

Revolutionising wastewater treatment

Royal HaskoningDHV is active in urban and rural planning, transport, infrastructure, water, maritime, aviation, energy, mining and buildings. It is one of Europe's leading project management, engineering and consultancy service providers. Going beyond the classic consultancy model, Royal HaskoningDHV aims to support its clients in developing technology solutions. Nereda® wastewater treatment technology is a good example of this approach, explains Royal HaskoningDHV's Global Director for Water Products & Innovation, René Noppene. Nereda is an innovative wastewater treatment technology that uses the unique features of aerobic granular biomass. More cost-effective than traditional water treatment methods, Nereda plants are up to four times smaller than traditional installations, consume only half the energy and require no chemicals for the treatment process.

Royal Haskoning facts and figures

- Global consultancy, design, engineering, technology and project management service provider
- Leader in sustainability and innovation
- Nr 1 in the Netherlands in terms of number of staff
- Turnover around USD 1 Billion
- 7,000 experienced and specialised staff
- 100 offices in 35 countries

Royal HaskoningDHV was formed in 2012 through the merger of Royal Haskoning and DHV, two of the biggest engineering companies in the Netherlands. The merger instantly created one of Europe's leading project management, engineering and consultancy service providers. Mr. Noppene, who joined the company over 25 years ago, and who has served in various leadership positions, was appointed Global Director of Water Products & Innovation in 2012. He

explains. "In a classic consulting model, you offer your clients advice. But we found that our clients worldwide were more interested in actual solutions, rather than more advice. That is why we now go beyond classic consultancy and move more and more into products, design and build, and operation and maintenance activities. Our Nereda is a good example of this."

Working together within the Dutch National Nereda® Research Program (NNOP), the Delft University of Technology, the Dutch Foundation for Applied Water Research (STOWA), and several Dutch water boards, Royal HaskoningDHV has been involved in the research and development of Nereda over a 20-year period. Mr. Noppene emphasises that STOWA and the water boards were instrumental in developing the invention from the university into an applied technology for full-scale municipal wastewater treatment plants. It moved from the laboratory to pilot installations and demos, and culminated in 2011 in the opening of the world's first municipal plant in the Dutch city of Epe by Willem-Alexander, then Dutch Prince of Orange. Since then the number of Nereda plants and pilots has risen exponentially. Nereda plants are currently under construction or treating wastewater in the Netherlands, Portugal, Poland, South Africa, Brazil, the UK, Ireland, Australia and Switzerland. "The key advantages of Nereda include the fact that plants are four times more compact and significantly cheaper to construct. They also have lower operating costs because the process requires significantly less energy and no chemicals," says Mr. Noppene. He goes on to explain that for more than a century, sewage has been treated with bacteria that form flocs. In this water



treatment method, bacteria are mixed with oxygen to clean the wastewater. After the bacteria remove the polluting substances from sewage, these organisms are separated from the cleaned water in sedimentation tanks which require space and the bacteria must be pumped back from these tanks to keep repeating the process. This pumping process requires energy; pumps need regular maintenance and must be replaced when worn out. The secret of Nereda technology is that the purifying bacteria form unique granules instead of conventional flocs, which settle much faster and all the bacteriological processes take place simultaneously within the granule. This is radically different from the traditional method where the process takes place in various sections of the treatment plant and requires various reaction compartments. In the granules, aerobic, anoxic and anaerobic compartments are formed and as a result, different bacteria can do their job simultaneously, making the treatment plant more energy efficient and uncomplicated.

Earlier this year, the inventor of Nereda, Mark van Loosdrecht of Delft University of Technology, won the prestigious Spinoza Prize for his work. The Spinoza Prize is awarded by the Netherlands Organisation for Scientific Research (NWO) and is the highest scientific distinction in the Netherlands. Mr. Noppene emphasises that Nereda could not have become a reality without the efforts not just of the Dutch scientific community but also of several Dutch government organisations. "Nereda is the result of a uniquely successful public-private partnership; a partnership that makes the most out of the strengths of all the individual stakeholders, and a partnership that sets

