Van Geel. “The Netherlands could play a key role in this, because we have an enormous amount of knowledge and expertise in water treatment, drinking water supply and water efficiency. One case in point is the Dutch know-how and experience in the field of water saving technologies in production processes, like

in the paper or the beer industry. It used to take twelve liters of water to produce one liter of beer, but now it only takes six liters. That saves millions of liters of clean drinking water.”

Task for 21st century

The main task for China in the 21st century is drinking water, according to Van Geel. “When you’ve got polluted rivers and not a lot of groundwater, you need to make improvements in those areas and make sure acceptable drinking water is available. The quality of ground water is also a problem in China and not enough is being done about soil decontamination”, the State Secretary says. That provides many windows of opportunity for further Chinese-Dutch cooperation. “China and the Netherlands are quite similar when it comes to problems related to climate change. Like in the Netherlands,

a large part of the population in China lives in deltas, close to the sea. For those areas a rise in the sea level would have serious consequences. So there are quite a few problems to tackle. The Netherlands could be very instrumental there.”

Latest of the latest

The State Secretary notes that countries like China and India used to be visited in the context of development cooperation. “Those days are over. China potentially has enormous spending power. Because of its size and its high growth rates it is a country with a solid economy and a government that knows exactly what it wants in terms of production, imports of cars or power stations. China no longer accepts outdated technologies, but it wants the latest of the latest. That’s why the Netherlands and China could be in partnership: in areas like water purification, drinking water supply etcetera, we are able to offer just that”, says Van Geel. He concludes with a reference to the World Expo in Shanghai in 2010. The aim is that, with the help of Dutch expertise, water taken from the Yangtze river will flow from the taps there, drinking water that meets European standards. “When you go for such targets with such a large population, then there are business opportunities there. That is good for the environment, for the Chinese, and for Dutch industry.”

Kiwa Water Research, at home in international arena

Dutch model for drinking water

Kiwa Water Research stands for innovation. It's the everyday job of this leading international knowledge centre from the Dutch (drinking) water community to develop and unlock knowledge and intensive knowledge services and water technology, and also to apply this knowledge. Kiwa is actively seeking cooperation with international partners, thus providing an important contribution to the international knowledge infrastructure in the field of (drinking) water supply.

An illustrative example is the collaboration between Kiwa Water Research and the Chinese water company Shanghai Waterworks Shibe. They are jointly undertaking research into advanced technologies for high quality drinking water. The Chinese-Dutch collaboration is addressing micro-pollution in raw water, disinfection and oxidation in water treatment and methods for evaluating the safety of drinking water. Research into aspects of distribution is also on the agenda, like changes in water quality during transportation and distribution and the performance of different materials for water mains.

Best practice

The foundation for the collaboration was laid in 2004, during a trip for research managers of Dutch water companies to Shanghai, Beijing and Singapore. "Shanghai is going through a phase of explosive growth in construction and the economy. The city is situated in a delta, just like the Netherlands is", says Ron van Megen, director of Kiwa Water Research. "Because it is situated at the end of large rivers such as the Huangpu and the Yangtze,

ScaleGuard optimizes nanofiltration and reverse osmosis installations

Kiwa Water Research is competing in three categories of the 2006 IWA Project Innovation Awards, which will be presented on September 12th at the IWA World Water Congress in Beijing. The projects submitted by the knowledge centre are: valve criticality analysis, prevention of well bore clogging and ScaleGuard. With the aid of the ScaleGuard it is possible to optimize nanofiltration and reverse osmosis installations, which saves money in pre-treatment, discharge of concentrate and use of chemicals. The ScaleGuard is a one element bench scale, fully automated and with accurate flow and pressure measurements, which carefully monitors the resistance of the membrane element.

the Shibe water company is faced with enormous pollution of the environment, and so has to deal with issues of chemical and microbiological water quality. Shanghai has adopted the European standards for drinking water. Shibe is looking for best practices and that is an area where the Dutch water industry has a good reputation. It would be a tremendous showpiece for the Dutch water industry if the water from the tap during the 2010 World Expo in Shanghai would be water produced according to the Dutch model. We are still in talks about this, but during a recent visit by an official delegation from China moves towards contracts were made. The dream is that a Dutch water company will demonstrate a complete drinking water system on the basis of the Dutch thinking about water, as if it were its own company." Shibe has also asked the knowledge centre to think along about a masterplan for the entire water supply of Shanghai. That will, among other things, entail the relocation of the main water intake point to the Yangtze river, together with the adaptation of the main infrastructure, such as reservoirs and drinking water production stations.