an example for public-private partnerships worldwide." Royal HaskoningDHV is the owner of the Nereda patent, but has a royalty sharing agreement with its co-developers, he explains. "That way everybody wins." The consulting firm has developed proprietary software to support the operation and control of the Nereda plants. Its AQUASUITE® Nereda Controller is delivered, together with preloaded software configured for the specific WWTW, and installed on site by Royal HaskoningDHV alongside the conventional PLC/SCADA system. The AQUASUITE can be remotely monitored and tweaked by the plant operator and Royal HaskoningDHV via a secure on-line connection over the Internet. AQUASUITE is linked with an advanced data evaluation management system running at Royal HaskoningDHV where

plant data is automatically evaluated and used for process optimisation and early warnings. So the company develops the complete technology package necessary to erect a Nereda plant but will not build or operate the facilities itself. "We're a technology company and an engineering firm, but not a contractor," emphasises Mr.

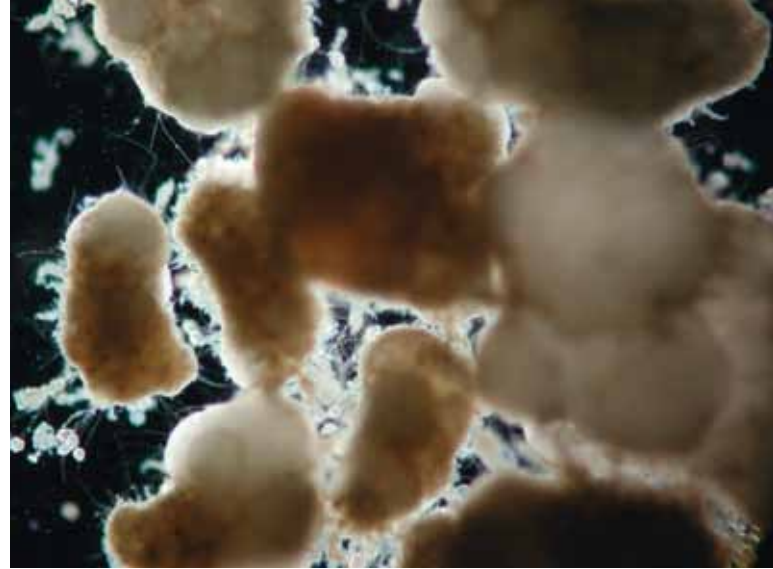


HRH Willem-Alexander of the Netherlands opened the world's first municipal Nereda® plant in the Dutch city of Epe. (Benno Wonink – Fotografie)

Noppeney. "We partner with strong contractors and operators around the world, such as Odebrecht, Wabag, and Imtech. The strength of such a premier partnership adds to the profile of our Nereda."

The local partners also help to win contracts for Nereda. In Australia, local Nereda partner Aquatec Maxcon was recently awarded a design and construct contract by Queensland's South Burnett Regional Council. The contract will see the upgrade of the Kingaroy wastewater treatment plant by September 2016. The plant upgrade to a design population of 12,500 is supported by 10 million Australian dollars in funding from the Queensland State Government and is expected to be completed by September 2016. It will provide the Kingaroy community with water which can also be re-used to irrigate sporting grounds in the area. It will also significantly improve the quality of effluent released from the plant, benefitting the local environment. Nereda technology was selected as a result of achieving both lower capital and operating costs than competing tenders.

Royal HaskoningDHV has also recently teamed up with VA TECH Wabag, one of the world's leading water technology companies. The two have signed a 10 year cooperation agreement to deliver Nereda wastewater treatment technology to India and Switzerland. India in particular is an interesting market for Royal HaskoningDHV as wastewater management has been given a high priority in the recently adopted India National Water Policy, underpinned by a multi-billion dollar government programme. "We are proud that we have joined forces with WABAG to enter the Indian and Swiss markets with our innovative Nereda technology. For us this is a major step forward, following the successful introduction of the technology in other markets such as Brazil, Australia, the UK and Ireland over the past two years," Mr. Noppeney states. He points out that Wabag has a close relationship with Odebrecht, one of the



largest construction and engineering firms in the world, and Royal HaskoningDHV's partner in Brazil. "We're building a global ecosystem of closely knit partners who can together speed up the adaptation of Nereda plants worldwide." Mr. Noppeney emphasises, however, that they are just as proud of smaller-scale Nereda partnerships such as that with EPS in Ireland, where the municipal Waste Water Treatment Plant at Clonakilty is currently being upgraded with Nereda technology.



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