Desalination of seawater

More and more often seawater is being used to produce drinking water. It is the main solution to overcome water shortages in dry coastal areas, because there is plenty of seawater. Desalination and membrane filtration are important areas of research. A project for membrane filtration is already underway in Singapore. "Besides the research into the choice of membrane, preliminary treatment and membrane pollution, energy is also an important issue. Desalination of seawater is very energy intensive and the challenge we are facing is to make this technology more energy

efficient", says Kiwa Water Research director Ron van Megen. "For this we would also like to start a demonstration project. And it looks like that might happen. Desalination of seawater is the main solution when there is not enough ground water and harvesting of rain water is not yielding enough results. Membrane filtration is one of the options, but there are others as well, like desalination with energy from residual heat, a kind of distillation process. Our knowledge centre does not think in products, but is working problem-oriented on made to measure concepts."



International innovation projects

NORTHWEST SUMATRA

Focus on rehabilitation after tsunami

Last year the H2O-Partners Sumatra Foundation launched a number of projects for renovation and rehabilitation of the infrastructure in the tsunami-hit area in northwest Sumatra. The extent of the damage to the infrastructure is enormous, but the rehabilitation of pumping stations is now underway. The construction of a number of distribution networks has started. New housing will be connected to the water distribution network. In addition, the Foundation is building a training centre.

The water companies lost many people in the tsunami, so new staff need to be trained. Apart from Emergency Aid, the Foundation is drawing up master plans for construction for the long term. And it has begun studies into water resources management, because earthquakes have disrupted run-off and changed some river courses. The H2O-Partners Sumatra Foundation has 11 million euros at its disposal for the work. It is the intention to keep the Netherlands involved in the water supply in northwest Sumatra.



SURINAM

Ensuring supply to rural areas

In Surinam, the Dutch water company Waternet has been working together with colleagues from the Surinaamsche Waterleiding Maatschappij (SWM) since 1996, on the rehabilitation of the drinking water distribution network, the design of a new pumping station, and optimisation of the production plants. Furthermore, Waternet is exploring how to set up, maintain and manage a new water treatment plant in the rainforest, in close cooperation with the local inhabitants and non-governmental organisations like the National Women Association. In 2006, Waternet and the national government started looking into the possibilities of including the entire inlands of Surinam in the scope of the cooperation projects, thereby ensuring supply to rural areas.

TA'IZ, YEMEN

Reduce leakage and redistribute water in Yemen

On February 21st 2006 Vitens committed to an international project in Ta'iz, a city of 800,000 in Yemen, at the invitation of the Dutch embassy. Yemen is suffering from serious shortages of water, so losses due to leakage should be minimised at all costs. Water is being rationed and in some neighbourhoods people only get water once every three weeks. At the same time a relatively large part of the available water is used for the irrigation of nearby agricultural land. By reducing leakage losses and redistributing water Vitens wants to increase water allowances to once every six days. The Dutch water company is mainly offering management support. Total cost for the partnership will be 1,650,000 euros. The Dutch Minister for Development Cooperation will contribute 950,000 euros over three years. Vitens will contribute a project team, of which one member will be stationed in Ta'iz for three years. Apart from manpower, the government in Yemen will invest 200,000 euros in the partnership.

MASAI PEOPLE, KENYA

Take charge of their own water supply

The water company of the Dutch province of Drenthe (WMD) is currently working on the Water for the Masai Project in the south of Kenya. Most rivers in the region are dry for the majority of the year. Sometimes, even during the rainy season, there's not enough water or it's contaminated. The Masai and their cattle mostly rely on water wells. But many of those no longer work, as a result of poor maintenance or a lack of spare parts. From 1997 to 2003 the Water for the Masai Project rehabilitated over forty water wells. The project formula is yielding permanent benefits. The Masai pay 25 percent of the cost of diesel engines, pumps and water pipes, giving them responsibility and ownership of the equipment. The Water for the Masai Foundation pays the remaining 75 percent and expenses. As a result over 60,000 nomadic people and hundreds of thousands of cattle now have daily access to clean drinking water. A Masai association is currently being set up to ensure that the Masai are able to take charge of their own water supply.

